

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

Status: Accepted

Date Accepted: 05/29/2015

I. Report Overview

1. Executive Summary

The Division of Agriculture Sciences and Natural Resources (DASNR) at Oklahoma State University has an integrated approach to research and extension programs. Over the past years the Oklahoma Agricultural Experiment Station (OAES) and the Oklahoma Cooperative Extension Service (OCES) have developed multidisciplinary Teams of research and extension faculty members working on priority research and extension needs. The teams are based on priorities identified by stakeholders, faculty and specialists. Our Planned Program areas as identified in our Plan of Work serve as overarching guides for the priority areas of research and extension. Each of the team activities is thus covered within one of the Planned Program areas. Each of the faculty members and specialists remains administratively connected to a disciplinary department or geographic region unit. However, each also plans and conducts research and/or extension program efforts in close collaboration with other individuals within at least one multidisciplinary team. Some significant research and/or extension efforts and developments during 2014 are presented following.

Sorghum is grown on 250,000-300,000 acres in Oklahoma. **Sugarcane aphid** "switched" to infesting sorghum, causing **significant yield losses in sorghum** in Texas, Louisiana, and Mississippi in 2013. Research conducted in 2013 indicated that currently registered products for aphid control in sorghum were ineffective. The discovery of this aphid in one Oklahoma county in 2013 prompted the Oklahoma Sorghum Growers to ask the OSU IPM coordinator and the Pesticide Education Program coordinator to support an emergency Section 18 registration for the use of sulfoxaflor to help control them. **In 2014, sugarcane aphid was found in 17 counties**, infesting a minimum of 10,000 acres statewide. Based on the results of the research/extension demonstration that evaluated impact on yield, an uncontrolled infestation of sugarcane aphid reduced yield by an average of 18 bushels per acre. Sulfoxaflor was applied to 10,000-12,000 acres of grain sorghum in 2014. Based on an extension demonstration coordinated by the IPM Crops Insect Pest Management Team, this emergency registration **saved Oklahoma sorghum growers between \$500,000 and \$700,000 in lost grain yield.**

The OSU Wheat Improvement Team saved Oklahoma wheat growers more than \$1.5 million in yield losses by screening winter wheat varieties for resistance to Hessian fly, resulting in the release of 5 new wheat varieties that contained partial or full resistance to Hessian fly. Small grains entomologists monitored emergence patterns for Hessian fly to evaluate additional management strategies. This work suggests that host plant resistance coupled with cultural controls will be the predominant method for Hessian fly management in Oklahoma.

Cattle sickness costs the beef cattle industry millions of dollars each year. These losses negatively impact producer profitability and they impact each and every level of the beef production chain. In order to facilitate the adoption of best management practices that should result in reduced sickness, a number of value enhancement programs are available. A leading program in the state of Oklahoma is the **Oklahoma Quality Beef Network (OQBN)**, which was initially developed by OSU Extension in 2001 and redefined in 2009. The objective is to add value to Oklahoma's calf crop and capture at least part of the added value. OQBN held 8 sales for verified cattle in Oklahoma throughout 2014 with 6,454 calves enrolled representing 103 producers. Analysis of data collected at the 8 auctions shows the average price premium (for a 600 lb. calf) was \$119.94/animal. Considering added gain and expenses attributed to the preconditioning, the **net profit to producers is \$170.99/animal or \$1,103,569 in net revenue total for all**

OQBN producers in the state of Oklahoma.

OSU Extension specialists train **small farmers in food safety practices and Good Agricultural Practices (GAP)** to improve safety and open up new markets. Underserved new and beginning producers of horticultural food crops have traditionally been difficult to contact due to the diverse locations and types of crops that they are growing. Because of this, the flow of information to these farmers has been limited. Basic information related to crop production is critical for these farms; both information and training in food safety is vital in allowing them to successfully expand their market opportunities. This project was originally started in 2012 and continued through 2014. Work in 2014 focused on creating a food safety program for a group of farmers including the Hmong in eastern Oklahoma. A training workshop in basic GAP was held in conjunction with a regional grocery store chain. A cooperative program was established among the **Hmong growers** and a common packing shed was constructed. OSU personnel assisted in the process of obtaining 3rd-party GAP certification for the cooperative packing operation. As a result, **over 30 growers were able to participate in an organized program of delivering fresh and minimally-processed produce to a regional grocery store chain.**

OSU research and extension specialists develop protocol for **wheat producers to fight Italian ryegrass** in their fields that could save them more than \$20 per acre. Herbicide resistant weeds cost U.S. farmers \$2 billion annually and 60 million acres are infested. Weed control represents a significant expense for farmers, but increased yields associated with controlling weeds generally far exceed the herbicide cost. When farmers rely too heavily on one herbicide chemistry or mode of action there is potential to select for herbicide-resistant weed populations. If farmers are aware of herbicide-resistant weeds in their fields, they can rotate crops, herbicide mode of action, or implement hand weeding to control the problem before it grows too large. If farmers are unaware of the presence of herbicide-resistant weeds, the return on their herbicide investment and grain yields will be greatly reduced. Oklahoma farmers sow 5.3 million acres of wheat annually, and grassy weeds, such as Italian ryegrass, significantly limit wheat grain yield and marketability. Acetolactate synthase inhibiting herbicides (ALS) are the most popular herbicides for Oklahoma wheat farmers, but it is estimated that at least 50% of Italian ryegrass in Oklahoma wheat fields is ALS resistant. In 2014 the **Oklahoma State University Weed Science Extension Program provided a free herbicide resistance diagnostic service to producers.** Approximately 50% of Italian ryegrass populations sampled in OK were found to be ALS-resistant. Herbicide cost to control non-resistant Italian ryegrass is approximately \$8.25 per acre; however, this cost jumps to \$28.80 per acre if the Italian-ryegrass is ALS resistant. It is estimated that at least 900,000 acres of wheat are impacted by Italian ryegrass in Oklahoma. Research has shown that, untreated, Italian ryegrass reduces wheat yield by 12 bushels per acre. The goal of this program is to help producers identify herbicide-resistant populations the first year they are experienced and offer alternative management solutions. **Prevention of herbicide resistance through as little as 20 minutes of hand weeding** or spot application of a nonselective herbicide can prevent a small resistant population from growing out of control in a farm, state, or region - **saving Oklahoma wheat farmers** as much as \$18,000,000 annually.

OSU Extension specialists provided **technical expertise to help 7-Eleven convenience store chain expand product manufacture.** 7-Eleven is a well-established convenience store chain with 110 locations across central Oklahoma. Over the years, 7-Eleven has expanded their line of food products. Robust sales of snack foods led to the construction and operation of the very successful 7th Heaven Bakeries® that serves their convenience stores. The OSU Food and Agricultural Product Center (FAPC) was heavily involved in the development and startup of the bakery. Recently, 7-Eleven has decided to move into the sandwich business by building and operating a sandwich commissary. They approached specialists from the FAPC to discuss potential project needs and issues, especially regarding shelf-life, sanitation, and food safety. Assistance was provided through team and individual response over a period of twelve months and included: product safety plans, quality plans, equipment and process recommendations, facility design, cleaning recommendations, labeling, formulation suggestions, and more. **7-Eleven is planning the construction of a new 9,000 square foot commissary facility** in 2015. The facility will manufacture and distribute sandwiches to 7-Eleven facilities across Central Oklahoma and **will employ approximately 20 persons (new positions)** and generate significant new tax revenue.

Listeria monocytogenes is an important pathogen of ready-to-eat (RTE) foods, especially meat

products (i.e., hotdogs, luncheon deli meats, etc.). *L. monocytogenes* is **responsible for ~2,500 illnesses per year** (~25% fatality rate) and numerous recalls of ready-to-eat meats annually. The bacterium is a contaminant of raw meat ingredients used in the manufacture of processed meats and because of its ability to form biofilms; it is a persistent contaminant in meat processing plants. RTE meat products are prone to be contaminated if it is present in the post-process areas and the significance stems from the fact that consumers do not always re-heat or cook RTE meats. *L. monocytogenes*' involvement with outbreaks, illnesses, and deaths from contaminated cantaloupe has also prompted a closer look at its presence on vegetables and produce. OSU researchers have investigated the molecular basis of adherence in *L. monocytogenes* using liquid chromatography-mass spectrometry (Orbitrap). They compared 5 methods of extracting proteins from the surface of *L. monocytogenes*. One method of extracting surface proteins was selected as better (UB-Ghost) and used for further studies in comparing the proteins isolated from the surface of strongly-adherent strains of *L. monocytogenes* with those of weakly-adherent strains. Researchers also examined the proteins from the surface of adhered cells (i.e., attached to beads) with those in solution (i.e., planktonic cells). Differences were found that identified select proteins as involved with attachment. The project resulted in the advanced training of one graduate student. In addition, **information on the molecular basis of attachment of *L. monocytogenes* may allow unique interventions to prevent adherence and reduce biofilms in food processing facilities.** Oklahoma home gardeners are interested in applying Integrated Pest Management (IPM) principles to their yard, garden and landscape; however, they often have limited knowledge of what tactics are available, and how they can apply them. In 2014, the IPM team developed and delivered an **Advanced IPM Workshop for Master Gardeners**. 54 Master Gardeners received 12 hours of training that included information on Scouting, Diagnosing problems, Cultural, Biological, Mechanical and Chemical Controls. Participants evaluated the program using a pre and a post-test to capture Knowledge, Attitudes and Skills changes of the participants with a (Likert Scale: 1=Very High, 5 = Very low). On average, **participants increased their Understanding of IPM** (Before 2.85, After 4.13), and had a **positive attitude change towards using IPM** (3.13 Before, 3.69 After). They also increased their **confidence about using and applying and teaching IPM principles (Skills Change) to their clientele** (2.42 Before, 3.64 After).

The **red imported fire ant (RIFA)** was recorded in parts of Oklahoma as early as 1985, and has since been found at one time or another in 42 Oklahoma counties - 20 of which are federally quarantined. Distribution of RIFA occurrence in Oklahoma is disjunct, most likely due to variable climate and continual artificial movement of hay and nursery materials. An area wide RIFA management project was funded through 2007 that included release of two fire ant decapitating flies (*Pseudacteon tricuspidis* and *P. curvatus*) as well as an evaluation of fire ant baits. Since red imported fire ant has been establishing in additional counties, it is important to provide updated information on fire ant management. *Pseudacteon tricuspidis* was released in two counties and *P. curvatus* was released in four counties. However, establishment was confirmed only in two counties. OSU researchers conducted a summer-long survey in 2014 for phorid flies in seven counties. ***Pseudacteon curvatus* was captured in five of the seven counties surveyed. This survey documents that phorid flies have established and spread from their original release sites.**

OSU researchers test different means to **reduce cattle death loss due to frothy bloat**. Frothy bloat of growing cattle grazing wheat pasture is a major herd health problem. While not a true bloat-preventive compound, monensin has been shown to decrease the incidence and severity of bloat of wheat pasture cattle in very intensive studies with small numbers of cattle. OSU researchers have conducted a 2-year study relative to the effect of monensin on the incidence and severity of bloat in large scale grazing trials with about 200 cattle/year. Method of delivery of monensin was different between years, and monensin consumption averaged 200 and 81 mg/animal/day. Despite the large difference in monensin consumption between years the incidence and severity of bloat was decreased both years by provision of monensin. **Provision of monensin to growing cattle on wheat pasture is an efficacious means of decreasing cattle death losses due to bloat**, and has huge potential to increase profitability of the approximately 4.5 million stocker cattle that are grown each year on wheat pasture in the southern Great Plains.

OSU research and extension specialists show **new means to control rescuegrass with 70-90% efficacy** -potentially saving an average wheat producer thousands of dollars. Currently, no conventional post-emergence herbicide treatment approaches are capable of controlling rescuegrass (*Bromus catharticus*) with only a few herbicides showing suppressive impact at low to moderate levels. Ongoing OSU research and extension efforts are documenting the effectiveness and impact of pre-plant or pre-emerge herbicide application in wheat production systems for rescuegrass control. Rescuegrass, a brome grass, is a particularly difficult weed to control in wheat production systems. Two current herbicides evaluated in the past few years, used alone or in tank mix combinations, have suppressive efficacy ratings of 70-90% utilizing a pre-plant or pre-emergence application method. They are Olympus™ and PrePare®. Approximately 800 producers have been reached through two multi-state crops conferences and numerous local and area crops meetings and tours where this application approach was demonstrated. **Evaluations conducted at two crops conferences**, where data from these field trials were part of the program, **indicated that 43% and 32% of producers expected to make at least minimal changes in their production systems** related to information presented at the meetings. The evaluation further showed that the **average dollar value of impact for individuals attending these meetings was approximately \$5,500 each.**

Oklahoma Extension and research specialists **help producers "catch up" with national no till movement to increase profits and save soil.** No-till crop production systems are an accepted practice to minimize soil erosion. While no-till acreage in Oklahoma is increasing, the state lags the national trend by about 10 years. Two primary items have slowed no-till adoption in Oklahoma. The first is grazing of winter wheat, either in graze out or dual purpose production systems and the second is the adoption of rotational crops. OSU Specialists have worked to establish Oklahoma State University as a leader in the tillage/cropping systems area. A conference has been conducted annually since 2008. The planning committee consists of producers, educators, government agency personnel, and industry representatives. Conference topics focus on issues related to reducing tillage operations in crop production systems specific to the Southern Great Plains. The 2-day conference is typically attended by more than 200 producers, educators, advisors, and policy makers. Producers were surveyed at the 2014 conference regarding their farm size, percent of farm in no-till, and their perceived value of the conference. There were almost 150,000 no-till acres represented at the conference and the average value placed on the information by the attendees was \$13.25 per acre. While there was certainly variation in responses, the **total value of the conference based on the attendees' perception was estimated to be between \$1 million and \$2 million.** In addition, research shows that **no-till reduces erosion on average by 2.25 tons per acre per year**, thus the **attendees represent an annual reduction in erosion of approximately 335 thousand tons.**

OSU researchers show producers how to modify pecan production to **improve pecan quality and profits.** Certain thin-shelled pecan cultivars tend to split at the shell suture when harvested early in the season. When harvested later in the season suture splits are infrequent. Early season harvest is desirable because pecan demand and prices are highest at the start of the season. OSU researchers demonstrated that suture split was related to high kernel moisture nuts being exposed to high solar radiation when shaken from the tree in preparation for harvest. Up to 10% of the harvested nuts had split sutures, a condition substantially reducing nut value. If high moisture nuts were harvested on cloudy days or shaken in the evening and harvested the next morning split sutures were reduced to less than 2%. **Based on current pecan prices** this modification in harvest procedures **represents a savings of about \$100 to \$220/acre for cultivars subject to suture split.**

Oklahoma Cooperative Extension trained and directed Master Gardeners make a big difference in their communities. Oklahoma Master Gardeners are trained, supervised and recruited to: 1) help provide one-on-one service to the non-commercial horticulture clientele in the county, 2) provide group learning and teaching activities for non-commercial clientele, and 3) form a group of Extension volunteers to support additional consumer horticulture efforts. Trainees participate in a 10 - 13 week course receiving between 40 - 56 hours of course work. Upon completion of the training period, satisfactorily passing an exam on materials and topics covered, and donating between 40 - 56 hours of volunteer time to the Horticulture program, the trainees are certified and awarded the title of Oklahoma Master Gardener.

Examples of Master Gardener Volunteer activities include: staffing plant clinics to answer phone and walk-in questions, manning educational exhibits, maintaining demonstration gardens, community beautification projects, serving as 4-H horticulture leaders, speaking at club/civic meetings, teaching horticulture activities at nursing homes, and appearing on TV and radio. **Close to 1,209 active Master Gardeners volunteered their time, contributing over \$1,678,418 in service time donated.** In addition to the many hours donated, **approximately 1,200 pounds of produce was donated to local food pantries/kitchens, shelters,** and other organizations throughout Oklahoma by the Master Gardeners.

Extension Specialists at **OSU's Food and Agricultural Product Center (FAPC) assisted food processor in planning a grant application to double their plant size and add 10-20 new employees.** Granna's LLC is an established food company located in Bessie that the FAPC has been working with since 2003. Granna's makes and packages nutritious frozen meals and entrees for sale to nursing homes and institutional clients or direct home delivery. Due to steady growth, good management, and market opportunity, Granna's is planning to more than double their production capacity. They have been working with the city of Frederick to plan the transformation of an existing National Guard Facility into a food processing plant. A team has been assembled to help Granna's expand. Members include an OCES Applications Engineer; the City of Frederick; OCES FAPC Project Lead; and an OCES FAPC Engineer. OCES FAPC personnel contributed in four main areas: (1) developed a list of process and utility equipment needed; (2) drew a layout of the facility showing changes and improvements required; (3) put together a spreadsheet to estimate the cost of the new equipment and facility improvements; and, (4) assisted with the process of collecting information for a USDA Rural Development grant. **The facility remodeling and construction process (20,000+ sq. ft. total) is slated for 2015. Once the new plant is in operation, it is expected to generate from 10 to 20 new jobs and a significant tax income.**

Oklahoma Extension **trains small businesses and entrepreneurs to better utilize e-commerce to improve product sales.** Small businesses in rural areas tend to struggle to establish a market presence and compete in today's economy. During 2014, the Oklahoma State University e-commerce program provided ten different training sessions to **105 small businesses** on how to plan, effectively set up, and promote their websites. Response to each of these different workshops has been extremely positive. **After the training, 92% of respondents planned on increasing their web efforts, and 93% indicated that they would be changing the way they marketed their website.** Anecdotal evidence suggests that the improved advertising offered by a website can increase small business sales anywhere from 20% to over 200%. With average sales of \$150,000 (which was the average displayed in a small business report by Mississippi State in 2007) this **implies that the e-commerce program increased the revenue of small businesses in Oklahoma** by between \$2.3M and \$23.0M during 2014.

In 2014, OCES Educators conducted 209 programs using various curricula with 3,400 individuals across Oklahoma. Programs presented include: **"Making Sense of Money Management"** classes are offered as an alternative to having bogus check charges filed in district court. Program evaluations show **77% plan to regularly track their income and spending, while 46% plan to have an emergency savings fund equal to at least three months' pay.** **"Money Habitudes"** cards are a fun, easy tool for participants to talk about money and understand their money personality type. **"Money Habitudes" help individuals understand their money personality and spending habits.** As a result, **79% plan to regularly track their income and spending, while 51% plan to have an emergency savings fund equal to at least three months' pay.**

OSU Cooperative Extension specialists **help rural hospitals meet their Community Health Needs Assessment (CHNA) requirements.** The Community Health Needs Assessment (CHNA) is required for all nonprofit hospitals by the Affordable Care Act of 2010. Penalties for non-compliance are assessed through the IRS. The process developed by OCES meets this requirement and also provides a forum for a discussion on health between the hospital and community. OCES, in conjunction with the Oklahoma Office of Rural Health, **led 7 communities through a facilitation process focused on community-level health in 2014.** A total of 21 community meetings were held during the year, with more than 300 individual participants, specifically for the CHNA process. The CHNA process is offered at no cost to all facilities. Private-market vendors exist offering to meet the same needs, but their costs and products vary significantly some between \$10,000 and \$20,000. Other states (Kansas and Kentucky) with similar

collaborations among state agencies and resources charge between \$5,000 and \$7,000 per community. Therefore, if the average of \$6,000 per community were applied, a **total value of \$42,000** could be assumed in 2014 alone. Success stories emerged after the process was completed in several communities that participated. The success stories included a **pilot program on grief counseling, discussing poison education with local elementary schools, and diabetes education via lunch seminars.**

The OSU **Roadside Vegetative Management** team annually **trains over 630 Oklahoma Department of Transportation employees in BMPs and IPM.** Each employee trained (100%) has adopted at least one (and often several more) of the BMP and IPM techniques. These improved management techniques were taught in 2014 through three initial pesticide applicator certification schools (78 attendees), three annual herbicide sprayer calibration workshops (70 attendees) and 14 annual continuing education workshops (637 attendees). There is no single practice or always a ridged set of practices to solve any given problem. ODOT uses an integrated vegetation selection, mowing and herbicide application program to **manage the 240,000 acres of right of way.** Each ODOT employee engaged in roadside management is using at the minimum at least one integrated practice. Adoption of BMPs and IPM techniques coupled with integration of the latest research results into product bid specifications followed by competitive bid process **results annually in a savings of over \$120,000** in ODOT roadside vegetation maintenance costs.

In 2014, 250 turfgrass industry professionals attended the annual **Oklahoma Turfgrass Conference and Trade Show.** Another **1,360 attended** 13 turf and pest management sessions offered by various Turfgrass team members around the state. Over 6,000 professionals receive one-on-one consultations primarily through post-conference oral consultation, email, phone, US mail and site visits each year. Recent surveys following yearly education sessions to professional Turfgrass managers have revealed that 94% of attendees are employing techniques that are Best Management Practices. These practices can involve use of newer or best adapted cultivars/species, soil-test based fertility programs, selection of proper mowing and irrigation regimes as well as regular pest scouting and use of economic thresholds concerning treat or no treat decisions. **Use of BMPs and IPM helps reduce un-necessary pesticide and reduce over use of fertilizers and irrigation, yield an acceptable Turfgrass stand at an affordable/acceptable cost.**

The O.S.U. **Inventor's Assistance Service (IAS)** provides preliminary market analysis and patent reports to inventors. These reports describe current competing products as well as existing patents that may be similar to the patent proposed by the inventors. Inventors are encouraged to use the information in these patents and information about competing products to improve their proposed inventions and make sure that they have sufficient differentiation to potentially make patenting their proposed invention viable and potentially profitable. IAS also offers on-line modules that inventors can complete to improve their ability to evaluate the potential for their own ideas. In addition, 15 to 20 percent of the inventions receive additional assistance with drawings, prototyping and marketing. For fiscal 2014, the inventor's assistance service received **63 applications for assistance** and referred 13 for further development. We estimate **cost avoidance impacts of \$600,000** that is created if, based on our reports, inventors do not attempt to patent or market ideas for which there would be the potential for patent infringement. Companies that **received additional assistance are reporting impacts of approximately \$140,000** (some are in ranges and will depend on actual sales).

Oklahoma Cooperative Extension Service provides the **Community Nutrition Education Programs (CNEP), a voluntary program for adults participating in federal food assistance programs as well as impoverished youth in qualifying schools and communities.** Program participants learn to feed their families in order to promote good health and to plan and budget their food dollars so their family will not go hungry at the end of the month. CNEP also educates Oklahoma youth on healthy food choices, safe food practices and physical activity with the purpose of reducing obesity and the associated risk of related chronic diseases. In FY14, CNEP had a positive impact on the health and wellness of **3,054 low-income Oklahoma families.** More than **94% of adult graduates demonstrate a positive change towards a healthy diet.** In addition, **39% of graduates less often ran out of food by the end of the month and 41% report that their children ate breakfast more often.** In addition, CNEP staff provided a total of 3,176 hours of nutrition information on healthy eating practices, **food preparation and food safety to**

16,841 qualifying Oklahoma youth during the 2014 fiscal year. And over 83% of the youth increased their knowledge or ability to choose healthy foods and 30% increased their frequency of fruit consumption.

The Oklahoma Manufacturing Alliance (OMA) and Oklahoma State University New Product Development Center (NPDC) jointly became National Institute of Standards and Technology (NIST) engagement-competitive award recipients (E-CAR). Through the E-CAR program, **NPDC design engineers assisted manufacturers in developing proposals for state and federal funding, helped with the introduction of new products and provided process innovation support for small manufacturing companies** in Oklahoma. They helped revolutionize productions and processes to keep manufacturers competitive in the marketplace. According to the Impact Accounting System of OMA, the E-CAR grant created and improved 79 projects; 64 companies were positively affected by E-CAR. The program created 117 jobs and retained 90 jobs. Additionally, the grant **generated capital investment of more than \$3.3 million and avoided unnecessary investments by more than \$6.8 million.** The program also resulted in a **change in sales of more than \$34 million and retention of sales of \$31 million.**

OSU Extension specialists helped **create and train members of 21 Prescribed Burn Associations (PBA)** in Oklahoma covering 37 counties with over 400 members. Prescribed burns help landowners **destroy invasive species and improve the land for grazing and wildlife habitat.** The OK PBAs **conducted 303 burns on at least 168,000 acres.** OSU extension conducted 10 hands-on training workshops across the state with over 500 attendees. The online training has been very successful with 281 people enrolled in the course from over 15 states. Extension specialists are continually updating the information and trying to make it user friendly to other states. The OK NRCS has adopted it for their basic training for employees and we are working with the NRCS at the national level to make it the introductory training for all NRCS employees. The **eXtension Prescribed Fire CoP has 68 fire related articles and 58 Frequently Asked Questions on its site.** There have been numerous ask the expert questions answered by its members. The latest developments include the availability of prescribed fire liability insurance, an FCC license for a statewide radio frequency for use by OPBA and its member PBAs, development of OPBAs website (ok-pba.org), and the **purchase of 8 prescribed burn trailers for PBAs.** They have safely conducted **1,100 burns on a half million acres in the past 15 years.**

Switchgrass, a plant native to Oklahoma, has been deemed one of the best options as a sustainable feedstock to support a biorefinery. Switchgrass, other native perennial grasses and annual forage species can be grown on marginal soils for producing large amounts of feedstocks in Oklahoma. Switchgrass (*Panicum virgatum* L.) is a naturally allogamous species. However, **efficient and reliable bagging methods are unavailable for inbred development.** Four northern lowland (NL) inbreds, four NL non-inbreds, two southern lowland (SL) non-inbreds, and 16 upland-lowland (interecotypic) F1 hybrids were self-pollinated by enclosing their inflorescences in polyester bags in the field, and on 14 F1 interecotypic hybrid plants potted in a greenhouse. The reliability of the bags was determined using 8-10 SSR markers that distinguished the genetic parentage of the pollen. Contaminants were identified in two groups: outcrossing contaminants (OCs) and physical contaminants (PCs) based on amplified alleles of progeny and their seed parents. Of 39 polyester bags tested in 2012 in the field, **35 bags showed 100 % selfed progeny**, four showed PCs and no OCs were identified. Similarly, of 61 bags tested in 2013 in two field plots, **50 bags produced 100% selfed progeny**, while four bags produced OCs, five produced PCs and the other two produced both OCs and PCs. No contaminants were identified from the progeny of 18 bags used in the greenhouse, suggesting that high wind speed, physical damage or handling errors may have resulted in the contaminations of bagged progeny in the field. The result of this experiment establishes **the increased reliability of the polyester bagging method over previously tested methods for selfing switchgrass under field and greenhouse conditions.** Additionally, the S1, S2 and S3 inbreds produced in this study will contribute to **developing completely or near completely homozygous inbred lines in the future.**

The Oklahoma Register **Poultry Feeding Operations Act requires all poultry farmers and litter applicators** to attend 9 hours of **educational training, conducted by the Oklahoma Cooperative Extension Service**, in the first year of operation, and an additional 2 hours of training annually until a total

of 19 hours of training have been earned. Following the initial 19 hours of training, operators and applicators must attend two hours of training every three years. Training must include environmental processes relevant to maintaining water quality, proper manure handling techniques, nutrient management and record keeping, and relevant laws and rules relevant to poultry waste management. Since 1998, **2,700 people have completed the initial nine hours of required training. In 2014, 55 new producers completed the initial nine hours of training, and 599 completed an additional 2 hours of training.** New subject matter developed in 2014 included a new resource manual "Record Keeping for Poultry Litter Applicators" designed to assist applicators with the record keeping process. This comprehensive tool included blank record forms, calculation spreadsheets, maps, regulatory information and nutrient management fact sheets in one easy to use resource. **One hundred percent of initial nine hour attendees surveyed said the information they had learned would help them in their daily operations,** with 88% strongly agreeing with the statement. Of 272 surveyed at continuing education classes, **over 80% said they had improved waste handling practices, remained in compliance with regulations, and improved the efficiency of their operation as a result of poultry waste management education classes. Seventy-eight percent had implemented a new technology or practice, and 46% of those surveyed transferred litter out of nutrient sensitive watersheds.** Essential elements are critical to effective youth development programs. These elements help youth become competent, contributing citizens. Created from **traditional and applied research characteristics that contribute to positive youth development, they help professionals and volunteers who work with youth view the whole young person, rather than focus on a single aspect of life or development.** These elements focus on social, physical, and emotional well-being which are necessary for positive youth development. **All eight elements are present in a healthy 4-H club.** Oklahoma 4-H requires that all clubs be chartered and that as a charter there are specific standards, which need to be met annually for a charter to be renewed. This is one means for our system to insure clubs are safe and healthy environments where youth want to participate. Approximately 153 of the **820 chartered clubs** are project clubs.

The Oklahoma **4-H Outdoor Adventure Program** is an outdoor leadership program for teens intended to develop character and integrity in young people through the teaching of teamwork, leadership, and outdoor skills and allows them to share their knowledge with others. By experiencing the **challenge of the out-of-doors, participants grow personally, developing an understanding of themselves and their limitations while instilling a new respect for the natural environment.** The highpoint of the program is a 5-day canoe camping experience to the Buffalo National River in Arkansas.

The fall OSU **Farm and Business Tax Institutes** and the summer OSU Tax Clinic allow **a tax preparer to get the full 40 hours of CPE/CLE as required by state.** Topics covered range from presentation of new tax laws and their implications, agricultural issues, business issues, tax planning opportunities, professional ethics, retirement, and social security to name a few. Twelve two day sessions are conducted each year with two of these in the summer and ten in the fall and two one day special topics courses. **In 2014 1,900 tax preparers attended - 46% certified public accountants, 27% tax preparers and bookkeepers, 10% enrolled educators, 2% attorneys, and the remaining 15% from a variety of backgrounds (including farmers).** These tax preparers **file roughly 80 percent of the farm returns for taxpayers in the state of Oklahoma.** High quality, professional instruction is provided to make continuing education credit available for Certified Public Accountants, Enrolled Agents, and Tax Attorneys. **Participants filed more than 37,645 Federal farm tax returns and 255,428 Federal non-farm tax returns as reported by the participants in the most recent program evaluations.**

OSU specialists from Animal Science and Agricultural Economics developed a comprehensive educational program in cooperation with others in Animal Science, Plant and Soil Science, Vet Med, Biosystems and Ag Engineering. The OSU **Master Cattleman Program** was launched in 2004 with the objective of enhancing the profitability of beef operations and the quality of life of beef producers by equipping them with vital information on many aspects of beef production, business planning, risk management and marketing. The educational curriculum is based on the **Oklahoma Beef Cattle Manual.** Producers must complete four hours in each of six subject matter areas plus an additional four hours of instruction or special projects for a total of **28 hours of instruction.** Local Extension educators plan and organize the

Master Cattleman educational series and select the specific curriculum offered. Approximately 1,016 farmers and ranchers enrolled in the Master Cattleman program since 2004 and, to date, **815 have completed the program**. In program evaluation surveys, graduates estimate annual improvement in their cattle operation's profitability at approximately \$3,500. With an average of 81 producers graduating per year, the **impact is approximately \$280,000 each year for 10 years for a total impact of \$2.8 million over the program's history** if the increase is a one-time event. Arguably, the **\$3,500 impact per producer could be in perpetuity** for the individual operation, resulting in a much bigger impact. On average, graduates indicate that they use the Beef Cattle Manual at least once monthly. Approximately **9,000 manuals have been distributed**.

Quicken is software that is user-friendly, widely available, and inexpensive and can be **adapted for farm use** where only cash records are required. OSU Extension **Specialists updated a Quicken instruction manual and developed a quarterly newsletter for past workshop participants** and notebook purchasers. Approximately 1,300 individuals are receiving financial information via the newsletter. Team members are also responding to phone, mail, and email requests for assistance and/or support. Extension educators who participated in a fall 2014 in-service training estimated the economic benefits (reduction in tax preparation charges, value in supporting decisions, etc.) from workshop participation at \$500 per person. This estimate is perhaps conservative given estimated bookkeeping cost savings of \$35-50 per month plus \$100 per hour for tax preparation as noted by professional tax preparers. Assuming that 75 in-state workshop participants and one-quarter of the 1,300 website users gained a \$500 benefit, the **economic impact exceeded \$187,500 for 2014**. Arguably, this estimate is conservative in that savings would also be derived in future years through the life of the business--once skills are gained, they are likely to continue to be applied.

Oklahoma Cooperative Extension Service programs are committed to the physical, mental and emotional health of our nation's youth so they may lead healthy and productive lives into and throughout adulthood. In order to advance the socio-economic development of the state, and have an impact on issues that address **childhood obesity**, educational programs have been created and implemented to educate Oklahomans on how to **attain a better quality of life related to the critical areas of food, nutrition, and health**. In 2014, 460 programs were presented to **22,927 participants**. **Oklahoma youth attended programs through 15 different curriculums**. Programs presented include: "OrganWise Guys" program in which based on 582 pre-posttests, **improvements were reported among participating Oklahoman youth in the areas of increasing servings of fruit and vegetables, skim milk and physically activity**. Youth also reported **decreased consumption of sweets, fat eaten and less screen time which can play a role in reducing overweight and risk of related chronic diseases**. "Growing Strong Bodies and Minds" aims to promote the development of healthful food preferences, physically active lifestyles and literacy skills in young children. Specific goals include: use of pre-reading and reading strategies to teach nutrition and health messages; promote consumption of whole grains, fruits, vegetables, low-fat dairy foods, and increase time spent in active play; and support parents of young children in offering economical, nutrient dense foods to their children and increasing time spent in active play. 2,148 youth across the state participated in this program.

Oklahoma State University 4-H Youth Development was a key partner in the development of **ATV Ride Safe Oklahoma**. This joint initiative is led by Oklahoma State University Cooperative Extension Service 4-H Youth Development, The Children's Center, and Trauma One Injury Prevention at OU Medical Center. The goal is to provide **safety education and injury prevention information as related to all-terrain vehicles (ATVs)**. In 2014 OSU Extension Educators reached **2,654 youth with two or more hours of classroom ATV safety education, 1,137 youth completed the ATV Safety Institute's online "ATV Safety E-Course"**, 500 plus youth completed the national 4-H Treadsylvania ATV Safety online educational game and **116 youth received their ATV Safety Institute RiderCourse Certification by completing the 4-5 hour hands-on ATV Safety Institute RiderCourse** program taught by our OSU licensed ATV Instructors. Oklahoma had 11 4-H youth participate in the 2014 National ATV Safety PSA "Do the Ride Thing Contest" receiving two of the nine national awards.

Oklahoma State University entomologists and area agronomists showed **canola producers how to save up to \$3.7 million by reducing insecticide applications using an integrated pest management (IPM)**

program for aphid control.

OSU Applications Engineers provide technical assistance that **helped Oklahoma manufacturers create or retain 79 jobs and increase sales over \$6 million in 2014**. Of the over 5000 manufacturers in Oklahoma, approximately half are located in rural areas and are extremely important to their local economies. These rural manufacturers face particular difficulty in getting relevant and usable information and technical assistance that will keep them abreast of the rapid changes in manufacturing technology. To address the difficulties faced by our small- to medium-sized rural manufacturers, OSU Cooperative Extension **provides technical assistance through the Applications Engineering Program**. The impact of this program is measured in several ways. One is the economic value of the service to the company as reported by the client. Another measure is the number of jobs created or retained. Both impacts are measured by an independent survey of the client. In 2014, the Applications Engineers client projects had the following impacts: **Sales increase \$6,184,500; Sales retained** that would have otherwise been lost **\$1,540,000; Cost savings \$644,400; Costs avoided \$1,536,472; 37 new jobs created** at \$75,511 per job for \$2,793,907; **42 jobs retained** at \$75,511 per job for \$3,171,462; Investment in new plant facilities and equipment in amount of \$2,542,999; for a total impact of \$18,413,740.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	245.5	0.0	85.0	0.0
Actual	268.0	0.0	82.7	0.0

II. Merit Review Process

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

- Internal University Panel
- Combined External and Internal University Panel
- Expert Peer Review
- Other (Administrative Review)

2. Brief Explanation

All OAES/OCES teams are required to have a team plan of work which is reviewed by team members, the administrative leaders, and the appropriate OAES/OCES assistant and associate directors. All team plans of work are reviewed with respect to relevance, the Division Strategic Plan, stakeholder input, and team competitive advantage. All individual OCES plans of work developed by county, area, district and state program professionals are reviewed in reference to quality and relevance by at least two individuals with program and/or administrative responsibility pertinent to the individual's program area. The reviewers assess the merit of the program plans of work with respect to issues, needs, and the problems identified through stakeholder input, quantity of effort planned in relation to appointment, and plans to evaluate and report program quality and impact. County plans are reviewed by the appropriate district subject matter specialist, district director, and state program leader (when appropriate). Area and district specialist plans are reviewed by the district director, and the subject matter department head. State specialist plans are reviewed by the appropriate department head and/or the appropriate assistant director/state program leader.

III. Stakeholder Input

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

- Use of media to announce public meetings and listening sessions
- 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
- Targeted invitation to selected individuals from general public
- Survey of traditional stakeholder groups
- Survey of traditional stakeholder individuals
- Survey of the general public
- Survey specifically with non-traditional individuals
- Survey of selected individuals from the general public
- Other (Professional journals, meetings, etc.)

Brief explanation.

A broad array of actions was used to encourage stakeholder input. Personal invitation and public notice are regularly used in Extension Program Advisory Committees as well as when we seek input to experiment station projects. Most all statewide and unit advisory groups are notified through direct contact. Several programs have targeted nontraditional stakeholder participation including sustainable agriculture, agribiosecurity, water, wildlife, youth, human health, Spanish speaking audiences, Native American tribes, etc. Numerous Native American tribal leaders have been invited to state and district discussions. Farm commodity groups regularly are invited to campus and we attend most of their meetings in order to hear input. A few of our advisory groups are statutory in nature such as our Food and Agriculture Products Center advisory group. In 2014, the new Vice President for Agriculture and Natural Resources held numerous town meetings around the state. He conducted these forums in Enid, Woodward, Guymon, Goodwell, Claremore, Miami, Shawnee, Antlers, Broken Bow, Idabel, Ft. Reno, Tipton and Altus. In the process he met with hundreds of producers, land owners, commodity reps, farm groups, ag lenders, public officials, business leaders, and other citizens. These served as an introduction to the state as well as a source of input to the direction of the Division for the years ahead.

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
- Use External Focus Groups
- Open Listening Sessions
- Needs Assessments
- Use Surveys
- Other (public meetings in various locales)

Brief explanation.

Every County CES office holds 2-4 program advisory meetings annually. OCES and OAES also meet with numerous boards, commissions, associations, public agencies, departmental advisory committees, special needs groups, consumers, school leaders, government officials, individuals, and, each year. See section 2(b) of this state report to get a partial list of groups providing input. During 2014, the Oklahoma Cooperative Extension Service continued to support multicultural and community engagement efforts through a project called Build an Intercultural Competent Community. The objective of this project is to contribute and develop new skills, knowledge and abilities for Extension educators and specialists, to better reach and serve people from different cultures in the state of Oklahoma. This effort includes five strategies to prepare Extension educators/specialists to serve a growing multicultural population. These are:

1. Assessment
2. Coaching
- 3.

Development of written materials

4. Intercultural Exchange program

In 2014, the office of Multicultural and Community Engagement assessed intercultural competence using the Intercultural Development Inventory (IDI). Nine groups were assessed, including professors, students, staff members and Extension educators (approximately 135). After the assessment, group discussion sessions were conducted to analyze the findings. Personalized coaching sessions were conducted to help participants to design their Intercultural Personal Plan (17 coaching sessions).

Three trainings were designed according to the Extension educators' level of intercultural competence, there were: 1. Introduction - Basic Training, 2. Discovering My Culture, and 3. Designing my Intercultural Developmental. The trainings were delivered during twelve In-Services and other Extension Conferences around the State of Oklahoma. Five Core Intercultural Competence Modules were designed for the Family Consumer Sciences online core competency training and one class called Intercultural Competence for Extension Educators was taught to future Extension educators.

2(B). A brief statement of the process that was used by the recipient institution to identify individuals and groups who are stakeholders and to collect input from them

1. Methods for collecting Stakeholder Input

- Meeting with traditional Stakeholder groups
- Survey of traditional Stakeholder groups
- Meeting with traditional Stakeholder individuals
- Survey of traditional Stakeholder individuals
- Meeting with the general public (open meeting advertised to all)
- Survey of the general public
- 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
- Other (Peer reviews, grant proposal reviews)

Brief explanation.

Following are some examples of stakeholder input - this list is in no way exhaustive. Representatives from OAES and/or OCES met with the following stakeholder groups.

Division of Agricultural Sciences and Natural Resources Advisory Council (twice per year)

Oklahoma Wheat Commission (ten times per year)
Oklahoma Peanut Commission (twice per year)
Oklahoma Sorghum Commission (twice per year)
Oklahoma Wheat Growers Association Board (twice per year)
Oklahoma Oilseed Commission
Soil Fertility Research and Education Advisory Board (three times per year)
Canola Advisory Board (twice per year)
Oklahoma Grain and Feed Association
Oklahoma Seed Trade Association
Oklahoma Genetics Inc. Board
Oklahoma Cattleman's Association
Oklahoma Home and Community Education
Oklahoma Ag in the Classroom Advisory Committee (Quarterly)
4-H Shooting Sports Committee
Land Judging Committee
Oklahoma Farm Bureau
4-H Centennial Gardens Committee (twice per year)
OK Youth Forestry and Wildlife Camp Committee (six times)
Northeast Oklahoma Beekeepers Association
USGA Advisory Committee
Oklahoma Pecan Growers Association
American Farmers and Ranchers
Rural Health Works Committee
Rural Health Works National Advisory Committee
Stormwater Advisory Committee
Tribal On-Site Waste Project Advisory Committee

Integrated Environmental Research and Education Site Advisory Committee
Oklahoma Sustainable Agriculture Research and Extension Advisory Committee
Oklahoma Food and Agricultural Advisory Center Advisory Committee (twice per year)

In all these settings we listen to the expressed problems, concerns, opportunities and situations faced by the various groups. This is in addition to the county PACs which were described earlier and result in over 1,000 people providing input at the local level. Likewise we periodically conduct surveys with respect to particular issues or groups of people.

3. A statement of how the input will be considered

- In the Budget Process
- To Identify Emerging Issues
- Redirect Extension Programs
- Redirect Research Programs
- In the Staff Hiring Process
- In the Action Plans
- To Set Priorities
- Other (In team planning and budget requests)

Brief explanation.

Input was used in decisions as to filling vacant positions in a difficult budget time. These decisions resulted in approval for filling the following positions Rangeland and Forage Systems, Beef Cattle Range Nutrition, Forage Improvement and Management, Food Animal Quality and Health, Water Center Director, Natural Resource Economics, Bioinformatics, Food Safety, and Landscape Architecture Specialist, strengthen identified high priority program areas.

We continued to receive much input related to drought. 2014 showed some relief in eastern Oklahoma but many western counties continued in a drought. Some areas of concern expressed by PAC attendees included:

Rebuilding cowherds
Farm bill and government programs
Risk management and crop insurance
Forage production
Mental health and chronic illness
Water use and water conservation
Invasive species and herbicide tolerance
Employment and job creation and skills
Youth alcoholism and teen pregnancy
Youth leadership development
Healthy choices for youth
Pasture Renovation/weed control options following drought
Alternative crops
No-till cropping systems

Science projects for youth
 Cattle management
 Gardening and consumer Horticulture
 Use of cover crops and crop rotations
 Tax laws
 Livestock and crop marketing
 Food Safety

Other implications relating to water use and availability continued to be of high interest. These included irrigation, water quality, quantity, pond management, and water rights.

Many also had concerns about decisions to be made relating to the Farm Bill, the commodity programs and risk management programs contained in the Farm Bill.

Brief Explanation of what you learned from your Stakeholders

Continued need for better risk management tools. Funding stability for Extension and Experimentation Stations particularly formula funds. Less complicated Farm Bill decisions and more timely implementation.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
5754781	0	4136035	0

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	3018073	0	3879503	0
Actual Matching	3018073	0	3879503	0
Actual All Other	32126130	0	19303029	0
Total Actual Expended	38162276	0	27062035	0

3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous				
Carryover	3018073	0	0	0

V. Planned Program Table of Content

S. No.	PROGRAM NAME
1	Animal Enterprises
2	Crop Enterprises
3	Plant Biological Technology
4	Commercial and Consumer Horticulture
5	Ecosystem and Environmental Quality and Management including Weather and Climate
6	Food Processing, Product Storage, and Food and Product Safety
7	4-H Youth Development
8	Turfgrass Development and Management
9	Community Resource and Economic Development
10	Integrated Pest Management
11	Food Safety - Agricultural Biosecurity
12	Farm and Agribusiness Systems Economics
13	Integrated Bioenergy and BioBased Products Development
14	Childhood Obesity - Hunger / Health / Risky Behaviors / Resilience Issue Teams
15	Structure and Function of Macromolecules
16	Environmental Family and Youth Issues
17	Family and Youth Environmental and Safety Issues
18	Food Safety - Hunger, Health and Safety
19	Global Food Security and Hunger - Families and Youth

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Animal Enterprises

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
121	Management of Range Resources	8%		15%	
302	Nutrient Utilization in Animals	10%		20%	
303	Genetic Improvement of Animals	8%		10%	
304	Animal Genome	0%		10%	
305	Animal Physiological Processes	7%		10%	
306	Environmental Stress in Animals	12%		10%	
307	Animal Management Systems	19%		10%	
308	Improved Animal Products (Before Harvest)	12%		5%	
311	Animal Diseases	13%		5%	
315	Animal Welfare/Well-Being and Protection	11%		5%	
	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	20.0	0.0	14.0	0.0
Actual Paid	27.0	0.0	9.2	0.0
Actual Volunteer	2.7	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
250000	0	457117	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
250000	0	457117	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
3175200	0	2265607	0

V(D). Planned Program (Activity)**1. Brief description of the Activity**

- Conduct fundamental and applied research
- Construct research facilities
- Write extramural grant proposals
- Conduct workshops and other educational meetings and conferences
- Provide in-service trainings
- Provide one-on-one consultation
- Develop and maintain numerous newsletters, web sites, press releases, Sun Up programs, and other mass media resources

2. Brief description of the target audience

Managers, owners and employees of farms, ranches and agribusinesses, research scientists, extension personnel, beef cattle producers, meat goat producers, consumers, and policy makers.

3. How was eXtension used?

Active participation in the Horse CoP. We are collaborating to develop an online curriculum for an introductory horse management university credit course through Michigan State University. The curriculum will be repurposed as an e-course book for use by universities, community colleges and high schools and as the core content for a massively open online course (MOOC) targeting general horse enthusiasts. In addition, we are working with the National Beef Cattle Evaluation Consortium extension team to cooperatively develop additional beef genetics extension materials so that a more uniform source of genetics materials is available across the US. As a part of these efforts, we are working to re-vamp and revitalize the genetics portion of the beef cattle CoP. We are currently developing new content with the goal of launching the new content in 2015, with a large roll-out coinciding with the Beef Improvement Federation Annual Meeting in June.

V(E). Planned Program (Outputs)**1. Standard output measures**

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	154010	3365078	19500	750000

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

Year: 2014
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	2	31	33

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of educational meetings, class guest lectures, conferences, in-service trainings held

Year	Actual
2014	196

Output #2

Output Measure

- Number of fact sheets, proceedings publications, newsletters, popular press articles and other non-peer reviewed extension publications produced

Year	Actual
2014	40

Output #3

Output Measure

- Number of Animal Enterprise television and radio spots or segments produced

Year	Actual
2014	66

Output #4

Output Measure

- Number of web sites maintained

Year	Actual
2014	4

Output #5

Output Measure

- Number of decision making tools developed

Year	Actual
2014	2

Output #6

Output Measure

- Number of peer reviewed manuscripts published

Year	Actual
2014	34

Output #7

Output Measure

- Number of beef and pork quality assurance program participants

Year	Actual
2014	103

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of cattle enrolled in value enhancement programs
2	Number of producers participating in beef cattle value enhancement programs
3	Percent of participants gaining knowledge in methods to decrease the incidence and severity of bovine viral diarrhea virus and bovine respiratory disease
4	Percent of producers gaining knowledge in pasture and rangeland management, forage use efficiency and pasture and rangeland recovery
5	Percent of producers and educators with access to resources regarding adaptation solutions for climate change
6	Frothy Bloat Control
7	Stocker Production System on Estimated Greenhouse Gas Emissions
8	Beef and Dairy Cattle Sustainability
9	Cattle and Forages: Reproduction
10	Cattle Receiving and Feeding: Behavior and Well-Being
11	Cattle Receiving and Feeding: Environmental Stress
12	Cattle Receiving and Feeding: Immunology
13	Food Safety and Meat Science
14	Meat Science: Dark Cutting Beef

Outcome #1

1. Outcome Measures

Number of cattle enrolled in value enhancement programs

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	46454

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Cattle sickness costs the beef cattle industry millions of dollars each year. These losses negatively impact producer profitability and they impact each and every level of the beef production chain. Negative impacts are felt at the producer level through decreased performance, death loss, increased costs associated with treating sick animals, increased labor expenses and additional expenses for equipment, to name a few. At times, these losses extend beyond the cow-calf producer to each of the other sectors of the beef economy. Chronically ill cattle place a huge financial burden on the entire industry as the cost of carrying such cattle replicates itself throughout the life of the calf. Unfortunately the cost burdens associated with cattle sickness do not stop once the cattle are harvested. There are a number of well-documented studies including the 1995, 2000 and 2005 Beef Quality Audits that clearly illustrate that sickness in cattle, at even an early age, can have dramatic impacts on carcass quality, tenderness, and in some extreme cases the condemnation of entire carcasses.

What has been done

In order to facilitate the adoption of best management practices that should result in reduced sickness and associated adverse effects, a number of value enhancement programs continue to enroll cattle with this goal in mind. A leading program in the state of Oklahoma is the Oklahoma Quality Beef Network (OQBN), which was initially developed in 2001 and redefined in 2009. The objective is to add value to Oklahoma's calf crop and capture at least part of the added value. OQBN held 8 sales for verified cattle in Oklahoma throughout 2014. 6,454 calves were enrolled representing 103 producers which is an increase of 16% in total cattle enrolled from 2013. Analysis of data collected at the 8 auctions shows \$19.99/cwt increase in price over non-weaned cattle that sold the same day.

Results

The average price premium (on average for a 600 lb calf) was \$119.94/animal. The added weight

gain over the 45 day preconditioning period on average was 90 lb, and that added gain was worth \$117.00/animal with a value of gain \$1.30/lb this fall, for a gross increase in revenue of \$236.94/animal. A seasonal price increase of \$2.25/cwt from weaning to marketing added \$13.50/animal. If the price of preconditioning is estimated at \$79.45/animal, net profit to producers is \$170.99/animal or \$1,103,569 in net revenue total for all OQBN producers in the state of Oklahoma. Other value enhancement programs included in the number of cattle reported above have similar requirements and goals, such as Angus Source, Superior Livestock Auction Vac 45,

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems
308	Improved Animal Products (Before Harvest)
315	Animal Welfare/Well-Being and Protection

Outcome #2

1. Outcome Measures

Number of producers participating in beef cattle value enhancement programs

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	325

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Cattle sickness costs the beef cattle industry millions of dollars each year. These losses negatively impact producer profitability and they impact each and every level of the beef production chain. Negative impacts are felt at the producer level through decreased performance, death loss, increased costs associated with treating sick animals, increased labor expenses and additional expenses for equipment, to name a few. At times, these losses extend beyond the cow-calf producer to each of the other sectors of the beef economy. Chronically ill cattle place a huge financial burden on the entire industry as the cost of carrying such cattle replicates itself throughout the life of the calf. Unfortunately the cost burdens associated with cattle sickness do not stop once the cattle are harvested. There are a number of well-documented studies including the 1995, 2000 and 2005 Beef Quality Audits that clearly illustrate that sickness in cattle, at even an early age, can have dramatic impacts on carcass quality, tenderness, and in

some extreme cases the condemnation of entire carcasses.

What has been done

To identify programs in which Oklahoma producers were involved in 2007 and 2012, various marketing programs were contacted to measure producer participation and the number of cattle marketed through value-added efforts. Contacts were made with source and age verification companies approved through USDA, breed associations, feedyards, pharmaceutical companies, and livestock markets as reported by the USDA Agriculture marketing Service (AMSA). Companies reported the total number of Oklahoma producers who participated in the value-enhancement program and total number of calves enrolled. In 2007, 85,575 Oklahoma calves were enrolled in a value-added marketing program which is 4.3 percent of possible calves available annually of Oklahoma cattle numbers. Revisiting this in 2012, 127,759 calves were enrolled in a value added marketing opportunity; this is 7.28% of the 1,754,000 calves available for market in 2012 and an overall increase of 33% of cattle enrolled over the 5 year period.

Results

In 2014, 103 Oklahoma beef producers enrolled 6,454 calves in the OQBN program, a 16% increase in enrollment over 2013. Eight regional OQBN Vac-45 calf sales were conducted in seven livestock markets where 4,704 calves were marketed. 1,750 animals were sold at other verified sales or private treaty. OQBN steer cattle received a premium of \$19.99/cwt, based on the weighted average price of all lots, over non-preconditioned cattle. The weighted average premium does not adjust for any price differences attributable to lot size, weight, breed, hide color, sex, fleshiness, and muscling. The average price premium (based on a 600 lb average calf) was an additional \$119.94 per head, while the added value of weight gain (average of 90 pounds gain at \$1.30/lb) during the preconditioning period averaged \$117.00 per head for a gross increase in revenue of \$236.94 per calf. At a \$19.99/cwt premium for OQBN calves, Oklahoma producers realized \$774,092.00 in added revenue from premiums. From the result of the additional gain during the preconditioning phase added to the premium, there is additional \$755,118.00 gross revenue (no cost subtracted out) to OQBN participants. From the weaning deadline to the OQBN sale dates, the cattle market increased on average of \$2 to \$5/cwt. At \$2.25/cwt, increase in the value of cattle from the market trend resulted in an additional \$13.50 per head for a total of \$72,913. The total increased gross revenue to Oklahoma OQBN Vac-45 participants in 2014 was an additional \$1,602,123 which takes into account the increase in the market prices from weaning to marketing, the additional weight gain, and the price premium.

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems
308	Improved Animal Products (Before Harvest)
311	Animal Diseases
315	Animal Welfare/Well-Being and Protection

Outcome #3

1. Outcome Measures

Percent of participants gaining knowledge in methods to decrease the incidence and severity of bovine viral diarrhea virus and bovine respiratory disease

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	103

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Bovine respiratory disease (BRD) is the most common disease among feedlot cattle in the United States, accounting for approximately 75 percent of feedlot morbidity and 50 percent to 70 percent of all feedlot deaths. BRD causes between \$800 million to \$900 million annually in economic losses from death, decreased performance, and antimicrobial treatment costs. Despite improved vaccines and antimicrobials, BRD rates have been increasing during recent years. Feedlot cattle that received 1, 2, or 3 treatments for BRD returned \$40.64, \$58.35, and \$291.93 less, respectively, than untreated animals. A substantial portion (79%) of lost return is due to decreased carcass weight and lower quality grade rather than treatment costs. Immune response and morbidity issues relative to cattle growth and carcass quality affect every level of the beef industry, from the producer to the packer, all the way to the consumer as end-user. Few studies have documented the economic effect of BRD from incidence of the disease through harvest, and especially the impact of BRD on acceptability of the final product as determined by consumers.

What has been done

OSU researchers evaluated the effects of BRD incidence during the receiving period on subsequent finishing performance, efficiency, carcass characteristics, and lung scores of feedlot steers. During the receiving period, crossbred steer calves were monitored daily for clinical signs of BRD. After the receiving period, calves were grouped by previous number of times treated for BRD and allocated to finishing pens. The BRD experimental groups included: never treated for BRD (0X), treated 1 time (1X), 2 times (2X), or 3 or 4 times (3/4X) for BRD.

Results

As the number of antimicrobial treatments for BRD increases, average daily gain in the backgrounding phase decreases, cost-per-unit increases, and net returns decline. Days on feed needed to reach a common 12th rib fat thickness increased by 7 days for every increase in

number of antimicrobial treatment required. Increased days on feed, lower final body weight and lower carcass value resulted in a 2.3%, 10.2%, and 14.0% decrease in the total value of calves at harvest for calves treated once, twice, and 3 or 4 times for BRD, respectively. Decreasing the average number of times an animal is treated for BRD by one treatment would result in a nearly \$9 million savings to Oklahoma feedlot cattle producers. In addition, marbling scores, color stability and overall acceptance of the final beef product by consumers decreases as the number of antimicrobial treatments increases.

4. Associated Knowledge Areas

KA Code	Knowledge Area
305	Animal Physiological Processes
306	Environmental Stress in Animals
307	Animal Management Systems
311	Animal Diseases
315	Animal Welfare/Well-Being and Protection

Outcome #4

1. Outcome Measures

Percent of producers gaining knowledge in pasture and rangeland management, forage use efficiency and pasture and rangeland recovery

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Grazing management is critical to the sustainability of livestock enterprises in Oklahoma. The majority of the state’s land is managed by ranchers for the primary purpose of providing grazing for beef cattle. These grazing lands are a vital part of the natural and economic resources of the state, and provide many diverse benefits to landowners and society. In a sense, grazing management affects all citizens of Oklahoma. Challenges such as drought, climate change, and feed/energy costs increase rancher’s reliance on good management to make efficient use of their grazing resources over the long run.

What has been done

A Master Cattleman Summit was held in Stillwater during the fall of 2014 with an emphasis on grazing management, forage use efficiency and rangeland recovery. Approximately 125 beef producers participated in the 2-day workshop. In addition Area Specialists and County Educators hosted two Cow Boot Camps with special emphasis on grazing management. Approximately 80 producers participated in these 3-day intensive workshops.

Results

Producer knowledge and awareness related to improved grazing management practices, forage use efficiency and rangeland recovery was greatly enhanced according to program evaluations. Most participants indicated a high degree of satisfaction with the educational opportunity and a high rate of adoption of best management practices related to better grazing resource utilization and management.

4. Associated Knowledge Areas

KA Code	Knowledge Area
121	Management of Range Resources
302	Nutrient Utilization in Animals
306	Environmental Stress in Animals
307	Animal Management Systems

Outcome #5

1. Outcome Measures

Percent of producers and educators with access to resources regarding adaptation solutions for climate change

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	450

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Climate variability has had a large impact on the entire United States over the past several years, and has impacted Oklahoma beef producers in the western part of the state most severely.

During these times, natural resource usage is critically important, and issues over water rights and availability are paramount.

What has been done

OSU researchers have obtained funding and are currently collecting data for a study to examine abiotic stresses on beef cattle production, including efficiency of water usage (direct consumption) in beef cattle. Over the next five years, we will collect and analyze data that encompasses genomics, bioinformatics, and metagenomics to explore how producers can select for animals better suited to adverse environmental conditions. Similarly, our extension group continues to emphasize "matching cows to forage" resources as an educational thrust as the industry continues to over-adopt traits that compromise cattle's ability to deal with harsh environmental conditions. Examples include increased aggressive selection for milk, growth and muscle as well as a decline in crossbreeding overall.

Results

This research information will be integrated and disseminated through the cooperative extension service and will provide producers with several new decision support tools that will help them better manage their cattle and natural resources. Currently, 3 MS, 2 Ph.D. and 2 undergraduate research scholars are being trained in animal genomics, genetics, data curation and management, and data analysis.

Results of the extension program, in concert with increased awareness by breed associations seem to be taking hold. While it is too early to tell, the genetic selection for traits that increase maintenance requirements of beef cows and their general "lack of fit" seems to be slowing while the industry appears to gradually be going back to more planned crossbreeding programs. We hope to have solid data to demonstrate these changes in 2015.

4. Associated Knowledge Areas

KA Code	Knowledge Area
121	Management of Range Resources
302	Nutrient Utilization in Animals
306	Environmental Stress in Animals
307	Animal Management Systems
315	Animal Welfare/Well-Being and Protection

Outcome #6

1. Outcome Measures

Frothy Bloat Control

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Frothy bloat of growing cattle grazing wheat pasture is a major herd health problem. While not a true bloat-preventive compound, monensin has been shown to decrease the incidence and severity of bloat of wheat pasture cattle in very intensive studies with small numbers of cattle.

What has been done

OSU researchers have conducted a 2-year study relative to the effect of monensin on the incidence and severity of bloat in large scale grazing trials with about 200 cattle/year. Method of delivery of monensin was different between years, and monensin consumption averaged 200 and 81 mg/animal/day.

Results

Despite the large difference in monensin consumption between years the incidence and severity of bloat was decreased both years by provision of monensin. Provision of monensin to growing cattle on wheat pasture is an efficacious means of decreasing cattle death losses due to bloat, and has huge potential to increase profitability of the approximately 4.5 million stocker cattle that are grown each year on wheat pasture in the southern Great Plains.

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems
311	Animal Diseases
315	Animal Welfare/Well-Being and Protection

Outcome #7

1. Outcome Measures

Stocker Production System on Estimated Greenhouse Gas Emissions

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The two primary greenhouse gases from livestock production are methane and nitrous oxide which come from enteric fermentation, and fertilizer and manure application to soil.

What has been done

OSU researchers have conducted a three-year study to evaluate the effect of stocker cattle production systems that alter rumen fermentation and replace fertilizer with feed supplements on greenhouse gas emissions. Summer grazing systems on old world bluestem pastures included: (1) non-fertilized, low stocked pastures (CONT); (2) N fertilized, high stocked pastures (NFERT); (3) N and phosphorus (P) fertilized, high stocked pastures (NPFERT); and (4) non-fertilized, high stocked pastures plus supplementation of dried distillers grains with solubles (DDGS).

Greenhouse gas emissions were computed for each pasture using life cycle assessment methods. Total greenhouse gas emissions (direct + indirect) were greater for NFERT, NPFERT, and DDGS than CONT (average 23,475 vs. 8367 kg CO₂e). However, when adjusted for shrunk body weight gain, total emissions were similar between DDGS and CON with NFERT and NPFERT having greater total emissions per kg BW gain.

Results

These data suggest that DDGS can be used to replace nitrogen fertilizer in stocker cattle grazing systems and decrease greenhouse gas emissions to levels similar to low input systems. Use of DDGS in place of fertilizer N could decrease greenhouse gas emissions from the millions of acres of improve pastures used in stocker cattle production systems across the U.S.

4. Associated Knowledge Areas

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

Outcome #8

1. Outcome Measures

Beef and Dairy Cattle Sustainability

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Enteric methane emissions from beef and dairy cattle represent a loss of feed energy value and methane is a greenhouse gas, 28 times more potent at trapping heat than carbon dioxide.

What has been done

A brand new ventilated hood system that has the capability of measuring enteric methane emissions from confined beef and dairy cattle has been constructed in the Department, which is a first of its kind for Oklahoma State. The system will be being validated in the winter and spring of 2015.

Results

The system will provide the capability to provide baseline data for Oklahoma enteric methane emissions from both beef and dairy cattle. Additionally, this system provides the capability to conduct studies on mitigating enteric methane emissions, which can lead to ways to improve the nutrient use efficiency of Oklahoma cattle producers. Furthermore, graduate students will be trained in a novel research area that is lacking trained professionals.

4. Associated Knowledge Areas

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

Outcome #9

1. Outcome Measures

Cattle and Forages: Reproduction

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Reproduction in the southern states is dramatically lower than in states further north. Improvements in reproductive capacity of the cowherd would have a very dramatic impact on profitability and sustainability of beef cattle operations in Oklahoma and the southern United States.

What has been done

In 2014, the Applied Reproductive Strategies in Beef Cattle Annual Meeting was held in Stillwater, OK, and was planned and organized in conjunction with the Beef Reproduction Task Force. Together, we raised approximately \$20,000 in sponsorships from industry partners to host the event, along with a \$5,000 USDA-NIFA-AFRI grant to support speaker travel and graduate student travel scholarships. The meeting was held October 8-9, 2014 and attracted over 200 beef producers, beef industry professionals, academics, extension professionals, and veterinarians from 15 different states (TX, CO, AR, OK, CA, IA, MO, KS, NE, LA, ID, SC, OR, GA, AZ), including many attendees from Oklahoma and the southern US.

Results

Attendee surveys highlighted the value they obtained from the conference (rated a 4.4 out of 5 overall) and 92% (69 out of 75 respondents including producers, veterinarians, extension educators, and industry consultants) indicated that they intended to make or recommend changes based on the information from the conference and that they expected these changes to affect over 340,000 head of cattle and be worth approximately \$2.9 million to the industry (# head * increased profit/head estimated by the attendee).

4. Associated Knowledge Areas

KA Code	Knowledge Area
303	Genetic Improvement of Animals
305	Animal Physiological Processes
307	Animal Management Systems

Outcome #10

1. Outcome Measures

Cattle Receiving and Feeding: Behavior and Well-Being

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

There is need to develop behavioral scoring systems and provide welfare scoring services for research in growth-promoting technologies, which are currently associated with beef cattle industry-wide and societal concerns in cattle welfare and mobility.

What has been done

Oklahoma State University evaluated the effects of growth-promoting technologies (i.e., antimicrobials, antibiotics, growth-promoting implants, beta-adrenergic agonists) typically used in conventionally raised beef cattle to determine how modern technologies affect cattle behavior and health when compared to cattle raised in an all-natural system (i.e., no growth-promoting technologies administered to cattle). Cattle were evaluated individually and as groups for a wide variety of behaviors. Cattle health records and blood samples were collected to monitor the overall health status of cattle. There were no negative impacts of technologies on cattle disposition, activity, condition of mobility, or health.

Results

Cattle health and behavior studies at Oklahoma State University have evaluated the welfare impacts of growth-promoting technologies in the beef industry. A novel scoring system of cattle mobility was tested and new information about cattle well-being and modern technologies in beef production have been determined. Research indicates there were no negative impacts of

technologies on cattle disposition, activity, condition of mobility, or health. Adopting the new mobility scoring system may help determine if other factors (i.e. varying transportation duration, weather conditions, cattle genetics, handling conditions, etc.) in combination with the use of modern technologies may alter the health, behavior and well-being of cattle. The development and evaluation of a novel scoring system of cattle mobility and an evaluation of the welfare implications of using growth-promoting technologies in feedlot cattle.

4. Associated Knowledge Areas

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

Outcome #11

1. Outcome Measures

Cattle Receiving and Feeding: Environmental Stress

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Environmental stress of confined cattle has begun to receive societal concern and also remains an economical concern of cattle producers. Effects of cold have been realized in recent severe winter storms of the north central United States while extreme heat periods of recent summers have intensified the focus. For confined feeding operations, hard dirt pen surfaces, animal density, animals with heavier condition, and shade area availability increase potential for sustained heat events to cause stress to cattle. The extent of the stress, impact on cattle well-being, and effectiveness of mitigation strategies is not clearly defined.

What has been done

Core body temperatures of finishing cattle under conventional and natural management programs have been monitored during confined feeding. Methods for managing heat load include balancing dietary adjustments, air flow, shade consumption, and evaporative cooling. The impact of shaded

provided from pens with barn feeding areas has been compared to outdoor feeding pens. Within outdoor pens, evaporative cooling relief by wetting with sprinklers during extreme heat days was evaluated. Data is being compared to Mesonet Cattle Comfort Advisor data to determine benchmarks that are appropriate for implementing heat load mitigation management strategies.

Results

Results, to date, suggest the differences in tolerance and response to heat loads can differ between conventionally and naturally managed cattle. Large barns feeding areas providing shade results in decreased heat accumulation by cattle. Sprinkling appears to provide minimal relief on single day heat events, but does result in measurable relief periods during multiple high heat load days. Development and evaluation of tools and management techniques to identify and mitigate heat loads that cause stress in confined cattle can lead to improved animal well-being and improved efficiencies of production.

4. Associated Knowledge Areas

KA Code	Knowledge Area
306	Environmental Stress in Animals
307	Animal Management Systems
315	Animal Welfare/Well-Being and Protection

Outcome #12

1. Outcome Measures

Cattle Receiving and Feeding: Immunology

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Food Drug Administration (FDA) just implemented a new policy in December 2013 to phase out the use of medically important antibiotics in healthy animals in three years. Alternatives to antibiotics are urgently needed.

What has been done

We have systematically screened the genomic sequences of cattle and identified the entire repertoire of the bovine beta-defensin and cathelicidin gene families. We are in the process of evaluating the potential of these antimicrobial peptides as candidate alternatives to antibiotics. Simultaneously, we have also discovered several dietary compounds and their combinations with a strong capacity to enhance the synthesis of host defense molecules, animal immunity, and disease resistance.

Results

Identification and characterization of novel host defense molecules and immune boosting compounds could potentially lead to the development of new effective alternatives to antibiotics to ensure animal health, productivity, and food safety and security with no reliance on in-feed antibiotics. Currently, 5 PhD, 1 MS, and 3 undergraduate research scholars are being trained in animal genomics, immunology, cell and molecular biology, and bioinformatics. Development of effective alternatives to antibiotics could potentially impact the global livestock industry.

4. Associated Knowledge Areas

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

Outcome #13

1. Outcome Measures

Food Safety and Meat Science

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

According to the recent CDC estimates, foodborne illnesses affect 48 million people, resulting in 128,000 hospitalizations, and 3,000 deaths annually in the US. Shigatoxin producing E. coli (STEC), Salmonella, and Listeria have been a major issue in the food industry, resulting in

continued recalls and foodborne outbreaks.

What has been done

(1) Development of best management practices (BMPs) for cow-calf operations to reduce foodborne pathogens such as Shiga-toxigenic E. coli and Salmonella; (2) Evaluating the food safety of mobile slaughter units for pastured poultry growers in the Southeast; (3) Molecular basis of adherence of food pathogens on food and food contact surfaces using molecular proteomics; (4) Improving the safety of organic leafy greens using good agricultural/production practices; (5) Assessment of plant-derived antimicrobials for reduction of foodborne pathogens during food processing and storage; (6) Development of bacteriophage and bacteriocins that can be used as a bio-preservative against E coli, Salmonella, and Listeria; (7) A Farm Health for Public Health Conference was held to educate livestock producers and Agri-event managers about Shigatoxin producing E. coli.

Results

Farm food safety assessment studies and development of good agricultural and management practices will lead to adoption of food safety principles by the livestock, poultry and fresh produce farmers. Reduction of foodborne pathogens in the food animals and farm environment, as a result, will enhance farmer competitiveness, leading to increased profitability. New knowledge in Listeria pathogenesis will help to develop novel control strategies. Assessment and intervention studies at food processing level will increase knowledge of food industry professionals; improve intervention strategies; and decrease cross contamination, making food supply safer. These studies will eventually result in decreased incidences of foodborne illnesses and improved consumer health. In 2014, 89 agricultural linked individuals received basic information about prevalence and on farm control of E. coli and critical control points for Agri-events to control pathogen transfer.

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems
308	Improved Animal Products (Before Harvest)

Outcome #14

1. Outcome Measures

Meat Science: Dark Cutting Beef

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

According to the 2011 National Beef Quality Audit 3.2% of the carcasses assessed were dark cutters. The US Beef industry loses approximately \$165 - \$170 million dollars due to discounted price in beef carcasses.

What has been done

Extended aging, modified atmospheric packaging, and enhancement techniques were used to improve the surface color in dark cutting beef. Follow-up studies are currently determining the sensory attributes of dark cutting beef.

Results

Developed aging and modified atmospheric packaging based techniques to improve the surface color of dark cutting beef. 7 Master students and 8 undergraduates are being trained in both applied and basic meat science research. To help the beef packers to use postharvest techniques to enhance the value of dark cutting beef. Techniques will have a national and international scope.

4. Associated Knowledge Areas

KA Code	Knowledge Area
308	Improved Animal Products (Before Harvest)

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.)

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Both the OQBN and VAC-45 programs used market data to evaluate the monetary results of producers using information and technology suggested by the programs. See state defined outcomes

Master Cattleman Summit used post conference questionnaire of participants to evaluate quality and value of education. See State Defined Outcomes

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Crop Enterprises

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	17%		5%	
133	Pollution Prevention and Mitigation	3%		5%	
201	Plant Genome, Genetics, and Genetic Mechanisms	9%		20%	
204	Plant Product Quality and Utility (Preharvest)	15%		10%	
205	Plant Management Systems	29%		20%	
211	Insects, Mites, and Other Arthropods Affecting Plants	5%		10%	
212	Diseases and Nematodes Affecting Plants	5%		10%	
213	Weeds Affecting Plants	10%		5%	
215	Biological Control of Pests Affecting Plants	3%		5%	
216	Integrated Pest Management Systems	4%		10%	
	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	18.0	0.0	11.0	0.0
Actual Paid	23.0	0.0	12.4	0.0
Actual Volunteer	1.3	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
232000	0	621729	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
232000	0	621729	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
2731600	0	3081473	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

1. Wheat cultivar performance testing and demonstration throughout Oklahoma
2. Wheat breeding, variety development, and introgression of new traits into elite germplasm
3. Publication of web sites, web-based updates, video presentations, and printed extension materials that disseminate research findings and address current and emerging issues in Oklahoma agriculture
4. Provide effective, non-classroom educational opportunities for industry professionals, Extension educators, farmers, and ranchers.
5. Conduct on-farm research and demonstration of nitrogen rich strips and use of hand-held sensors.
6. Explore opportunities for market-based solutions to global climate change and evaluate potential for Oklahoma stakeholders to participate in these opportunities
7. Explore opportunities for market-based solutions to global climate change and evaluate potential for Oklahoma stakeholders to participate in these opportunities

2. Brief description of the target audience

Wheat growers, dual-purpose wheat producers, millers, bakers, wheat importers, seed growers and dealers, wheat breeders, crop producers, canola, peanut, sunflower and other crop producers and nutraceutical producers.

3. How was eXtension used?

Dr. Randy Boman is active in the Cotton CoP

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	54940	3074966	100000	1300

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	14	65	79

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Field Demonstrations, field days, and conferences

Year	Actual
2014	97

Output #2

Output Measure

- Regionally adapted wheat cultivars

Year	Actual
2014	0

Output #3

Output Measure

- Educational materials developed

Year	Actual
------	--------

2014 95

Output #4

Output Measure

- Web-based educational materials such as web sites, videos, and social media applications

Year	Actual
2014	12

Output #5

Output Measure

- Locally-controlled evaluations and agronomic data for small grains crops

Year	Actual
2014	55

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of wheat varieties released to address agronomic and end-use quality needs of the hard red and hard white winter wheat industries.
2	Percentage of wheat acres sown to varieties with improved pest resistance, yield potential, and end-use quality.
3	Number of on-farm demonstrations of nitrogen rich strips and of hand-held sensors
4	Locally-controlled evaluations and agronomic data for small grains crops
5	Improving Resistant Weed Management in Wheat
6	New Herbicide Program Approach for Rescuegrass Weed Control in Wheat Production Systems in Oklahoma
7	Economics of foliar fungicides for hard red winter wheat in the southern Great Plains
8	No-Till Oklahoma Conference
9	Fertilization and economic feasibility of sweet sorghum grown as biofuel feedstock using commercial fertilizer
10	Drought monitoring: a system for tracking plant available soil moisture based on the Oklahoma Mesonet
11	Canola Integrated Pest Management

Outcome #1

1. Outcome Measures

Number of wheat varieties released to address agronomic and end-use quality needs of the hard red and hard white winter wheat industries.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Wheat and the associated grazing component are worth in excess of \$1.5 billion annually to the Oklahoma economy. In the winter-wheat market, farmer profitability is yield-driven while end-user value is quality driven. While yield potential and end-use quality are not mutually exclusive traits, developing and marketing cultivars that satisfy both requirements is extremely difficult. The fact that there are relatively few scientists and even fewer private companies working in the area of wheat improvement exacerbates the problem.

What has been done

The Oklahoma State University Wheat Improvement Team was developed as a cross-cutting collection of scientists who work collaboratively to develop, test, and distribute improved wheat cultivars for the Southern Great Plains. As part of this effort over 900 individual crosses are made on a yearly basis. In addition approximately 45 cultivars are evaluated in replicated small grain performance trials at 24 sites throughout Oklahoma. Farmers are involved in both of the processes through advisory organizations and direct participation in research trials.

Results

Several advanced experimental lines were tested and considered for release in 2014. The extreme drought, however, was a confounding factor in candidate line evaluation. The experimental line OK09125 showed promise in 2014 and is undergoing additional testing in 2015. In addition, a hard white advanced experimental line OK10728W is being considered for release in 2015. This line shows great adaptability to the northcentral Oklahoma region and a high level of sprouting tolerance. If released, OK10728W could allow Oklahoma farmers to supply some of the 4,000,000 bushels of hard white used in the region.

Wheat varieties released by OSU now occupy 15% (3.2 million) of wheat acres in the southern Great Plains and approximately 6% of the entire US wheat acreage.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Percentage of wheat acres sown to varieties with improved pest resistance, yield potential, and end-use quality.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	47

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In 2006 over half (54%) of all wheat acres were sown to the cultivar Jagger or the Jagger-by-Abilene cross Jagalene. In addition, many newer wheat cultivars have offered increased yield as compared to Jagger and Jagalene, but have relied on Jagger resistance genes to fight the problematic foliar diseases leaf and stripe rust. Shifts in disease races over the past four years have made these genes largely ineffective, presenting an unnecessary production risk for farmers and grain merchandisers.

What has been done

Since 2006, the Oklahoma State University Wheat Improvement Team has developed and released ten wheat cultivars with disease resistance and agronomic performance superior to that of Jagger and Jagalene in targeted environments. In addition, our newest releases and advanced experimental lines contain insect and disease resistance genes different from those in Jagger. A comprehensive educational campaign has made farmers and ranchers aware of improved cultivars released by land-grant institutions and private breeding companies in the region.

Results

In 2012 acreage of Jagger and Jagalene had fallen to 5% and 0%, respectively. Acreage of the disease and Hessian fly resistant cultivar Duster increased from 0.3% of acreage in 2007 to

19.7% in 2013 and improved cultivars now occupy 47% of Oklahoma wheat acres. Unfortunately, the disease resistance of Jagger-derived lines such as OK Bullet and Fuller are no longer highly effective at preventing foliar disease and future efforts will focus on displacing these varieties with superior genetics of newer lines such as Gallagher and Iba. Gallagher, for example, fits a similar production profile as Duster but offers increased yield potential, foliar disease resistance, and kernel size without sacrificing Hessian fly resistance, acid soil tolerance, or fall forage production for dual-purpose systems. In 2012 Gallagher offered a 5.9 bu/ac average yield advantage over Duster, indicating a potential increase in Oklahoma farm revenue of \$53 million annually if we meet our target of replacing 1.2 million acres of Duster with Gallagher in the next five to seven years.

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

Number of on-farm demonstrations of nitrogen rich strips and of hand-held sensors

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Current global nitrogen use efficiency for cereals production is estimated to be 33%. Environmental concerns and increasing fertilizer prices have necessitated improved precision in determining crop nitrogen requirements.

What has been done

Oklahoma State University has developed hand-held sensors and corresponding web-based decision aids that can be used to generate in-season nitrogen recommendations based on yield potential. This method is much more accurate than yield-goal-based systems in predicting high or

low-yielding years where nitrogen fertilizer application rates should be adjusted accordingly. Sensor based nitrogen management presentations and demonstrations were given at 20 in-state grower meetings with approximately 1,000 individuals in attendance in 2014. The topic was presented in four out of state talks to a total audience of approximately 400 individuals. Two websites devoted nutrient management (nue.okstate.edu and npk.okstate.edu) were viewed approximately 20,000 times in 2014.

Results

In the fall of 2014 it is estimated that the N-Rich Strip and SBNRC was established on nearly 500,000 acres of Winter Wheat and Winter Canola. Recent research concluded that this technologies increases profit in winter crops by \$10/ac resulting in a state wide impact of approximately \$5 million. Additional to the success of the N-Rich strips is the commercialization of the smaller Hand Held GreenSeeker sensor. This sensor is sold at 10% of the cost (\$50 versus \$500) of the larger unit historically used. The adoption of this low cost sensor will greatly impact the state of Oklahoma as the implementation of the N-Rich Strip and Sensor Based Nitrogen Calculator which will ultimately the increase economic and environmental sustainability of winter wheat production in Oklahoma.

4. Associated Knowledge Areas

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

Outcome #4

1. Outcome Measures

Locally-controlled evaluations and agronomic data for small grains crops

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	65

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Choosing the right cultivar is essential to ensuring economic profitability of any production system.

Wheat yield data collected in 2010, for example, show that cultivar choice can easily increase gross income by more than \$120 per acre and dramatically reduce pesticide use.

What has been done

The Oklahoma State University small grains variety testing program tests 25 to 45 released wheat cultivars and advanced experimental lines in replicated test plots at 25 to 30 sites throughout Oklahoma on an annual basis. The wheat multi-use team sows 40 to 45 additional non-replicated wheat variety demonstration tests at sites throughout Oklahoma. All but five of these sites are located on-farm and are conducted with the assistance of farmer-cooperators.

Results

Field day attendees typically represent over 1.7 million acres of wheat and report an average perceived value of the information received at field day events to be \$21.46 per acre for a total impact of over \$37 million annually.

Wheat phenological data, forage yield, grain yield, test weight, and protein content data were collected and posted near real time on the Oklahoma small grains variety testing site at www.wheat.okstate.edu. This site received an estimated 30,000 page views in 2014 and was reinforced with the @OSU_smallgrains Twitter feed which currently has over 950 followers. Hard copies of results were distributed to over 8,000 stakeholders in the state of Oklahoma via direct mailing and to over 700 producers via electronic copy. In-season recommendations and progress reports were provided by the World of Wheat blog at www.osuwheat.com. The blog received over 19,000 page views in 2014 and visitors represented 108 countries with most visitors originating from the US, France, and Canada.

4. Associated Knowledge Areas

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

Outcome #5

1. Outcome Measures

Improving Resistant Weed Management in Wheat

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Herbicide resistant weeds cost U.S. farmers \$2 billion annually and 60 million acres are infested. Weed control represents a significant expense for farmers, but increased yields associated with controlling weeds generally far exceed the herbicide cost. When farmers rely too heavily on one herbicide chemistry or mode of action there is potential to select for herbicide-resistant weed populations. If farmers are aware of herbicide-resistant weeds in their fields, they can rotate crops, herbicide mode of action, or implement hand weeding to control the problem before it grows too large. If farmers are unaware of the presence of herbicide-resistant weeds, the return on their herbicide investment and grain yields will be greatly reduced.

Oklahoma farmers sow 5.3 million acres of wheat annually, and grassy weeds, such as Italian ryegrass, significantly limit wheat grain yield and marketability. Acetolactate synthase inhibiting herbicides (ALS) are the most popular herbicides for Oklahoma wheat farmers, but it is estimated that at least 50% of Italian ryegrass in Oklahoma wheat fields is ALS resistant.

What has been done

In 2014 the Oklahoma State University Weed Science Extension Program provided a free herbicide resistance diagnostic service to producers. Samples from 15 weed populations in Oklahoma were submitted for analysis, and samples represented some of the most difficult-to-control weeds in Oklahoma agriculture such as cheat, Italian ryegrass, marestail, Palmer amaranth, waterhemp and kochia. The most common resistant weed species in Oklahoma was ALS-resistant Italian ryegrass and approximately 50% of Italian ryegrass populations sampled in OK were found to be ALS-resistant.

Results

Herbicide cost to control non-resistant Italian ryegrass is approximately \$8.25 per acre; however, this cost jumps to \$28.80 per acre if the Italian-ryegrass is ALS resistant. So, prevention of herbicide resistance would save a 2,500 acre wheat farmer approximately \$50,000 in herbicide costs annually. Research has shown that Italian ryegrass reduces wheat yield by 12 bushels per acre, and knowing the best weed control strategy to implement for control of Italian ryegrass would allow a 2,500 acre farmer to eliminate these losses adding another \$220,000 to their bottom line.

The goal of this program is to help producers identify herbicide-resistant populations the first year they are experienced and offer alternative management solutions. As little as 20 minutes of hand weeding or spot application of a nonselective herbicide can prevent a small resistant population from growing out of control in a farm, state, or region. It is estimated that at least 900,000 acres of wheat are impacted by Italian ryegrass in Oklahoma. Modest progress in combatting herbicide-resistant Italian ryegrass could easily generate an additional \$20 million in Oklahoma farm revenue.

Notes: Assumes \$7.35 per bushel for HRW June 2014. NASS 2014 crop year data - 2.33 million

acres planted and 1.54 million harvested. Most in this region that is not harvested is overseeded with ryegrass. Many farmers stopped cutting grain because they gave up the fight against Italian ryegrass. Assume that 0.5 of non-harvested acres could be cut for grain = 0.4 million. Assume 33% of acres harvested in the region have some level of Italian ryegrass = 0.5 million. So, a conservative estimate is about 900,000 acres affected.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
213	Weeds Affecting Plants

Outcome #6

1. Outcome Measures

New Herbicide Program Approach for Rescuegrass Weed Control in Wheat Production Systems in Oklahoma

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Currently, no conventional post-emergence herbicide treatment approaches are capable of controlling rescuegrass (*Bromus catharticus*) with only a few herbicides showing suppressive impact at low to moderate levels.

What has been done

Ongoing research and extension efforts are documenting the effectiveness and impact of pre-plant or pre-emerge herbicide application in wheat production systems for rescuegrass control. Rescuegrass, a brome grass, is a particularly difficult weed to control in wheat production systems.

Results

Two current herbicides evaluated in the past few years, used alone or in tank mix combinations,

have suppressive efficacy ratings of 70-90% utilizing a pre-plant or pre-emergence application method. They are Olympus™ and PrePare®. Research findings have been presented in numerous grower meetings and crop conferences along with extension field tours documenting and demonstrating these products and the application approach. According to industry representatives one of these products, PrePare®, has been sold for 90,000 acres in Southwest Oklahoma. This agrees with verbal and visual observations of extension professionals working with these products. Approximately 800 producers have been reached through 2 multi-state crops conferences, several local and area crops meetings, and 4 extension field tours where this application approach was demonstrated. Evaluations conducted at two crops conferences, where data from these field trials were part of the program, indicated that 43% and 32% of producers expected to make at least minimal changes in their production systems related to information presented at the meetings. The evaluation further showed that the average dollar value of impact for individuals attending these meetings was approximately \$5500 each. These studies continue to be met with positive reception among producers with continued requests and interest in the results and findings.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
213	Weeds Affecting Plants

Outcome #7

1. Outcome Measures

Economics of foliar fungicides for hard red winter wheat in the southern Great Plains

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Foliar diseases such as leaf rust (*Puccinia triticina* Erikss.), stripe rust (*Puccinia striiformis* Westend. f. sp. *tritici* Erikss.), and powdery mildew [*Blumeria graminis* (DC.) Speer f. sp. *tritici* emend. É.J. Marchal] often reduce the grain yield of winter wheat in the southern Great Plains. Yield losses from leaf rust alone have averaged over 3% per year from 1980 to 2011 in Oklahoma, with some individual year losses in excess of 10% (USDA ARS, 2012). Historically,

control of these diseases through foliar fungicide applications has not been economical for U.S. producers. As a result, management of foliar diseases has largely relied on genetic resistance and other cultural practices such as crop rotations. However, in recent years there has been a growing interest in reevaluating fungicide treatments as part of an economically optimal foliar disease management plan.

What has been done

Primary data were produced in on-farm variety field trials managed by, agronomist Jeffrey T. Edwards and plant pathologist Robert M. Hunger.

Field days enabled direct observation of findings by farmers and ag business professionals. Findings were also made available on the web and via blog postings.

Findings were made available to the scientific community via a refereed journal article: Thompson, Nathanael M., Francis M. Epplin, Jeffrey T. Edwards, and Robert M. Hunger. Economics of foliar fungicides for hard red winter wheat in the Southern Great Plains. *Crop Protection* 59(2014):1-6.

Results

When averaged across years, plots to which fungicide was applied generated greater average net returns than plots that did not receive fungicide for susceptible varieties at one location, and for all varieties at another location. However, foliar fungicide application was not economical in every year at either location suggesting fungicide use should be reassessed each year given that profitability depends on year specific yield potential, prices, and foliar disease conditions. At both locations high disease incidence occurred in all but one site-year when the average March through May relative humidity exceeded 65%.

Additional research would be required to test the relationship between relative humidity and other environmental factors and disease incidence. The ultimate goal would be to develop an economic threshold decision aid that could be used to provide a timely recommendation to farmers based on conditions for specific locations for the specific growing season enabling growers to apply fungicide in regions and years with a high probability of economic benefit and avoid treatment in regions and years with a low probability of economic benefit.

Results of this analysis suggest that fungicide treatment on hard red winter wheat in the southern Great Plains can be an economically sound management strategy under some conditions. Despite the variable response, fungicide treatment did tend to protect producers from the downside risk of large yield losses in years of high disease incidence and severity, especially when growing wheat varieties susceptible to common foliar diseases.

4. Associated Knowledge Areas

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

Outcome #8

1. Outcome Measures

No-Till Oklahoma Conference

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

No-till crop production systems are an accepted practice to minimize soil erosion. While no-till acreage in Oklahoma is no doubt increasing the state lags the national trend by about 10 years. Two primary items have slowed no-till adoption in Oklahoma. The first is grazing of winter wheat, either in graze out or dual purpose production systems and the second is the adoption of rotational crops.

What has been done

OSU Specialists have worked to establish Oklahoma State University as a leader in the tillage/cropping systems area. A conference has been conducted annually since 2008. The planning committee consists of producers, educators, government agency personnel, and industry representatives. Conference topics focus on issues related to reducing tillage operations in crop production systems specific to the Southern Great Plains. The 2-day conference is typically attended by more than 200 producers, educators, advisors, and policy makers.

Results

Producers were surveyed at the 2014 conference regarding their farm size, percent of farm in no-till, and their perceived value of the conference. There were almost 150,000 no-till acres represented at the conference and the average value of the information was \$13.25 per acre. While there was certainly variation in responses, the total value of the conference based on the attendees' perception was estimated to be between \$1million and \$2 million. Given that no-till reduces erosion on average by 2.25 tons per acre per year this represents an annual reduction in erosion of approximately 335 thousand tons per year.

4. Associated Knowledge Areas

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

Outcome #9

1. Outcome Measures

Fertilization and economic feasibility of sweet sorghum grown as biofuel feedstock using commercial fertilizer

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

A reticular set of environmental, agricultural, and energy issues may be alleviated through beneficial re-use of poultry litter as a nutrient source to poor quality soils for production of sweet sorghum as biofuel feedstock.

What has been done

This study assessed the viability of an integrated biofuel system that seeks to increase profitability of producing a biofuel crop using an organic by-product as an alternative to commercial fertilizer (CF). Sweet sorghum was established annually for three years on a relatively poor quality soil. Poultry litter was annually applied at four different application rates and CF applied at equivalent nitrogen (N), phosphorus (P), and potassium (K). Yield and changes in soil properties were monitored. Yield and input costs were used to determine economic return and viable litter transportation distances. Our results are in the process of being extended to producers and stakeholder sin the biofuel industry.

Results

OSU research field experiment results (published in Agronomy Journal) found that after three years of litter application, several soil quality parameters increased for litter amended soils compared to CF. Overall yields increased with nutrient application rate and yields from litter were not significantly different from CF, although economic return was greater for litter. While increased nutrient application rate increased overall economic return, this was a function of the year (i.e. climate). As a result of increased economic return from litter compared to CF, litter could be transported various distances depending on application rate. Break-even transport distance

decreased with increased application rates. Use of litter as a nutrient source for growing sweet sorghum as biofuel feedstock can potentially improve water quality in source watersheds, improve soil quality, and reduce dependence on fossil fuels in an economically sustainable manner.

4. Associated Knowledge Areas

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

Outcome #10

1. Outcome Measures

Drought monitoring: a system for tracking plant available soil moisture based on the Oklahoma Mesonet

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Real-time drought monitoring is essential for early detection and adaptive management to mitigate the negative impacts of drought on the people, economy, and ecosystems of Oklahoma, and improved drought monitoring is a key need identified in the 1995 Update of the Oklahoma Comprehensive Water Plan. Drought impacts can be severe in Oklahoma. For example, the 2006 drought cost the state's economy over \$500 million from lost crop production alone. While drought monitoring is critical to Oklahoma's resource managers, it is hampered by a lack of data on a crucial drought indicator: plant available water. Crop yield losses and, by extension, the economic impacts of drought, are strongly linked to plant available water. Plant available water (PAW) is the amount of soil moisture currently in the profile which is available for plant uptake. Some water is held so strongly by the soil that it is not available to plants. The goal of this project was to improve drought monitoring in Oklahoma through the development of a Mesonet-based system for tracking plant available water.

What has been done

The project team collected and analyzed intact soil samples from each Mesonet site to determine the soil properties controlling the plant availability of soil moisture. The measured soil properties

and the daily Mesonet soil moisture sensor data were combined to create operational daily PAW maps on the Mesonet website. This project resulted in educational opportunities and career training for five undergraduate students and one graduate student. The project has also directly contributed to the publication of two peer-reviewed journal articles, multiple scientific presentations and press releases, and two new funded research projects worth over \$300,000, which build upon the PAW monitoring system.

Results

No other state in the nation and no other region in the world has a drought monitoring system like the one developed in this project. The new Mesonet PAW system provides resource managers with reliable, daily information on the remaining reserves of PAW. This system enables end users to more effectively adapt their management strategies. For example, by knowing early that PAW is decreasing and reaching critical minimum values, ranchers, facing the potential for reduced pasture, can make early arrangements to purchase hay or could sell cattle early, when prices are more favorable. Further, government agencies, such as the Oklahoma Water Resources Board, can gain a clearer picture of the extent of drought effects in the state and could target relief efforts more effectively. The new daily PAW maps are embedded in the "Soil Moisture" section of the Mesonet website (www.mesonet.org), which reaches thousands of citizens every month. Since the PAW system was added, extension personnel indicate an increased interest in soil moisture information and both small and large agricultural producers have stated that they now monitor the PAW conditions on a regular basis using the Mesonet.

4. Associated Knowledge Areas

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

Outcome #11

1. Outcome Measures

Canola Integrated Pest Management

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Canola is a potentially valuable rotation crop for Oklahoma wheat growers. It allows them opportunities to manage difficult grassy weeds such as Italian ryegrass, and cheat while providing them with an additional cash crop. Harvested acreage in Oklahoma has grown from 41 acres in 2002 to over 150,000 acres in 2011-2012 worth ca. \$55.1 million. However, insect pests (aphids and caterpillars) regularly infest winter canola throughout winter and spring causing economic damage. In 2007, canola producers were surveyed about their pest management concerns and listed insects as the second most important production problem that they faced and aphids (cabbage, turnip and green peach aphids) the key insect pest problem. Because producers were unfamiliar with their management, they often made multiple insecticide applications to control them with limited success.

In addition, blackleg, a disease caused by *Leptosphaeria maculans* had become a concern among growers.

What has been done

Entomologists and area agronomists conducted research demonstrations from 2005-2007 to evaluate management strategies for canola aphids. They determined that aphids could be effectively managed with a combination of insecticide seed treatments and regular scouting using a threshold of 200 aphids per plant. OSU Plant pathologists are currently screening germplasm for resistance to blackleg. They have identified five races for use in screening germplasm for resistance to blackleg disease.

Results

The research demonstrations showed that producers could save an average of \$30 per acre by reducing insecticide applications from four per season to one with no loss in yield. This resulted in \$3.7 million in potential cost savings in the 2013-14 canola crop.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Diseases and Nematodes Affecting Plants
216	Integrated Pest 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

Brief Explanation

Drought conditions continue to make research and trials difficult.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Wheat seed producers and merchandizers regularly provide sales data to help verify acreages planted to various varieties. - see State Defined Outcomes

Post demonstration trials field days' evaluations are completed by participants to estimate value of information. - See State Defined Outcomes

Field trials are regularly used to test research findings. - see State Defined Outcomes

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Plant Biological Technology

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
123	Management and Sustainability of Forest Resources	0%		5%	
132	Weather and Climate	0%		5%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		25%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%		15%	
206	Basic Plant Biology	0%		15%	
211	Insects, Mites, and Other Arthropods Affecting Plants	0%		5%	
212	Diseases and Nematodes Affecting Plants	0%		30%	
	Total	0%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	12.0	0.0
Actual Paid	0.0	0.0	12.2	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	607491	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	607491	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	3010905	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Design and conduct research, including the development of methods and procedures
- Write and submit grant proposals to private, state and federal agencies
- Generate scientific publications - communicating scientific results to a wide range of scientists
- Training of professional scientists - graduate and undergraduate students, technicians and post docs in the scientific discipline
- File patents

2. Brief description of the target audience

- Scientists and scientific societies
- Governmental science organizations
- Educational institutions
- Applied researchers and extension specialists
- Students
- Private, federal, state, and industrial funding agencies
- Other stakeholders (producers, consumers, educators, public)

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

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

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

Patent Applications Submitted

Year: 2014
 Actual: 4

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	0	36	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Grant proposals written and submitted

Year	Actual
2014	36

Output #2

Output Measure

- Peer-reviewed publications including journal articles

Year	Actual
2014	38

Output #3

Output Measure

- Graduate students graduated

Year	Actual
2014	11

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Graduate students graduated
2	Improving biomass yield and stress tolerance of biomass crops
3	Adaptation to abiotic stress

Outcome #1

1. Outcome Measures

Graduate students graduated

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	11

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
206	Basic Plant Biology
212	Diseases and Nematodes Affecting Plants

Outcome #2

1. Outcome Measures

Improving biomass yield and stress tolerance of biomass crops

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

: Increase in global temperature, air pollutants such as ozone and the erratic rainfall regimes leading to extended drought pose significant threats to agricultural production not only in Oklahoma, but the entire world. The decrease in arable land compounded by the climate change issues has led to significant reductions in crop yields that will ultimately impact the cost of food, fuels and fodder. Understanding the molecular processes in plants that leads to this decrease in production will provide us with tools for tweaking those pathways and ensure sustainable production in the wake of climate change.

What has been done

Identifying key genes involved in drought stress signaling will provide rational candidates for engineering drought resistant plants. Since drought is a perennial problem in the state of Oklahoma, our research on characterizing key genes involved in drought resistance will have a significant economic impact. Drought is a problem that affects US agriculture and nearly 80% of yield losses world-wide are attributed to water-deficits.

Results

Our research on the Arabidopsis RNA binding protein involved in drought signaling shows the interconnections between the biotic and abiotic stress signaling mechanisms in plants. In the future we will determine the functional role of RBP45b in drought signaling. We will seek to identify the homologs of this key drought responsive protein in wheat. We are also expanding our research on drought in switchgrass, an important biofuel crop. Understanding how the switchgrass plants are able to generate their massive biomass with very limited water will enable us to engineer plants with high water use efficiency.

Plants are exposed to multiple stresses simultaneously in nature. Yet, most studies of plant stress responses are conducted using a single stressor at a time. A combination of drought and ozone stress simultaneously in *Medicago truncatula* evoked unique sets of genes that were not identified when the stressors were applied singly. This indicates plants perceive combined stress as a new stress state and not just an additive effect of the single stresses. These results indicate that studies on stress tolerance should consider co-occurring stresses that are likely to occur in field conditions.

4. Associated Knowledge Areas

KA Code	Knowledge Area
---------	----------------

201	Plant Genome, Genetics, and Genetic Mechanisms
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
206	Basic Plant Biology

Outcome #3

1. Outcome Measures

Adaptation to abiotic stress

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	6

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

MicroRNAs, a class of small noncoding RNAs are, well known for their gene regulatory roles by destroying or repressing translation of the mRNA targets. We are conducting research that might identify miRNAs that might be important for adaptation to abiotic stress conditions. Our recent studies in this direction are described below.

What has been done

1). Identification of oxidative stress induced microRNA in Arabidopsis

Our previous research has shown that miR398 that targets superoxide dismutases is down-regulated under oxidative stress conditions. In contrast, we found an oxidative stress-induced miR395 in Arabidopsis. Because this miRNA is highly conserved among the angiosperms it is highly likely that it will also be regulated in similar fashion in other plants as well.

2). Identification of the upstream biochemical pathway involved in regulating miR395 expression under stress conditions using mutants defective in redox signaling.

In plants, changes in cellular redox properties have been observed under a variety of biotic, abiotic stresses including nutrient deprivation. It has been reported previously that the reduction potential was increased in spinach leaves subjected to S- and P-deprivation and N-deprivation. The readjustment of redox homeostasis fails when excessively available electrons are transferred to oxygen producing reactive oxygen species (ROS), establishing strong electron sinks and thus inducing oxidative stress. The thiol redox homeostasis is maintained by NADPH-dependent thioredoxin reductases (NTRa, -b and -c) - thioredoxin (TRX) and glutathione reductase - GSH-dependent glutaredoxin (GRX) systems that modify target proteins facilitating stress responses in plants. In order to identify if redox signaling plays a role in miR395 expression under S-

deprivation, we used *cad2* mutant which is partially defective in GRX system, and *ntra/ntrb* double mutant which is partially defective in TRX system as well as *ntra/ntrb/cad2* triple mutant, which is partially defective both in GRX and TRX systems. Compared to wild-type *miR395* levels, in single (*cad2*), double (*ntra/ntrb*) and triple (*ntra/ntrb/cad2*) mutants grown under S- deprived conditions approximately 20, 50% and 45% decrease in induction of *miR395* levels, respectively. These findings unequivocally demonstrated the involvement of redox signaling in inducing *miR395* expression under S-deprivation. Our lab and many other laboratories around the world have shown that the expression of miRNAs is either induced or down-regulated under stress in a variety of plant species. However the upstream signaling pathway that regulates/activates these miRNAs is completely unknown. The study reported the first characterization of upstream biochemical pathway involved in regulation of a miRNA expression in plants.

3) The Role of microRNAs in salt tolerance of *Thellungiella salsuginea* and *T. parvula*
 Soil salinity is one of the primary causes of crop losses worldwide. *Thellungiella salsuginea* and *T. parvula*, both are naturally adapted salt-tolerant species, thus emerged as important model systems for dissecting molecular basis of salt tolerance in plants. Although both of these species are salt-tolerant compared to its close relative *Arabidopsis*, but differ in their tolerance to salinity. The analysis of these two plant species will allow comparison of the responses between two closely related plant species with contrasting salt tolerance. miRNA profiling has revealed numerous novel miRNAs expressed in these plant species. Most importantly several conserved miRNA families and novel miRNA families are differentially regulated during salt stress.

Results

Six peer-reviewed journal articles were published in 2014. Funding from the NSF-REU helped in recruiting an African-American student (female) from Langston University in the summer of 2014. Significant progress has been made in the OCAST funded project on characterization of miRNAs involved on salt tolerance. Scientists chaired a session on Abiotic Stress at the PAG-Asia-2014, Singapore and co-chaired a session at the Pearl Millet Genome Sequencing Consortium, Shenzhen, China; and were invited to give a seminar in the International Crops Research Institute for Semi-Arid Tropics (ICRISAT), India, Kunming University of Science and Technology, China, University of South Dakota, Vermillion, and University of Alabama, Huntsville.

4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
206	Basic Plant Biology
212	Diseases and Nematodes Affecting Plants

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

Brief Explanation

Research in plant biotechnology and crop improvement has been negatively impacted by the very limited federal funding for agricultural research in general. Further, irrational levels of government regulation, mostly at the international level, regarding transgenic plants has a serious chilling effect on research progress in this area.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

None

Key Items of Evaluation

None

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Commercial and Consumer Horticulture

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
124	Urban Forestry	8%		10%	
202	Plant Genetic Resources	10%		10%	
204	Plant Product Quality and Utility (Preharvest)	15%		15%	
205	Plant Management Systems	36%		40%	
502	New and Improved Food Products	18%		20%	
901	Program and Project Design, and Statistics	3%		5%	
903	Communication, Education, and Information Delivery	10%		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	12.0	0.0	3.0	0.0
Actual Paid	23.0	0.0	2.1	0.0
Actual Volunteer	25.6	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
228000	0	104912	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
228000	0	104912	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
2637600	0	519975	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

•Conduct research to evaluate cultivars of traditional and nontraditional horticultural crops and ornamental plants. •Conduct research into crop cultural systems, particularly the feasibility of horticultural crops in rotation with agronomic crops. •Management of website for grape production for eXtension. •Conduct research to develop "seed to market" production systems for high-value alternative horticultural crops like cilantro and herbs. •Conduct research to develop sustainable and/or organic production systems for commercial horticultural crops. •Provide demonstrations and education and disseminate information to support Oklahoma's commercial horticulture industry, with emphasis on electronic resources. •Survey Oklahoma Consumers (Gardeners) to assess the needs and wants of the gardening public. •Upgrade the web-based delivery. •Review and revise annually or as needed Fact sheets and other publications. •Educational programs focused on Consumer Best Management Practices (BMP) for the conservation of energy, water resources, water pollution prevention, Integrated Pest Management (IPM), and urban landscape wildlife conservation. •Educational programs are conducted based on public interest and County Educator requests. •Participate and support eXtension Consumer Horticulture/Master Gardener Community of Practice. •Conduct Master Gardener/Junior Master Gardener Training. •Conduct pesticide training and education. •Assist in Youth at Risk and Obesity/School Gardens.

2. Brief description of the target audience

Horticultural crop producers, commodity groups, food processors, landscape professionals, input suppliers such as seed and chemical companies, peer scientists, extension specialists and county professionals, horticultural dealers and merchants, greenhouses, Master Gardeners, home owners, communities, and youth.

3. How was eXtension used?

In 2014 approximately 28 responses were provided by state specialists to users of eXtension through the Ask an Expert feature of the Gardens, Lawns & Landscape Community of Practice eXtension web site.

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	77400	29700000	4155	4000

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	36	19	55

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- New Master Gardeners trained

Year	Actual
2014	245

Output #2

Output Measure

- Manuscripts submitted for consideration of publication in peer-reviewed journals

Year	Actual
2014	19

Output #3

Output Measure

- Number of Extension publications completed - fact sheets, newsletters, trial reports, web-based materials

Year	Actual
2014	63

Output #4

Output Measure

- Number of statewide "Oklahoma Gardening" shows produced

Year	Actual
2014	37

Output #5

Output Measure

- Number of Funded Grant Proposals

Year	Actual
2014	15

Output #6

Output Measure

- Number of potential fresh market growers of horticulture crops trained

Year	Actual
2014	85

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of horticultural crop producers newly certified as organic
2	Number of volunteer hours provided to community horticulture programs statewide
3	Number of home gardeners experiencing increased awareness and knowledge about environmental issues and IPM principles
4	Pecan Suture Split Research
5	Sensor-Based Fertilization Control in Ornamentals

Outcome #1

1. Outcome Measures

Number of horticultural crop producers newly certified as organic

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)

Organic produce is an important niche market for fresh market fruit and vegetable producers within the state. A segment of consumers are interested in having more certified organic produce available for purchase. As a result there is demand for more certified organic farmers who can fill this market demand.

What has been done

As a Land Grant institution Oklahoma State University has committed both people and resources to develop a research and outreach programs to provide research based information for organic farmers. In addition, this effort is in collaboration with the Oklahoma Department of Agriculture Food and Forestry's (ODAFF) Organic Certification program to provide both information and certification to increase the number of organic farmers available to fill this developing market.

Results

During the past 12 months ten newly certified organic producers have been added to the ODAFF certified list. Contact: Dr. Lynn Brandenberger at: lynn.brandenberger@okstate.edu

4. Associated Knowledge Areas

KA Code	Knowledge Area
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
502	New and Improved Food Products

Outcome #2

1. Outcome Measures

Number of volunteer hours provided to community horticulture programs statewide

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	80384

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Rapid urban growth in many areas of the United States coupled with increased interest in the environment and home gardening have prompted an ever-increasing number of garden and landscape inquiries. Along with this interest, comes a multitude of gardening questions needing individual explanation and too few Extension staff members to answer each question. Many of these questions are seasonal in nature and are relatively easy to answer assuming that one has horticulture training.

What has been done

Oklahoma Master Gardeners are trained, supervised and recruited to: 1) improve overall efficiency in providing one-on-one service to the non-commercial horticulture clientele in the county, 2) provide group learning and teaching activities for non-commercial clientele, 3) allow agents to develop proactive Extension programs, and 4) form a group of Extension volunteers to support additional consumer horticulture efforts.

Trainees participate in a 10 - 13 week course receiving between 40 - 56 hours of course work on subjects including: basic plant science, vegetables, fruits, nuts, ornamentals, lawns, diagnosing pest problems, soils, and other related topics. Upon completion of the training period, satisfactorily passing an exam on materials and topics covered, and donating between 40 - 56 hours of volunteer time to the Horticulture program, the trainees are certified and awarded the title of Oklahoma Master Gardener.

Examples of Master Gardener Volunteer activities include: staffing plant clinics to answer phone and walk-in questions, manning educational exhibits, maintaining demonstration gardens, community beautification projects, serving as 4-H hort leaders and judges, speaking at club/civic meetings, teaching horticulture activities at nursing homes, etc., assisting in horticulture mailings, newsletters, etc., and appearing on TV and radio.

Results

The service from the Master Gardener volunteer program has proven to be a highly popular means of extending the knowledge of the Oklahoma State University Cooperative Extension Service to the residents of Oklahoma. The Oklahoma Master Gardener Program now has 28 counties participating in the program as of January 2015. The following data was provided by 20 of the 28 counties. Approximately 255 new Master Gardeners were trained during the 2014 training season. Close to 1,209 active Master Gardeners volunteered their time, contributing approximately 80,384 volunteer hours resulting in over 6,417,767 educational interventions with Oklahomans and as many as 2,510+ educational and community programs and activities being conducted in their communities in 2014. This translates to over \$1,678,418.00 in service that was donated by volunteers (wage rate of \$20.88/hour was used, which includes a 12% estimate of fringe benefits. This hourly rate is the assigned wage for non-management, non-agricultural workers in 2013 for the state of Oklahoma as published by The Independent Sector, an organization that "serves as a national forum to encourage giving, volunteering and not-for-profit initiative," http://www.independentsector.org/programs/research/volunteer_time.html). Reports are gathered yearly at the beginning of the following year.

In addition to the many hours donated, approximately 1,200 pounds of produce was donated to local food pantries/kitchens, shelters, and other organizations throughout Oklahoma by the Master Gardeners.

4. Associated Knowledge Areas

KA Code	Knowledge Area
124	Urban Forestry
205	Plant Management Systems
903	Communication, Education, and Information Delivery

Outcome #3

1. Outcome Measures

Number of home gardeners experiencing increased awareness and knowledge about environmental issues and IPM principles

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	5554

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Public concern for the environment continues to increase. Traditional landscape management practices have involved extensive use of pesticides, fertilizers, and other materials that could harm the environment if not used properly. Integrated Pest Management (IPM) uses biological principles, cultural practices, and some chemicals to control pest populations with minimal environmental impact.

What has been done

Over 2,510 gardening programs and IPM workshops, educational programs/seminars and Oklahoma Gardening segments are used to educate the public of IPM practices and other related gardening topics. A train-the-trainer workshop on IPM was conducted with 57 participants representing 22 counties and one commercial business (garden center employees).

Results

Participants evaluated the program using a pre and a post-test to capture Knowledge, Attitudes and Skills changes of the participants with a (Likert Scale: 1=Very High, 5 = Very low). On average, participants increased their Understanding of IPM (Before 2.85, After 4.13), and had a positive attitude change towards using IPM (3.13 Before, 3.69 After). They also increased their confidence about using and applying and teaching IPM principles (Skills Change) to their clientele (2.42 Before, 3.64 After).

Homeowners are better educated and can make choices in maintaining the landscape that are more environmentally friendly. Participants of the IPM workshop have conducted numerous presentations to other MG volunteer groups as well as the public.

4. Associated Knowledge Areas

KA Code	Knowledge Area
124	Urban Forestry
205	Plant Management Systems
903	Communication, Education, and Information Delivery

Outcome #4

1. Outcome Measures

Pecan Suture Split Research

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Certain thin-shelled pecan cultivars tend to split at the shell suture when harvested early in the season. When harvested later in the season suture splits are infrequent. Early season harvest is desirable because pecan demand and prices are highest at the start of the season.

What has been done

OSU researchers demonstrated that suture split was related to high kernel moisture nuts being exposed to high solar radiation when shaken from the tree in preparation for harvest. Up to 10% of the harvested nuts had split sutures, a condition substantially reducing nut value. If high moisture nuts were harvested on cloudy days or shaken in the evening and harvested the next morning split sutures were reduced to less than 2%.

Results

Based on current pecan prices this modification in harvest procedures represents a savings of about \$100 to \$220/acre for cultivars subject to suture split. Contact: Dr. Mike Smith at: mike.smith@okstate.edu

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems

Outcome #5

1. Outcome Measures

Sensor-Based Fertilization Control in Ornamentals

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

According to a 2007 United States Department of Agriculture specialty crop census, the floriculture industry in Oklahoma is valued at approximately \$14 million. Economic margins are often extremely tight for growers, so they are constantly looking for efficient ways or new technology to improve productivity, enhance competitiveness, and increase sustainability with efficient fertilizer use.

What has been done

Over the last three years, GreenSeeker, SPAD, and atLEAF optical sensors have been evaluated as a nondestructive, rapid method for predicting plant nitrogen status in 12 different ornamental crops. Three journal articles, an OSU fact sheet, and an iphone app have resulted from the research.

Results

The OSU fact sheet alone has been viewed over 600 times since being published online a year ago. OSU researchers found that sensor-based fertilization control can greatly improve fertilizer applications and thus nutrient run-off, cutting the initial fertilizer application or subsequent applications by 20%. It is estimated that just in Oklahoma, this could save ornamental growers \$100,000 per year in fertilizer costs. The scope of impact is multi-state national. Contact: Dr. Bruce Dunn at: bruce.dunn@okstate.edu

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

In 2014, the IPM team developed and delivered an **Advanced IPM Workshop for Master Gardeners**. 54 Master Gardeners received 12 hours of training that included information on Scouting, Diagnosing problems, Cultural, Biological, Mechanical and Chemical Controls. Participants evaluated the program using a pre and a post-test to capture Knowledge, Attitudes and Skills changes of the participants with a (Likert Scale: 1=Very High, 5 = Very low). On average, **participants increased their Understanding of IPM** (Before 2.85, After 4.13), and had a **positive attitude change towards using IPM** (3.13 Before, 3.69 After). They also increased their **confidence about using and applying and teaching IPM principles (Skills Change) to their clientele** (2.42 Before, 3.64 After).

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Ecosystem and Environmental Quality and Management including Weather and 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
104	Protect Soil from Harmful Effects of Natural Elements	5%		10%	
111	Conservation and Efficient Use of Water	20%		10%	
112	Watershed Protection and Management	15%		10%	
121	Management of Range Resources	5%		15%	
123	Management and Sustainability of Forest Resources	2%		10%	
132	Weather and Climate	5%		5%	
133	Pollution Prevention and Mitigation	5%		5%	
135	Aquatic and Terrestrial Wildlife	5%		5%	
136	Conservation of Biological Diversity	5%		5%	
141	Air Resource Protection and Management	13%		5%	
205	Plant Management Systems	10%		5%	
403	Waste Disposal, Recycling, and Reuse	5%		5%	
605	Natural Resource and Environmental Economics	5%		10%	
	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	9.0	0.0	14.0	0.0
Actual Paid	16.0	0.0	14.5	0.0
Actual Volunteer	1.4	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
165000	0	721895	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
165000	0	721895	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
1680000	0	3577925	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Conduct multi-disciplinary research on grassland fuel modeling as part of an awarded Joint Fire Science Program grant.

Provide agriculture and natural resource management technical expertise for weather and climate data and models maintained and operated by the Oklahoma Mesonet.

Create and deliver weather and climate education for the general public, agriculture and natural resource sectors through OSU SUNUP TV, online video/audio tutorials, fact sheets, email newsletters, educational programs, seminars and workshops. Some extension materials developed in 2014 were part of the extension program objectives of the USDA NIFA AFRI Grazing CAP #2012-02355.

Design and conduct research

Forge collaborative relationships that build on current strengths in research in management.

Partner with state and federal agencies to address pressing needs in conservation.

Produce scientific publications; disseminate information through other print and online media outlets.

Conduct workshops, field days, and other personal information exchanges to promote issues and alternatives in natural resource management.

Submit grant proposals

Produce scientific publications

Conduct Poultry Waste Management Education

Develop and deliver weather and climate education for the general public and agricultural sector will be conducted through weather reports on TV through OSU SUNUP, online video/audio tutorials, printable information and fact sheets, email newsletters, educational programs, seminars and workshops.

Multi-disciplinary research on grassland fuel modeling will be conducted as part of an awarded Joint Fire Science Program grant.

Investigate and develop weather-related decision tools in the areas of wildland fire management, plant disease prediction, livestock environmental management, and crop heat units as they relate to agronomic crop stage.

Provide agriculture and natural resource management technical expertise for weather and climate data and models maintained and operated by the Oklahoma Mesonet.

Develop and deliver weather and climate education for the general public, agriculture and natural resource sectors through OSU SUNUP TV, online video/audio tutorials, fact sheets, email newsletters, educational programs, seminars and workshops.

Conduct research and develop weather-based plant biomass models as a tool in ecosystem, rangeland and pasture management adaptation to climate changes.

Investigate and develop weather-related decision tools in the areas of wildland fire management, plant disease prediction, livestock environmental management, and crop heat units as they relate to agronomic crop stage.

Create factsheets, videos and webcontent to explain anaerobic digestion of animal manure to the layman and provide practicing engineers material to aid in design and operation.

Create factsheets, videos and webcontent to physical properties of of byproduct materials to the layman and provide practicing engineers material to aid in design of materials handling and physical treatment equipment.

2. Brief description of the target audience

Scientists, students, related agencies (Federal, State, private), land owners, farmers, ranchers, communities, consumers, land developers, state legislators, commodity groups, community leaders, homeowners

3. How was eXtension used?

Josh Payne has uploaded 22 frequently ask questions videos concerning animal mortality composting on the Animal Manure Management resource area. These videos have had 3,500 views.

Doug Hamilton has written 4 pages on anaerobic digestion in the Farm Energy resource area. The pages were visited by 2,740 users in 2014, with an average time on page of 4 minutes thirty seconds.

OSU is the lead institution on the eXtension controlled burning CoP.

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	12030	214616	2007	12000

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

Patent Applications Submitted

Year: 2014

Actual: 1

Patents listed

Phosphorus Removal Structure

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	28	45	73

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Grant proposals written and submitted

Year	Actual
2014	41

Output #2

Output Measure

- Manuscripts submitted for consideration of peer-reviewed publication

Year	Actual
2014	55

Output #3

Output Measure

- Extension conferences, workshops and training sessions

Year	Actual
2014	99

Output #4

Output Measure

- Research and Extension reports and fact sheets

Year	Actual
2014	33

Output #5

Output Measure

- Number of web-based weather related decision tools provided through Oklahoma Mesonet to improve crop and livestock production and safety and/or reduce costs

Year	Actual
2014	16

Output #6

Output Measure

- Weather-based decision support tools made operational and delivered through Oklahoma Mesonet websites for use on computer and mobile devices.

Year	Actual
2014	1

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of poultry producers and poultry litter applicators acquiring initial waste management certification and number maintaining certification
2	Number of animal waste analyses conducted for land application of beef, dairy or swine waste.
3	Number of animal waste analyses conducted for poultry litter application
4	Number of users accessing website designed to deliver information about water policy, conservation and efficient use
5	Number of downloads of Extension fact sheets and related education materials
6	Number of enrollments in conservation-related land management programs
7	Land area restored in Oklahoma through invasive/encroaching species removal
8	Land area restored in Oklahoma through prescribed fire or other practices
9	Access by users of Oklahoma Mesonet computer and mobile device weather and climate data and tools
10	Development of a Particulate Matter Data for Dispersion Model
11	Improving Irrigation Efficiency
12	Developing Management Strategies for Sub-surface Drip Irrigation
13	Solute and Contaminant Transport between Streams and Alluvial Floodplains
14	Improved Chicken Litter Handling and Transport
15	Bird collisions with U.S. buildings
16	Biophysical and hydrological parameterization of eastern redcedar using paired experimental watershed data
17	Carbon Sequestration in Oklahoma Forests and Probable Response to Climate Change

18	Grassland management to benefit wildlife and promote beef production in the Flint Hills - Number of Acres Management Changed
----	---

Outcome #1

1. Outcome Measures

Number of poultry producers and poultry litter applicators acquiring initial waste management certification and number maintaining certification

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	654

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The Oklahoma Register Poultry Feeding Operations Act requires all poultry farmers and litter applicators to attend 9 hours of educational training in the first year of operation, and an additional 2 hours of training annually until a total of 19 hours of training have been earned. Following the initial 19 hours of training, operators and applicators must attend two hours of training every three years. Training must include environmental processes relevant to maintaining water quality, proper manure handling techniques, nutrient management and record keeping, and relevant laws and rules relevant to poultry waste management in the State of Oklahoma.

What has been done

Since 1998, 2,700 people have completed the initial nine hours of required training. In 2014, 55 new producers completed the initial nine hours of training, and 599 completed an additional 2 hours of training. New subject matter developed in 2014 included a new resource manual "Record Keeping for Poultry Litter Applicators" designed to assist applicators with the record keeping process. This comprehensive tool included blank record forms, calculation spreadsheets, maps, regulatory information and nutrient management fact sheets in one easy to use resource.

Results

One hundred percent of initial nine hour attendees surveyed said the information they had learned would help them in their daily operations, with 88% strongly agreeing with the statement. Of 272 surveyed at continuing education classes, over 80% said they had improved waste handling practices, remained in compliance with regulations, and improved the efficiency of their operation as a result of poultry waste management education classes. Seventy-eight percent had implemented a new technology or practice, and 46% of those surveyed transferred litter out of

nutrient sensitive watersheds.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation
403	Waste Disposal, Recycling, and Reuse

Outcome #2

1. Outcome Measures

Number of animal waste analyses conducted for land application of beef, dairy or swine waste.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	75

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Producers are reluctant to adopt new technologies without firsthand experience with the technology. The North American Manure Expo began modestly 12 years ago in Wisconsin as a joint effort between Extension, manure applicators, and the agricultural equipment industry to provide live demonstrations of waste application equipment. The Expo has grown to become a major annual event, travelling to 13 American states and Canadian provinces.

What has been done

The North American Manure Expo travelled south for the first time in 2014, and was held July 8 and 9th in Springfield, Mo. The University of Missouri and Oklahoma Cooperative Extension Services acted as co-educational partners for the Expo. The two day event features live demonstrations of manure agitation equipment, sludge removal dredges, solid waste applicators, liquid manure injectors, as well as, cleaning and disinfection equipment. Fifty-three manure handling, applying and management companies participated in a one and a half day trade show. Educational classes offered in depth instruction on equipment operation, manure value optimization, new equipment for solid and liquid application, and environmental protection. A

special session was held on the manure applicators role in reducing the spread of Porcine Epidemic Diarrhea Virus.

Results

Over six hundred farmers, manure applicators, governmental agency personnel, Extension educators, and journalists attended the 2014 North American Manure Expo. Based on past surveys of Manure Expos, 57% of attendees said it was an important or very important source of information when they make manure application decisions. Ninety-two percent of farmers and applicators used what they learned at the Expo to do a better job of handling manure, and an identical percentage shared information they had gained at the Expo with others. Twenty-two percent of applicators saved money based on information learned at past expos, with average savings of \$6,500 per year.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation
205	Plant Management Systems
403	Waste Disposal, Recycling, and Reuse

Outcome #3

1. Outcome Measures

Number of animal waste analyses conducted for poultry litter application

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	461

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
133	Pollution Prevention and Mitigation
205	Plant Management Systems
403	Waste Disposal, Recycling, and Reuse

Outcome #4

1. Outcome Measures

Number of users accessing website designed to deliver information about water policy, conservation and efficient use

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	8780

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
605	Natural Resource and Environmental Economics

Outcome #5

1. Outcome Measures

Number of downloads of Extension fact sheets and related education materials

Not Reporting on this Outcome Measure

Outcome #6

1. Outcome Measures

Number of enrollments in conservation-related land management programs

Not Reporting on this Outcome Measure

Outcome #7

1. Outcome Measures

Land area restored in Oklahoma through invasive/encroaching species removal

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	168000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahoma landscapes evolved with frequent fire and decades of fire suppression have led to multiple problems ranging from loss of productive grazing land to increased water use and wildfire risk from woody encroachment. Many landowners understand the problem and would incorporate prescribed fire into management but they are limited due to liability concerns, lack of training, lack of equipment, and shortage of labor.

What has been done

OSU extension has assisted with forming locally led prescribed burn associations (PBAs). Through the PBA landowners pool labor and equipment to help each other burn, thereby reducing

liability and increasing the available labor and equipment at each burn. Landowners enrolled in PBAs are eligible for grants for equipment and training. NREM extension led development of the Oklahoma Prescribed Burn Association to assist PBAs with education, training, funding, and creation of new PBAs. This has also led to the formation of the Alliance of Prescribed Burn Associations with members from OK, TX, KS and NE to improve prescribed fire use and PBAs on a regional level.

Results

There are currently 21 PBAs in OK covering 37 counties with over 400 members. The OK PBAs conducted 303 burns on at least 168,000 acres 2001-2012. OSU extension along with other groups like the Noble Foundation has conducted 10 hands-on training workshops across the state with at least 500 people attendees. The online training has been very successful with 281 people enrolled in the course from over 15 states. We are continually updating the information and trying to make it user friendly to other states. The OK NRCS has adopted it for their basic training for employees and we are working with the NRCS at the national level to make it the introductory training for all NRCS employees. The Prescribed Fire CoP has 68 fire related articles and 58 Frequently Asked Questions on its site. There have been numerous ask the expert questions answered by its members. From this site NREM extension as also developed a Facebook page that has become very popular. NREM extension work with the OPBA has led to many improvements for landowners across the state. The latest include the availability of prescribed fire liability insurance, an FCC license for a statewide radio frequency for use by OPBA and its member PBAs, development of OPBAs website (ok-pba.org), and the purchase of 8 prescribed burn trailers for PBAs. They have safely conducted 1,100 burns on a half million acres in the past 15 years.

4. Associated Knowledge Areas

KA Code	Knowledge Area
104	Protect Soil from Harmful Effects of Natural Elements
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
121	Management of Range Resources
123	Management and Sustainability of Forest Resources
135	Aquatic and Terrestrial Wildlife
136	Conservation of Biological Diversity
605	Natural Resource and Environmental Economics

Outcome #8

1. Outcome Measures

Land area restored in Oklahoma through prescribed fire or other practices

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	168000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Rangelands in the U.S. are grazed by beef cattle that are not native to North America. Most parasitic flies of beef cattle also are not native. The horn fly, *Haematobia irritans* (L.), is the most economically damaging and widespread ectoparasite affecting livestock production with a 1991 estimate of annual losses on US pastured cattle production at \$876 million (equal to \$1.46 billion adjusted for inflation in 2012). Effective primary strategies for horn fly control on beef cattle rely on insecticides. In the 1980s, synthetic pyrethroid ear tags began providing season-long control but resistance is currently widespread. Therefore, alternative control strategies are needed for control of the horn fly and other ectoparasites of beef cattle on rangelands and other grazing lands.

What has been done

Ongoing research in Oklahoma and Iowa provided us the opportunity to assess the effect of burning, including patch-burn grazing, on parasitic flies of beef cattle.

Results

Effects of fire varied by location and species of parasitic fly. However, reducing horn fly populations below the economic threshold by managing rangeland with patch-burn grazing could potentially save tens of millions of dollars, in Oklahoma alone. These losses would be attributed only to improving cattle performance from reducing the number of horn flies and from reduced use of insecticide. Other benefits include reduction of other parasitic fly species, ticks, and internal parasites.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
121	Management of Range Resources
123	Management and Sustainability of Forest Resources
135	Aquatic and Terrestrial Wildlife
136	Conservation of Biological Diversity

205 Plant Management Systems
605 Natural Resource and Environmental Economics

Outcome #9

1. Outcome Measures

Access by users of Oklahoma Mesonet computer and mobile device weather and climate data and tools

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	792685

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The Oklahoma Mesonet has assembled and created weather-based tools that give Oklahoma agricultural producers and natural resource managers the opportunity to move from calendar-based to weather-based farm management. Weather-based farm management can act as a risk management tool that can be used to: reduce farm inputs, increase crop yield and quality, improve farm sustainability, provide new integrated pest management (IPM) opportunities, improve environmental protection and expand crop marketing information. The Oklahoma Mesonet provides farmers and ranchers weather-based risk management tools and information in a number of formats, including: website for desktop and tablet, iPhone app, Android app, and mobile website for other cellphone platforms.

Weather-based management has been made possible because the Oklahoma Mesonet operates one of the most data-rich weather networks in the world. Updated weather data are transmitted every 5 minutes from a statewide system of 120 automated weather-monitoring towers. This constant flow of verified, research-quality weather data are used to maintain a wide spectrum of weather and agricultural decision support products made available for computer and mobile devices.

The challenge in implementing weather-based agricultural management includes: providing intuitive decision-support tools, enhancing mobile device information delivery, expanding grower weather knowledge, and simplifying weather data display. These challenges are further complicated by agriculture's need for forecast, current, and climate perspectives in supporting farm and ranch management decisions.

What has been done

Oklahoma State University, the University of Oklahoma, and the Oklahoma Climatological Survey (OCS) through the Oklahoma Mesonet have created multi-faceted agricultural and natural resource extension/outreach online data and models. The Oklahoma Mesonet data has supported various agricultural and ecological research projects. Mesonet.org provides desktop and tablet access to weather data and products at no cost to Oklahoma farmers and ranchers. An Agriculture section within Mesonet.org organizes decision support products by crop and livestock commodity. Android and iPhone apps provide 5-minute weather, forecast, and radar information, wherever the user has mobile network access. Ongoing extension/outreach efforts inform growers about available products and introduction to weather-based farm management tools via farm show exhibits, educational presentations, television, web tutorials, and printed materials.

In 2014 efforts focused on expanding crop and livestock producer, agriculture industry professional and extension educator weather education. Educational presentations and National Weather Center tours provided information to a wide variety of agricultural groups, from producers to political leaders.

Working relationships with Kansas State University were organized to develop new extension publications that will provide basic weather and climate information. From an assessment in 2013 and a 2014 survey of extension educators in Oklahoma and Kansas, basic weather and climate information geared to agricultural audiences were identified as priority needs.

The Wheat First Hollow Stem Advisor was brought online in 2014. The Oklahoma Wheat Commission, Oklahoma Wheat Growers Association and the Oklahoma Cattlemen's Association along with Oklahoma Cooperative Extension Service produced a variety of news releases about the Wheat First Hollow Stem Advisor. Media venues included electronic newsletters, traditional newspaper, and television.

Results

The informal feedback from the Oklahoma agricultural community continues to be very complimentary of the Oklahoma Mesonet. Farmers and ranchers turn to the Mesonet to monitor rainfall and soil moisture on a regular basis as they monitor drought conditions that began in 2010. Conservative estimates of lost farm production in Oklahoma due to this drought cycle are over \$3 billion. Crop insurance has covered a portion of these losses.

Producers have noted how they use Mesonet to determine if a far away field received rain or not. This eliminates lost time, vehicle wear and tear, and wasted fuel. To minimize drift hazard, producers and custom applicators use the Mesonet Drift Risk Advisor.

Monitoring soil temperature has become increasingly important with the dramatic climb in seed costs to avoid seedling damage from cool soils. Soil moisture provides a way to monitor water available for crop production at the beginning of the planting season. Near Willow, OK a producer used 10 and 24-inch soil moisture to decide not to plant dry land cotton. Lack of rain during that growing season would have resulted in a failed cotton crop and no crop revenue to cover planting and crop care expenses.

Growers monitor current and forecast relative humidity to determine good times to bale hay or harvest crops. Hay producers use the Mesonet to monitor humidity changes for hay baling. The Mesonet allows them to monitor the field conditions from home and get more sleep. A rested farmer is a safer farmer.

An estimated 70% of agriculture producers and 90% of industry professionals in Oklahoma are using smartphones. This makes the Mesonet Android and iPhone apps important tools for delivering the latest weather information to those in the agriculture community. Close to 90% of the people we visit with at farm shows ask us to show them how to download the Mesonet apps on to their smartphone or mention they already have the app. Downloads of the Mesonet iPhone app have climbed to over 33,000, since its release in 2011. Android app downloads have reached 7,500, since December 2013.

Mark Hodges, past Executive Director for the Oklahoma Wheat Commission, has used Oklahoma Mesonet soil moisture and rainfall maps to build customer relations with international grain buyers of Oklahoma wheat. While Mr. Hodges has not put a direct value on Oklahoma Mesonet data, he has stated that Mesonet information has helped Oklahoma grain sellers market millions of bushels of wheat over multiple years to buyers in Mexico.

Mesonet serves agricultural and horticultural enterprises on several levels. Dennis Brigham of Bentley Turf Farms told how he uses weather information to help him schedule sod installation by his company's installation crews. One day north of Mustang, a Bentley Turf Farms' crew was busy laying sod, while to the southwest a severe storm cell spawned a funnel cloud. Mr. Brigham used the radar displayed by Mesonet to track a tornado that formed and direct their crew out of the path of this tornado to a safer location.

An economic survey completed by OU graduate student Kim Klockow using recognized economic analysis techniques, estimated that the 10% of Oklahoma crop land being managed with Oklahoma Mesonet data saved \$8 million in production costs in 2008. This estimated value did not include the Mesonet value to livestock producers for that year and only covered 10% of Oklahoma cropland.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
121	Management of Range Resources
123	Management and Sustainability of Forest Resources
132	Weather and Climate
205	Plant Management Systems

Outcome #10

1. Outcome Measures

Development of a Particulate Matter Data for Dispersion Model

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Robust data sets for evaluating and developing particulate matter dispersion models are virtually non-existent. Generally model developers will evaluate new algorithms against other models and not actual data. Particulate matter dispersion models over predict actual concentrations by a factor of 3.5 to 9. For the majority of industries that are permitted based on modeling results, an over prediction by a factor of two is the difference between being in compliance or not.

What has been done

A highly collaborative team led by a researcher in the OSU Biosystems and Agricultural Engineering has conducted stack and ambient particulate matter sampling tests in California, New Mexico, Texas, Missouri and North Carolina. This is the largest single site particulate sampling campaigns ever conducted. During a single sampling campaign 100 to 130 ambient sampling points are strategically placed around the facility -- ten times more than most ambient sampling campaigns previously conducted. In addition to ambient sampling, the research team is developing average emission rate for each of the point sources. The team is actively compiling the enormous dataset and developing plans to conduct the final large scale control release study. Upon completion, this particulate matter data set will be the largest and most complete resource of its kind.

Results

Use of the developed particulate matter data set could be used by model developers to significantly improve the accuracy and precision of dispersion models, which could lead to industry seeing reduced regulatory pressures due to regulatory agencies using models that are validated against actual data. State implementation plans could be refined as source level indicators will likely change based on modeling results.

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation
141	Air Resource Protection and Management

Outcome #11

1. Outcome Measures

Improving Irrigation Efficiency

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The demands for freshwater resources in Oklahoma continue to grow from agricultural, industrial, and urban sectors. The increase in drought frequency and intensity plus declining surface and groundwater resources pose significant challenges to water managers and decision makers. Irrigated agriculture and urban landscape are two of the largest users of freshwater in the state and have been significantly impacted by water scarcity during the past several years. Southwest Oklahoma is suffering from record droughts and the Lugert-Altus Irrigation District has not been able to deliver any irrigation water since 2012, due to the low water levels at Lake Altus. Producers in Oklahoma Panhandle are in a better shape as they have access to groundwater, but the water levels in Ogallala aquifer has been dropping constantly, reducing irrigation well capacities. With increasing water scarcity, many producers in eastern Oklahoma are also considering the installation of new or expansion of existing irrigation systems to be able to meet the crop water requirement during the peak season.

What has been done

A comprehensive program was initiated to foster the use of advanced sensor-based technologies to improve irrigation efficiencies and minimize water losses. This program involved 550 contact hours to educate clientele about recent advances in sensor technologies. In addition, numerous in-print, online, and audio/video educational materials were generated. Three demonstration sites were established in cooperation with local producers near cities of Hydro and Martha to showcase the application of different types of soil moisture sensors under different types of irrigation systems (sprinkler and drip). Another site was established at the Cimarron Valley Research Station to demonstrate the potential of this technology for grape irrigation.

Results

Agricultural producers and urban water managers have shown great interest in this program. Those produces who participated in the program speak highly about it and have encouraged their

peers to consider this technology. According to one of them, the use of sensors has also created new questions about his land and water management that he has not considered before. Recently I have been approached by several dryland farmers who are interested in using sensor-based technology to improve their operation, as they have seen the benefits of having knowledge about water content in the soil profile. In addition, several horticultural producers have shown interest in this technology and field visits have been scheduled in 2015 to assist them with purchasing, installing, and maintaining the sensors. We are in the process of talking to the state NRCS to offer cost-share for sensor installation as part of the EQIP program.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water

Outcome #12

1. Outcome Measures

Developing Management Strategies for Sub-surface Drip Irrigation

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Subsurface Drip Irrigation (SDI) systems offers great opportunities in terms of precision irrigation and fertilizer application, reduced labor costs, and improved water conservation due to minimized deep percolation, surface runoff, and soil evaporation. However, these potential benefits can only be achieved if these systems are managed and maintained properly. Several states have developed guidelines for managing SDI systems, but these guidelines are area-specific as climate, soil, water, and crop conditions have significant variability. The use of SDI systems is increasing in Oklahoma, necessitating the need to develop management strategies that are useful to Oklahoma producers. As SDI systems require large capital investments, failing to develop and implement appropriate management practices will lead into waste of money and natural resources. One area of particular concern in southwest Oklahoma is the risk of increasing soil salinity by changing from surface/sprinkler to SDI.

What has been done

An integrated research/extension program was initiated to develop and test management guidelines for SDI systems. Two management practices were tested at the OSU-Oklahoma Panhandle Research and Extension Center for irrigation amount and drip tape spacing for corn and sorghum. The results of this project are still being processed, but preliminary results show a great potential for conserving irrigation water. The yield of both crops was highly correlated to the level of irrigation application (50%, 75%, and 100%). But the spacing between crop rows and drip tapes did not seem to have a significant impact on the total yield. Crop emergence and rodent damages, two of the most common challenges in using SDI, were not observed at OPREC study. A pilot project was conducted on a cotton field in southwestern Oklahoma using SDI. The results showed that SDI can be very effective at stretching the limited water resources. However, field measurements indicated a considerable increase in soil salinity compared to an adjacent field under center pivot sprinkler system.

Results

An integrated research/extension program was initiated to develop and test management guidelines for SDI systems. Two management practices were tested at the OSU-Oklahoma Panhandle Research and Extension Center for irrigation amount and drip tape spacing for corn and sorghum. The results of this project are still being processed, but preliminary results show a great potential for conserving irrigation water. The yield of both crops was highly correlated to the level of irrigation application (50%, 75%, and 100%). But the spacing between crop rows and drip tapes did not seem to have a significant impact on the total yield. Crop emergence and rodent damages, two of the most common challenges in using SDI, were not observed at OPREC study. A pilot project was conducted on a cotton field in southwestern Oklahoma using SDI. The results showed that SDI can be very effective at stretching the limited water resources. However, field measurements indicated a considerable increase in soil salinity compared to an adjacent field under center pivot sprinkler system.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water

Outcome #13

1. Outcome Measures

Solute and Contaminant Transport between Streams and Alluvial Floodplains

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Billions of dollars are spent annually through governmental programs in North America and Europe to mitigate surface runoff, sediment, pesticide, and nutrient loads through conservation and restoration of riparian buffers. Although these management plans can be effective, subsurface phosphorus transport could also be a contributing factor in certain conditions with this transport occurring along focused as opposed to diffuse pathways. A growing collection of research indicates that subsurface phosphorus transport can be significant and also that phosphorus from streambanks can be a considerable source of in-stream phosphorus loads in some watersheds. There is also debate regarding the efficiency of filters and filter size requirements. This debate is largely due to the belief that no quantitative methodology exists for predicting runoff buffer efficiency when conducting acute and/or chronic environmental exposure assessments.

What has been done

Significant research progress has occurred on quantifying solute and contaminant transport between riparian floodplains and streams. OSU research quantified heterogeneity in infiltration rates at three floodplain sites in the Ozark ecoregion of Oklahoma and Arkansas. Primary research activities included analyzing previously conducted field studies, including plot scale (1 by 1 m and 3 by 3 m) solute injection experiments along with geophysical imaging, on both gravel outcrops and non-gravel outcrops. Laboratory flow through phosphorus sorption experiments were conducted in order to examine the effect of retention time (RT) and inflow phosphorus concentration on phosphorus sorption; this was compared to results of isothermal titration calorimetry (ITC) experiments.. Data from innovative field studies, including plot scale (1 by 1 m, 3 by 3 m, and 10 by 10 m) solute injection experiments along with geophysical imaging, were analyzed for both gravel outcrops and non-gravel outcrops. Research is also underway to quantify the magnitude of sediment and phosphorus loading from streambank erosion and failure in sensitive watersheds in eastern Oklahoma. The research is quantifying the impact of riparian management practices in limiting sediment and phosphorus input from this source. We characterized the distribution of soil phosphorus concentrations in stream banks both with and without implemented riparian protection in the Barren Fork Creek watershed in eastern Oklahoma. Our research team developed a simple empirical regression model to quantify total phosphorus trapping efficiency by a vegetative filter strip based on the hydrologic (infiltration) and sedimentological response of the filter from ten previous studies reported in the literature.

Results

This research has wide reaching implications for how riparian floodplains throughout the world are managed. Estimates of load reductions of sediment and phosphorus by riparian protection will be used explicitly by the Oklahoma Conservation Commission in justifying conservation practices. Dissemination of research findings on this objective during the past year have occurred through presentations at local, state, and national meetings and publication of peer-reviewed journal articles and conference proceedings during the project period. Eighteen (18) peer-reviewed,

technical, and conference proceedings papers were based on this research work this year:

4. Associated Knowledge Areas

KA Code	Knowledge Area
104	Protect Soil from Harmful Effects of Natural Elements
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation

Outcome #14

1. Outcome Measures

Improved Chicken Litter Handling and Transport

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The poultry industry has an economic importance in Eastern Oklahoma, serving as a major source of employment in rural areas and often a more profitable alternative to traditional agricultural enterprises in the region. Most of these poultry operations are concentrated animal feeding operations (CAFOs). Poultry CAFOs are supported by the import of animal feed containing nutrients such as nitrogen (N), phosphorus (P), and potassium (K); these nutrients are then exported from the farm in the form of agricultural products. However, much of the nutrients imported with the feed will remain on the farm in the form of manure. There hence lies a need to reduce litter mass with little monetary and labor inputs for the purpose of reducing litter transport costs and increasing hauling distances.

What has been done

The objectives of this study were to: (i) determine to what degree an alternative litter storage process (composting) designed to promote C degradation would decrease mass and affect litter properties including nutrient concentrations and carbon forms, and; (ii) conduct an economic analysis of this storage process in the context of transporting litter from poultry dense watersheds to areas deficient in soil P.

Results

Our published results suggest that composting chicken litter will reduce its mass by about 20 percent. This is expected to result in a savings of over \$35 million over the next 20 years in subsidies, transportation costs, and reduced fertilizer expenditures. Our on-going research is estimating the impact on energy savings.

Our research on the application of poultry litter to sweet sorghum indicates that litter can be an economically viable substitute for inorganic fertilizers when applied at nutrient equivalent rates. According to our estimates, poultry litter can be profitably shipped up to 100 miles when compared to commercial fertilizer. Moreover, extending the use of poultry litter as a fertilizer source will enable producers to fertilize sweet sorghum, a crop that is usually left non-amended. Poultry litter, when field applied at the optimal rate will provide a per acre impact of \$75 per acre compared to non-amended fields. Helping improve the profitability of sweet sorghum production will have a positive impact on the biofuel industry in Oklahoma by reducing the cost of biofuel stocks. Increasing the off-site use of poultry litter will also provide substantial environmental impacts to Oklahoma by reducing the potential for phosphorus runoff into its waterways.

Our research team has also begun to research the value of drill cuttings and other soil removed from the oil drillings in Oklahoma. Two research projects are currently proposals have been submitted.

Study results revealed that the two organic fertilizers tested in the experiment, BM and SE, are adequate substitutes for chemical fertilizers. No significant difference in corn yield was found between the organic and chemical sources of nutrients, and BM and SE generated higher economic returns than AA. The findings were generally robust across the wide range of prices encountered during the experiment, although neither SE nor BM would not have been as profitable as AA during the cheap energy prices experienced in the late 1990s (1998-2000). Hence, this study is in agreement with previous research that found animal manures to be adequate, and oft en remunerative, substitutes for chemical sources of N. Site-specific conditions such as weather, animal waste management practices, and soil properties should be considered before results can be generalized to other locations outside the Oklahoma Panhandle.

4. Associated Knowledge Areas

KA Code	Knowledge Area
104	Protect Soil from Harmful Effects of Natural Elements
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation
205	Plant Management Systems

Outcome #15

1. Outcome Measures

Bird collisions with U.S. buildings

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Collisions with buildings and their windows affect hundreds of North American bird species?from backyard birds to those whose migrations span hemispheres. However, no rigorous U.S. estimates of the number of birds killed have been made, and little is known about whether some species are particularly prone to collisions. We conducted a meta-analysis to quantify bird?building collision mortality, to estimate species vulnerability, and to provide a basis for further research.

What has been done

We combined mortality data from 26 previously conducted studies across the continent and estimated 365?988 million U.S. birds die annually from building collisions. We delivered presentations to national and international audiences, including The Canada/Mexico/U.S. Trilateral Committee for Wildlife and Ecosystem Conservation and Management, and professional society conferences, including plenary presentations. We published the results in the international journal *The Condor: Ornithological Applications*, and the article was selected as ?editor?s choice? for the issue. We gave media interviews for ~50 outlets in the U.S. and internationally. We also published an accompanying fact sheet: ?Best Practices for Studies of Bird-building Collisions? that we distributed to 12 U.S. and Canadian citizen science programs.

Results

The results and impact of this work have been far-reaching. For example, the USFWS is using our findings to inform broad prioritizing decisions and suggest policies for management of incidental take. Our work was included in the *State of the Birds 2014*, an annual national report published by a consortium of 23 federal agencies and conservation organizations. Officials from county and municipal governments (e.g., San Jose and San Francisco, CA, and Cook County, IL) used our results for ?bird-friendly building? guidelines in their jurisdictions. As measured by Altmetric, the paper is #1 all-time for the journal in media coverage and in the top 1% of all

research articles ever tracked in any academic field. Our research has reached millions through national and international coverage, including by the BBC, Wall Street Journal, New York Times, Washington Post, USA Today, Nature Magazine, National Geographic, Smithsonian.com, and National Audubon, etc. Our recommended best practices have been adopted by citizen science programs in the U.S. and Canada.

4. Associated Knowledge Areas

KA Code	Knowledge Area
136	Conservation of Biological Diversity

Outcome #16

1. Outcome Measures

Biophysical and hydrological parameterization of eastern redcedar using paired experimental watershed data

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Field studies have confirmed that woody encroachment decreases water yield and availability, however, the quantities could be substantially different across spatial scales. Modeling of encroachment is necessary for upscaling the impact from tree, stand, plot, and experimental watersheds to landscapes. However, representative biophysical and hydrological parameters of juniper species such as eastern redcedar (*Juniperus virginiana* hereafter ?juniper?) for modeling are lacking due to limited data availability and inappropriate experimentation design in previous studies.

What has been done

OSU researchers parameterized the physically-based hydrological transport model, Soil and Water Assessment Tool (SWAT), by using comprehensive in situ observations at three paired experimental watersheds of juniper and grassland at the Cross Timbers Experimental Range (CTER). The watersheds provided accurate water balance control with respect to the rainfall, runoff and soil water storage variations. The recently developed shuffled complexes with principal component analysis algorithm was used to search the best biophysical and hydrological parameters of the juniper within the measured potential parameter ranges.

Results

The calibrated SWAT model successfully reproduced the consistently low soil moisture and surface runoff from juniper encroached watersheds during the 3-year monitoring period (2011-2013). Modeling results suggested a strong climate dependency of water used difference between the grassland and juniper watersheds. On average, evapotranspiration (ET) from the juniper watersheds was annually 100 mm greater than from the grassland. The calibrated SWAT model adequately simulated the long-term streamflow of a nearby, large watershed under rapid eastern redcedar encroachment since 1970. To our knowledge, this is the first complete set of biophysical and hydrological parameters for juniper species. Results from this improved model simulation can provide actionable recommendation for climate change adaptation and mitigation at landscape and river basin scales.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
121	Management of Range Resources

Outcome #17

1. Outcome Measures

Carbon Sequestration in Oklahoma Forests and Probable Response to Climate Change

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Significant amounts of atmospheric carbon are stored in forest resources. Much of this carbon would have otherwise been released to the atmosphere with potentially deleterious effects regarding global warming. Carbon storage is not necessarily incompatible with production of forest products from Oklahoma forests because significant amounts of carbon are often stored long term in forest products. Better methods of quantifying present states of Oklahoma forests and predicting their future states are needed.

What has been done

In cooperation with the USDA Forest Service the 25th year re-measurement of forest growth plots located in shortleaf pine forests in eastern Oklahoma and western Arkansas was completed. These data can be used to model forest growth for a key forest type in eastern Oklahoma. Additionally, several projects relating to improved methods for sampling forests in Oklahoma and the USA more generally were conducted, some of which were cooperative with the USDA forest service.

Results

Two publications were published in international peer reviewed journals relating to improved forest sampling methods. Four additional publications were accepted for publication in international peer-reviewed journals but will be published in 2015. Two presentations were made at national conferences relating to forest measurements. Graduate students constructed forest growth and mortality models using a long-term shortleaf pine remeasurement dataset. This work will be developed for publication and dissemination in 2015. Four abstracts were accepted for poster presentations to be made at the 18th Biennial Southern Silviculture Conference in 2015 in Knoxville, TN.

4. Associated Knowledge Areas

KA Code	Knowledge Area
132	Weather and Climate
141	Air Resource Protection and Management

Outcome #18

1. Outcome Measures

Grassland management to benefit wildlife and promote beef production in the Flint Hills - Number of Acres Management Changed

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	200000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The Flint Hills is the largest remaining landscape of Tallgrass Prairie in North America. It is critical habitat for many grassland obligate species. Further, it is highly productive rangeland for

beef cattle. Current agricultural practices of annual burning and herbicide use are not conducive for many imperiled species including the greater prairie-chicken (*Tympanuchus cupido*).

What has been done

Our goal is to find productive land management options for livestock producers that reduce cost, maintain or improve livestock production, and improve habitat conditions for grassland obligates including the greater prairie-chicken. We have carried out 5 years of research and outreach on livestock production, prescribed fire, herbicide, vegetation response, public perception, and wildlife response.

Results

We have found that wildlife compatible practices can be carried out without any loss of livestock production. This work has resulted in 8 publications, 2 PhDs, 1 post doc, and 1 research associate. Further this research has directly led to changed management on over 200,000 private acres of the Flint Hills to benefit the greater prairie-chicken and other wildlife while maintaining profitability of livestock producers.

4. Associated Knowledge Areas

KA Code	Knowledge Area
121	Management of Range Resources
135	Aquatic and Terrestrial Wildlife
136	Conservation of Biological Diversity

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

This research has wide reaching implications for how riparian floodplains throughout the world are managed. Estimates of load reductions of sediment and phosphorus by riparian protection will be used explicitly by the Oklahoma Conservation Commission in justifying conservation practices. Dissemination of research findings on this objective during the past year have occurred through presentations at local, state, and national meetings and publication of peer-reviewed journal articles and conference proceedings during the project period. Eighteen (18) peer-reviewed, technical, and conference proceedings papers were based on this research work this year:

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Feedback from Oklahoma Mesonet users about agriculture and natural resource decision support products has been positive. Users have expressed high approval of Mesonet iPhone and Android apps. Long-time users note how they learn something new each time they go to another workshop or seminar. This indicates the depth of the weather information and decision support products made operational by the Oklahoma Mesonet. It provides informal verification that learning about and incorporating weather data and information into the management process is a long-term process. The Poultry Litter Educational Program surveyed participants of educational programs. One hundred percent of initial nine hour attendees surveyed said the information they had learned would help them in their daily operations, with 88% strongly agreeing with the statement. Of 272 surveyed at continuing education classes, over 80% said they had improved waste handling practices, remained in compliance with regulations, and improved the efficiency of their operation as a result of poultry waste management education classes. Seventy-eight percent had implemented a new technology or practice, and 46% of those surveyed transferred litter out of nutrient sensitive watersheds.

Key Items of Evaluation

Key Items of Evaluation:

- Feedback on OK-FIRE website information and decision support products.
- Feedback on Oklahoma Mesonet website weather data and information.
- Feedback on Oklahoma Mesonet Agriculture section decision support products.

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Food Processing, Product Storage, and Food and Product Safety

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
216	Integrated Pest Management Systems	15%		5%	
401	Structures, Facilities, and General Purpose Farm Supplies	9%		5%	
403	Waste Disposal, Recycling, and Reuse	3%		5%	
501	New and Improved Food Processing Technologies	15%		10%	
502	New and Improved Food Products	9%		10%	
503	Quality Maintenance in Storing and Marketing Food Products	9%		10%	
701	Nutrient Composition of Food	5%		10%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	5%		10%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	10%		25%	
723	Hazards to Human Health and Safety	20%		10%	
	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	1.0	0.0	5.0	0.0
Actual Paid	6.0	0.0	4.0	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
35000	0	197335	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
35000	0	197335	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
730000	0	978049	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Food Safety:

- Conduct research on preventing contamination of foods with pathogenic microorganism during production, processing, storage, distribution, and/or consumer use.
- Conduct research on eliminating or reducing the numbers of potential pathogenic microorganisms in foods during production, processing, storage, distribution, and/or consumer use.
- Conduct research on detecting contamination of foods with pathogenic microorganisms.
- Conduct research on detecting microbial toxins in foods.
- Conduct research on detecting undeclared allergens in foods.
- Provide technical information and assistance to food industry and/or consumers to determine safe food production, food processing, and/or food handling procedures.
- Conduct food safety workshops designed to provide certification in recognized food safety systems such as Hazard Analysis Critical Control Points (HACCP).
- Conduct technical assistance projects designed to assist food production / food processing enterprises in developing comprehensive, written food safety programs and to pass third-party audits of comprehensive food safety programs.
- Disseminate food safety recommendations to industry and consumers via popular press, fact sheets, eXtension publications, web-based outreach, workshops, and/or peer-reviewed journal articles.

Food Processing:

- Conduct research on improving or maintaining the quality of processed foods.
- Conduct research on developing profitable new food products and food processing technology.
- Conduct research on maximizing the efficiency and sustainability of food processing operations.
- Conduct research on improving the healthfulness and nutritional value of processed food products.
- Conduct research on evaluating the economic feasibility of food processing activities.
- Provide technical information and assistance related to processing, analyzing the chemical and physical properties, and improving or maintaining the quality of processed food products.
- Provide technical information and assistance related to food product formulation and new food product development.
- Provide technical information and assistance related to selection and evaluation of processing technology
- Provide technical information and assistance related to food process evaluation.
- Provide technical information and assistance related to processed-food business economic planning and product marketing.

- Serve as a resource to help commercial food processors recognize and comply with applicable food product processing and labeling regulations.
 - Disseminate recommendations for food processing industry best practices via popular press, fact sheets, eXtension publications, web-based outreach, workshops, and/or peer-reviewed journal articles.
- Product Storage:

- Conduct research that evaluates agricultural product storage and handling technologies with the aim of improving quality, safety, and costs. Provide technical applications, demonstrations and education for grain and food storage providers and handlers.

2. Brief description of the target audience

Food processors; handlers, manufacturers, and marketers of grain, feed and food; food safety regulators

3. How was eXtension used?

The Food Safety and Small Meat Processors Resource Areas were monitored for information regarding emerging issues of concern. Used as a reference for safety problems for on farm storage managers.

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	1200	20490	107	506

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

Patent Applications Submitted

Year: 2014
 Actual: 1

Patents listed

System and Method for Producing Individually-Wrapped Peanut Butter Products. W. McGlynn, D. Bellmer, A. Nault. 2014.U.S. Patent Pending.

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	15	37	52

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of conferences and other extension outreach presentations

Year	Actual
2014	92

Output #2

Output Measure

- External funding obtained

Year	Actual
2014	1380000

Output #3

Output Measure

- Workshops, symposia, short courses, and round tables conducted

Year	Actual
2014	59

Output #4

Output Measure

- Technical assistance projects completed

Year	Actual
2014	129

Output #5

Output Measure

- Manuscripts submitted for publication in peer-reviewed journals

Year	Actual
2014	29

Output #6

Output Measure

- Extension publications completed

Year	Actual
2014	37

Output #7

Output Measure

- Number of air quality monitors tested
Not reporting on this Output for this Annual Report

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Grain storage, food or pest control entities adopting new process or product
2	Number of food industry personnel newly certified as HAACP trained
3	Number of food industry personnel newly certified as having attended food safety and processing workshops
4	Number of food industry jobs created
5	Number of new food businesses started
6	New or improved food processing, food safety and/or product storage adopted by industry
7	Number of emergency response teams available in Oklahoma
8	Number of food producing/food processing enterprises that implemented a comprehensive food safety plan with team assistance
9	Number of food producing/food processing enterprises that passed a third-party food safety program audit with team assistance
10	Farm Focused Food Safety Training
11	Listeria monocytogenes produces strongly-adherent biofilms in food processing facilities.
12	Bacteriocins of lactic acid bacteria as potential biopreservatives for use in foods.

Outcome #1

1. Outcome Measures

Grain storage, food or pest control entities adopting new process or product

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	17

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

7-Eleven is a well-established convenience store chain with 110 locations across central Oklahoma. Over the years, 7-Eleven has expanded their line of food products. Robust sales of snack foods led to the construction and operation of the very successful 7th Heaven Bakeries® that serves their convenience stores. The FAPC was heavily involved in the development and startup of the bakery. Recently, 7-Eleven has decided to move into the sandwich business by building and operating a sandwich commissary. Consequently they approached the FAPC for help with this endeavor.

What has been done

Specialists from the OSU Food and Products Center visited with the client several times to discuss potential project needs and issues, especially regarding shelf-life, sanitation, and food safety. Assistance has been provided through team and individual response over a period of twelve months and included: product safety plans, quality plans, equipment and process recommendations, facility design, cleaning recommendations, labeling, formulation suggestions, and more.

Results

7-Eleven is planning the construction of a new 9,000 square foot commissary facility in 2015. The facility will manufacture and distribute sandwiches to 7-Eleven facilities across Central Oklahoma and will employ approximately 20 persons (new positions) and generate significant new tax revenue.

4. Associated Knowledge Areas

KA Code Knowledge Area

216	Integrated Pest Management Systems
401	Structures, Facilities, and General Purpose Farm Supplies
503	Quality Maintenance in Storing and Marketing Food Products
723	Hazards to Human Health and Safety

Outcome #2

1. Outcome Measures

Number of food industry personnel newly certified as HAACP trained

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	66

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
503	Quality Maintenance in Storing and Marketing Food Products
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
723	Hazards to Human Health and Safety

Outcome #3

1. Outcome Measures

Number of food industry personnel newly certified as having attended food safety and processing workshops

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	312

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Underserved new and beginning producers of horticultural food crops have traditionally been difficult to contact due to the diverse locations and types of crops that they are growing. Because of this, the flow of information to these farmers has been limited. Basic information related to crop production is critical for these farms; both information and training in food safety is vital in allowing them to successfully expand their market opportunities.

What has been done

This project was originally started in 2012 and continued through 2014. Project funding was from a grant from the USDA Risk Management Agency (RMA). Work in 2014 focused on creating a food safety program for a group of farmers including the Hmong in eastern Oklahoma.

Results

A training workshop in basic Good Agricultural Practices (GAP) was held in conjunction with a regional grocery store chain. A cooperative program was established among the Hmong growers and a common packing shed was constructed. OSU personnel assisted in the process of obtaining 3rd-party GAP certification for the cooperative packing operation. As a result, over 30 growers were able to participate in an organized program of delivering fresh and minimally-processed produce to a regional grocery store chain.

4. Associated Knowledge Areas

KA Code	Knowledge Area
216	Integrated Pest Management Systems
502	New and Improved Food Products
503	Quality Maintenance in Storing and Marketing Food Products

- 711 Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
- 712 Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
- 723 Hazards to Human Health and Safety

Outcome #4

1. Outcome Measures

Number of food industry jobs created

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	83

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Granna's LLC is an established food company located in Bessie that the FAPC has been working with since 2003. Granna's makes and packages nutritious frozen meals and entrees for sale to nursing homes and institutional clients or direct home delivery. Due to steady growth, good management, and market opportunity, Granna's is planning to more than double their production capacity. They have been working with the city of Frederick to plan the transformation of an existing National Guard Facility into a food processing plant. An application for a USDA rural development grant has been made to help with the facility renovations. Granna's needed help to: (1) understand the requirements for transforming the National Guard Facility into a food processing plant; and, (2) get input for grant applications to help lower the cost.

What has been done

A team has been assembled to help Granna's expand. Members include Mr. Bill Cunningham, Manufacturing Extension Agent; Mr. Don Lake, OCES Applications Engineer; the City of Frederick; Mr. Chuck Willoughby, OCES Food Products Center (FAPC) Project Lead; and Tim Bowser, OCES FAPC. OCES FAPC personnel contributed in four main areas: (1) developed a list of process and utility equipment needed; (2) drew a layout of the facility showing changes and improvements required; (3) put together a spreadsheet to estimate the cost of the new equipment and facility improvements; and, (4) assisted with the process of collecting information for a USDA Rural Development grant.

Results

The facility remodeling and construction process (20,000+ sq. ft. total) is slated for 2015. Once the new plant is in operation, it is expected to generate from 10 to 20 new jobs and a significant tax income.

4. Associated Knowledge Areas

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
502	New and Improved Food Products

Outcome #5

1. Outcome Measures

Number of new food businesses started

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	21

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
503	Quality Maintenance in Storing and Marketing Food Products

Outcome #6

1. Outcome Measures

New or improved food processing, food safety and/or product storage adopted by industry

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	72

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Kize Concepts is a relatively new company that manufactures a healthy energy bar product that is rapidly gaining market share for athletes and active consumers. Initially their products were completely made and packaged by hand. The production process was tedious and expensive. While quality was very good, the final result had too much variability. Increasing sales volumes were causing Kize run out of storage and processing space in their existing facility.

What has been done

Specialists from the OSU Food and Agricultural Products Center (FAPC) visited Kize to survey needs and help with an immediate packaging problem. The packaging problem was quickly solved, and the issues described above were systematically addressed. New processing equipment and techniques were identified and tried. Kize purchased and installed automatic bar forming equipment. Quality assessment tools were identified and developed for ingredients and final product. New packaging materials and techniques were tried. We helped Kize find a new processing facility that had a larger and cleaner space, with better utility at a better price.

Results

Kize Concepts is growing quickly and has hired additional help (two new persons) and has moved to a better location with more space. They continue to grow quickly and are positioning themselves for national distribution.

4. Associated Knowledge Areas

KA Code	Knowledge Area
401	Structures, Facilities, and General Purpose Farm Supplies

501	New and Improved Food Processing Technologies
502	New and Improved Food Products
503	Quality Maintenance in Storing and Marketing Food Products
701	Nutrient Composition of Food
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
723	Hazards to Human Health and Safety

Outcome #7

1. Outcome Measures

Number of emergency response teams available in Oklahoma

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)

Grain entrapment is a safety concern for on farm and commercial grain managers.

What has been done

Funding has been secured and 3 new research/extension projects were initiated to train workers for safety practices and develop safety equipment to protect workers.

Results

2 safety workshops and existing publications/videos are scheduled to be presented both in English and in Spanish in 2015

4. Associated Knowledge Areas

KA Code	Knowledge Area
723	Hazards to Human Health and Safety

Outcome #8

1. Outcome Measures

Number of food producing/food processing enterprises that implemented a comprehensive food safety plan with team assistance

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	20

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

A local meat processor was having problems with gas-producing bacteria on their meat products, resulting in product loss and lost sales.

What has been done

OSU Specialists established a graduate student fellowship to sample their facility monthly (incoming raw materials, premises/equipment surfaces, personnel, final retail products, returned products). Bacterial samples were identified by molecular sequence identification (PCR, 16S rRNA sequencing, sequence analysis).

Results

We identified how the bacteria gets into their plant, what sanitary practices can be performed to reduce the occurrence and minimize issues with their final product. In the prior year, the processor incurred ~\$500,000 in lost/reduced contracts and sales because of the spoilage problem. Helping them to overcome these spoilage issues makes them competitive with similar products and allowed them to retain sales through large vendors such as Walmart and Aldi.

4. Associated Knowledge Areas

KA Code	Knowledge Area
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
723	Hazards to Human Health and Safety

Outcome #9

1. Outcome Measures

Number of food producing/food processing enterprises that passed a third-party food safety program audit with team assistance

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	8

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
503	Quality Maintenance in Storing and Marketing Food Products
723	Hazards to Human Health and Safety

Outcome #10

1. Outcome Measures

Farm Focused Food Safety Training

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	70

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

This one-day training is designed for small to very small dairies, milk processors, shell egg producers, feed manufacturers, and fruit and vegetable producers, and provides necessary knowledge of preventive controls and food security to assist producers in meeting the requirements of the Food Safety Modernization Act (FSMA). Topics include FSMA, pathogens of concern, written food safety plans, monitoring and record keeping, and FDA's Food DEFENSE program.

What has been done

These workshops were provided around the state of Oklahoma on 13 February 2014, 13 March 2014 and 8 May 2014 and provided expertise in the area of food safety programs, especially as it relates to pathogens of concern, written food safety plans, liability & insurance issues, monitoring & record keeping, food DEFENSE, HACCP plans, sanitation programs & GMP's, pest management, recalls and understanding the Food Safety Modernization Act.

Results

These workshops were provided around the state of Oklahoma on 13 February 2014, 13 March 2014 and 8 May 2014 and provided expertise in the area of food safety programs, especially as it relates to pathogens of concern, written food safety plans, liability & insurance issues, monitoring & record keeping, food DEFENSE, HACCP plans, sanitation programs & GMP's, pest management, recalls and understanding the Food Safety Modernization Act.

4. Associated Knowledge Areas

KA Code	Knowledge Area
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
723	Hazards to Human Health and Safety

Outcome #11

1. Outcome Measures

Listeria monocytogenes produces strongly-adherent biofilms in food processing facilities.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Listeria monocytogenes is an important pathogen of ready-to-eat (RTE) foods, especially meat products (i.e., hotdogs, luncheon deli meats, etc). . L. monocytogenes is responsible for ~2,500 illnesses per year (~25% fatality rate) and numerous recalls of ready-to-eat meats annually. The bacterium is a contaminant of raw meat ingredients used in the manufacture of processed meats and because of its ability to form biofilms, it is a persistent contaminant in meat processing plants. RTE meat products are prone to be contaminated if it is present in the post-process areas and the significance stems from the fact that consumers do not always re-heat or cook RTE meats. L. monocytogenes? involvement with outbreaks, illnesses, and deaths from contaminated cantaloupe has also prompted a closer look at its presence on vegetables and produce.

What has been done

We have investigated the molecular basis of adherence in L. monocytogenes using liquid chromatography-mass spectrometry (Orbitrap). We compared 5 methods of extracting proteins from the surface of L. monocytogenes that were compatible with the mass spectrometry equipment in the OSU DNA/Protein Core Facility.

Results

One method of extracting surface proteins was selected as better (UB-Ghost) and used for further studies in comparing the proteins isolated from the surface of strongly-adherent strains of L. monocytogenes with those of weakly-adherent strains. We also examined the proteins from the surface of adhered cells (i.e., attached to beads) with those in solution (i.e., planktonic cells). Differences were found that identified select proteins as involved with attachment. The project resulted in the advanced training of 1 graduate student. In addition, information on the molecular basis of attachment of L. monocytogenes may allow unique interventions to prevent adherence and reduce biofilms in food processing facilities.

4. Associated Knowledge Areas

KA Code	Knowledge Area
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
723	Hazards to Human Health and Safety

Outcome #12

1. Outcome Measures

Bacteriocins of lactic acid bacteria as potential biopreservatives for use in foods.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Lactic acid bacteria (LAB) are generally-recognized-as-safe (GRAS) by the U.S. FDA and can be freely used in foods as food ingredients. Some strains of LAB also produce bacteriocins (i.e., antimicrobial peptides) that have been proposed for use as biopreservatives against *L. monocytogenes*.

What has been done

Bacteriocin-producing (Bac+) lactic acid bacteria (LAB) were isolated from a variety of food products and animal sources. Antimicrobial activity against *L. monocytogenes* was detected by 41 isolates obtained from 23 of 170 food samples (14%) and 11 of 110 samples from animal sources (10%) tested. Isolated Bac+ LAB included *Lactococcus lactis*, *Lactobacillus curvatus*, *Carnobacterium maltaromaticum*, *Leuconostoc mesenteroides*, and *Pediococcus acidilactici*, as well as *Enterococcus faecium*, *Enterococcus faecalis*, *Enterococcus hirae*, and *Enterococcus thailandicus*.

Results

These data continue to demonstrate that despite more than a decade of antimicrobial interventions on meats and produce, a wide variety of food products still contain Bac+ microbiota that are likely eaten by consumers and may have application as natural food preservatives. This project provided advanced training for 3 graduate students and 1 post-doc.

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
723	Hazards to Human Health and Safety

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.)

Brief Explanation

No change here. Drought conditions hinder progress for safety and grain quality initiatives and research. Funding from corporate sponsors is limited due to low check off dollars. Limited formula funding has hindered our ability to conduct applied research and technical assistance projects. In addition, financial and in-kind support from industry partners has been flat.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Extension and outreach programs were evaluated based on before and after assessments of attendee knowledge using questionnaires for product storage safety programs. Attendees were evaluated primarily on their knowledge of definitions and applications of major program concepts, e.g. how to employ basic principles of food safety programs such as HACCP.

A needs assessment for safety training is planned for 2015. Surveys of fire departments and elevator managers will provide information about safety equipment availability and training experience in Oklahoma.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 7

1. Name of the Planned Program

4-H Youth Development

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
806	Youth Development	100%		0%	
	Total	100%		0%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	61.0	0.0	0.0	0.0
Actual Paid	85.0	0.0	0.0	0.0
Actual Volunteer	75.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
885000	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
885000	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
9197210	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Volunteer Management System (VMS) - recruited, oriented and trained adult volunteers to serve as club and project leaders and to serve as leaders on local, district and state committees to assist with planning

and coordinating activities and events.

Club Management System (CMS) - increased the number of 4-H projects offered.

Operation Military Kids (OMK) - trained and recruited educators and volunteers, as well as partnered with military personnel, to increase awareness of issues facing military families.

Science, Technology, Engineering and Math (STEM) - Provided training and equipment for introducing youth to STEM concepts and careers.

Outreach -Utilized social media (facebook, twitter, web page) networks to reach and expanded audience of youth and alumni. Communicated the message of 4-H to all Oklahoma House and Senate members during annual 4-H Day at the Capitol.

All other - Developed and maintained programming, activities, events and educational materials focused on positive youth development.

2. Brief description of the target audience

Youth, children, parents, teachers, youth and adult volunteers, middle to low income families; race and ethnicity will also be recognized as an identifier of audiences; caretakers, agencies and service providers, schools, policy makers

3. How was eXtension used?

- 611 volunteers and educators participated in the 4-H Youth Development Working with Minors Training. Six on-line volunteer continuing education units were developed to be released in 2015.
- Companion Animal Communities of Practice, eXtension developed a companion animal video and photo contest for 4-H youth that was launched the summer of 2014.

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	20000	1089000	402513	8100000

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

Patent Applications Submitted

Year: 2014

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	0	3	3

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Web-delivered curriculum - lessons developed and tested

Year	Actual
2014	88

Output #2

Output Measure

- Educational trainings offered for volunteers and staff

Year	Actual
2014	379

Output #3

Output Measure

- Number of outreach contacts through social media, mass communications, etc.

Year	Actual
2014	9189133

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	40% increase in the number of certified volunteer participants managing local programming.
2	100% of counties in Oklahoma will seek caring and qualified adults will prepare youth for successful lives as community leaders and contributing citizens
3	The number of active 4-H project clubs and project groups.
4	Project curriculum training in support of Mission Mandates
5	Youth will develop a well rounded understanding of mental and emotional health obtained through project work and activities which encourage healthy life style choices - camping, recreation, shooting sports, fitness, safety, hobbies and creative pursuits through the arts.
6	Youth and adults work in partnership to identify and solve/resolve community needs and environmental issues through an organized and executed plan of action.
7	At least 500 youth will demonstrate a positive increase in making healthy lifestyle choices through the use of curricula and educational materials.
8	Participants in livestock programs will focus on acceptable animal husbandry practices, demonstrating knowledge about animal health, breeding, production, marketing and meat science while being conscientious about product quality assurance, animal welfare/well-being and protection and effects on the environment while having positive family experiences.
9	Participants will increase knowledge and awareness of STEM technologies and career opportunities, including an increased knowledge and awareness of plants and soil systems and an awareness of entomology.
10	Companion animal programs will focus on animal welfare and human-animal interaction.
11	Military families receiving support through 4-H partnerships will increase their use of local support networks

Outcome #1

1. Outcome Measures

40% increase in the number of certified volunteer participants managing local programming.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	7378

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Based on research by the National Camping institute there is an appropriate youth to adult ratio, which helps to insure successful contact and good risk management practices. The ratio varies by age

What has been done

All county and district staff are trained in the implementation of the ACCESS enrollment system. Based on information reported in the national database, 312/7387 direct volunteers are certified, 742/7387 direct volunteers are screened. 25/7387 indirect volunteers are certified and 96/7387 indirect volunteers are screened. 64/7387 certified volunteers are not classified and 130/7387 screened volunteers are not classified. A total of 402 volunteers are reported as being certified and 974 volunteers are reported as being screened.

Results

13% (402/7387) of our reported volunteers are screened and 5% (402/7387) of our reported volunteers are certified.

6143 Adult Volunteers

1244 Youth Volunteers

7387 Total 4-H Volunteers who work with 4-H participants/4-H Activities

One percent decrease in volunteer based on 2013 enrollment numbers recorded in the national data base, 7387/7911.

It is difficult to divide out 4-H volunteers from other episodic volunteers reported through school enrichment. Used the total adult volunteer to figure ratios

6143 adult volunteers/29626 4-H members or a 1:5 ratio of adults to youth

6143 adult volunteers/96614 total youth reached w/o duplicates or 1:15 ration of adults to youth

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #2

1. Outcome Measures

100% of counties in Oklahoma will seek caring and qualified adults will prepare youth for successful lives as community leaders and contributing citizens

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	97

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Positive Youth Development Programs are designed to prepare young people to meet the adolescence through a series of structured, progressive series of activities and experiences. Research indicates youth involved with caring and qualified adults will be prepared for successful lives as contributing citizens.

What has been done

Extension educators at the county, district and state levels actively recruit, train, utilize and manage adult volunteers to serve as leaders to Extension programming efforts. In a unique partnership, extension professional and volunteers work to provide positive youth development experiences for young people.

Results

881 volunteers and staff completed 4-H Working with Minors training (611 on-line and 270 with county educators). Eight counties reported 249 volunteers completed volunteer continuing education at the county, district and state levels. Eight counties conducted new volunteer orientation reaching 91 new volunteers participated in new volunteer orientation. Three districts conducted volunteer conferences, as well as on state and regional conference for continuing education.

Volunteers completing annual continuing education are better prepared to meet the needs of the youth and more capable of being prepared to handle the mission and objectives of positive youth development. Based on data in national data base (289/7387) approximately 4% of our volunteers are receiving the training required to be a certified volunteer.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #3

1. Outcome Measures

The number of active 4-H project clubs and project groups.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	835

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Essential elements are critical to effective youth development programs. These elements help youth become competent, contributing citizens. Created from traditional and applied research characteristics that contribute to positive youth development, they help professionals and volunteers who work with youth view the whole young person, rather than focus on a single aspect of life or development. These elements focus on social, physical, and emotional well being which are necessary for positive youth development. All eight elements are present in a healthy 4-H club.

What has been done

Oklahoma 4-H requires that all clubs be chartered and that as a charter there are specific standards, which need to be met annually for a charter to be renewed. This is one means for our system to insure clubs are safe and healthy environments where youth want to participate.

Results

Approximately 153/820-chartered clubs are project clubs.

At the present time it is difficult to track the charter renewal process. We have been diligent in making sure club charters are current and on file.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #4

1. Outcome Measures

Project curriculum training in support of Mission Mandates

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)

4-H is dedicated to incorporating current research based information into curriculum development and sharing these with extension educators and volunteers for use with Oklahoma youth.

4-H youth and adults work together to create sustainable community change and this is accomplished within three primary content areas, or mission mandates, - citizenship, healthy living, and science. These three mission mandates ? all intertwine and can be integrated across project areas and activities.

What has been done

36 trainings were delivered to over 500 Extension educators and 4-H volunteers on curricula that support the 4-H Mission Mandates. Trainings and programs were then replicated and/or created on district, county and local level increasing the outreach of the 36 trainings.

Results

We have seen an increase in the number of programs offered in the 3 Mission Mandate areas at the local, county and district levels. There has been an increase in demand for kits that support both healthy living and science.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #5

1. Outcome Measures

Youth will develop a well rounded understanding of mental and emotional health obtained through project work and activities which encourage healthy life style choices - camping, recreation, shooting sports, fitness, safety, hobbies and creative pursuits through the arts.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	9589

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Research continues to indicate that youth who spend time out-of-doors involved in constructive learning environments and involved in physical activity score higher on accepted tests related to physical, social and emotional health.

What has been done

The Oklahoma 4-H Outdoor Adventure Program is an outdoor leadership program for teens intended to develop character and integrity in young people through the teaching of teamwork, leadership, and outdoor skills and allows them to share their knowledge with others. By experiencing the challenge of the out-of-doors, participants grow personally, developing an understanding of themselves and their limitations while instilling a new respect for the natural environment. The highpoint of the program is a 5-day canoe camping experience to the Buffalo National River in Arkansas.

The Leisure Education for 4-H Camps Workshop was presented to teen leaders and Extension educators to learn skills necessary to make 4-H overnight and day camps; fun, safe and meaningful. Participants received training in roles and responsibilities of counselors, flag ceremonies, campfire ceremonies, crafts, icebreakers and "get to know you" games to make new and young campers feel at ease.

State Extension staff hosted a Team Building and Leadership training to help build team and

leadership skills which are essential for adult and teen leaders. This training introduced participants to challenge activities where they experienced hands-on training intended to prepare them to facilitate team-building activities utilizing easily accessible props.

A 4-H Zoo Snooze was held to enhance the environmental awareness of 4-H members and to teach them about animal camouflage and how camouflage is used in many people's careers. Participants were provided an educational program, a night hike of the zoo and day long zoo passes.

Oklahoma State University 4-H Youth Development was a key partner in the development of ATV Ride Safe Oklahoma. This joint initiative is led by Oklahoma State University Cooperative Extension Service 4-H Youth Development, The Children's Center, and Trauma One Injury Prevention at OU Medical Center. The goal is to provide safety education and injury prevention information as related to all-terrain vehicles (ATVs).

Results

Three hundred and fifteen (315) 4-H members and volunteers attended the 4-H Zoo Snooze to enhance their environmental awareness.

Oklahoma 4-H conducted at least 63 state level events, workshops and or encampments that had an education goal of improving participant health. Some had a physical health component, some emotion or social impact, and others were primarily safety oriented. Events include: state shooting sports events, day camps, State 4-H Roundup; reached over 28,000 youth. Additionally about 30 county or multi-county camps were conducted, reaching over 30,000 youth.

In 2014 we reached 2,654 youth with two or more hours of classroom ATV safety education, 1,137 youth completed the ATV Safety Institute's online ATV Safety E-Course, 500 plus youth completed the national 4-H Treadsylvania ATV Safety online educational game and 116 youth received their ATV Safety Institute RiderCourse Certification by completing the 4-5 hour hands-on ATV Safety Institute RiderCourse program taught by our OSU licensed ATV Instructors. Oklahoma had 11 4-H youth participate in the 2014 National ATV Safety PSA "Do the Ride Thing Contest" receiving two of the nine national awards. The \$2,500 overall scholarship award and one \$500 1st place scholarship award.

Our ATV Ride Safe Oklahoma team involved over 100,000 youth and adults at events such as the Oklahoma Department of Wildlife Outdoor Expo, Oklahoma Emergency Medical Services for Children Safety Days, Septemberfest at the Oklahoma Governor's Mansion, state FFA Convention, state 4-H Youth Roundup, state Injury and Prevention Conference, state Agricultural/Farm shows and state and county fairs.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #6

1. Outcome Measures

Youth and adults work in partnership to identify and solve/resolve community needs and environmental issues through an organized and executed plan of action.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	4100

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Research results show that youth who are involved in meaningful adult partnerships are better prepared to address community needs as they transition into young adulthood and beyond.

What has been done

For 2014, County Extension Educators and stakeholders identified needs related to health and wellness education. More than \$4,000 in 4-H Foundation sponsored mini-grants were awarded to implement local programs. Twenty-one counties participated with youth and adults teams at the county and club levels to teach youth the advantages of healthy eating and increased physical activity.

Results

More than 3500 school aged youth were taught the advantages of healthy eating and increased physical behavior.

Youth and adult teams were created to teach healthy eating through home gardening and community gardens. Other teams reached their goals by teaching youth ?Get Fit for Life? lessons, and others reached youth through the 4-H Food Showdown and other nutrition and fitness curriculum. Using a variety of curriculum and lessons to educate participants, each team focused on achieving the same goals of improving eating habits and healthier lifestyles.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #7

1. Outcome Measures

At least 500 youth will demonstrate a positive increase in making healthy lifestyle choices through the use of curricula and educational materials.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	5350

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahoma youth are facing serious health and wellness issues due to obesity, poor nutrition, and lack of physical fitness. These health issues are affecting our children's future health, academic achievement, and our economy.

What has been done

Educational programming delivered to over 5,000 youth focused on improving the health and fitness levels of all children and families through food and nutrition education and physical fitness program efforts. 60 teens across the state were trained to serve as teachers and to assist with the implementation of various physical fitness and healthy nutrition programs to Oklahoma underserved children. The teens as teachers trainings focused on education and activities that help youth develop a positive understanding of health and nutrition, so they make healthier food and nutrition choices and incorporate daily exercise that leads to healthier lives.

Specifically to:

Teach youth to make better foods choices and select appropriate food portions sizes.

Teach youth how to balance their food intake with exercise on a daily basis.

Results

Mini-grants were awarded to 22 county sites around the state and to four Extension districts where healthy living projects were implemented. Additionally, state-wide efforts were implemented to train educators, volunteers and 4-H members in:

Yoga for Kids (2 State-wide trainings are being provided for educators to implement yoga programming back in their home county)

Get Fit 4 Life (OK 4-H curriculum supported and kits stocked, curriculum supports 10 lessons on food choices and each lessons contains a physical activity and take home component)

4-H HERO (Health Educators Reaching Others). Development of county-based healthy living ambassadors (4-H HERO)

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #8

1. Outcome Measures

Participants in livestock programs will focus on acceptable animal husbandry practices, demonstrating knowledge about animal health, breeding, production, marketing and meat science while being conscientious about product quality assurance, animal welfare/well-being and protection and effects on the environment while having positive family experiences.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	17179

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Youth need to learn acceptable animal husbandry practices, demonstrating knowledge about animal health, breeding, production, marketing and meat science while being conscientious about product quality assurance, animal welfare/well-being and protection and effects on the environment while having positive family experiences.

What has been done

In partnership with the Oklahoma and National Pork Councils educators offered the Pork Quality Assurance Plus (PQA Plus) youth education and youth certification program

In collaboration with the Oklahoma Beef Council a new Youth Beef Quality Assurance curriculum was developed and implemented for 4-H and FFA in 2014.

Within the Agri- Science project areas, when 9-12 year-olds were asked to compare themselves against peers:

- ?88% knew food comes from the farm to the dinner plate.
- ?78% indicated a better understanding of how to take good care of their pets and/or livestock by feeding them and meeting their other needs.
- ?81% were setting goals but have not thought much about trying to reach a goal.
- ?74% indicated they tended to more closely identify with their peers when it came to topics like:
 - ?The importance of caring for things in nature.
 - ?The degree to which they like science and want to learn more about it.
 - ?Doing what they have to do or are told to do
 - ?Intended to pursue a college education

Results

Approximately 6700 youth 8-18 years of age in both 4-H and FFA programs were certified in the PQA Plus program as part of their county pork project and enabled them to show at the Oklahoma Youth Expo and the Tulsa State Fair. As a result of this program there has been a decrease in stress related deaths in exhibition animals and a more marketable meat product.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #9

1. Outcome Measures

Participants will increase knowledge and awareness of STEM technologies and career opportunities, including an increased knowledge and awareness of plants and soil systems and an awareness of entomology.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	13352

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The US is falling dangerously behind other nations in developing its future workforce of scientists, engineers, and technology experts. Only 18% of US high school seniors are proficient in science (NAEP, 2005). Oklahoma 4-H is combating this issue by teaching youth about Science Technology, Engineering, and Math (STEM).

What has been done

Oklahoma 4-H STEM program is addressing this issue through STEM curriculum promotion, 4-H trainings in the area of STEM, and professional development of 4-H Educators. In 2014 the OCES STEM program offered 10 state and district level professional development opportunities for County Educators.

Results

TechXcite is a recently developed Engineering curriculum that is designed for middle school aged students. OK4-H was fortunate to receive a sub-grant from Duke University to pilot these materials. One hundred and twenty eight educational kits have been distributed across the state. These kits are being used by educators to introduce youth to career fields in engineering and the engineering method in 52 locations across the state. As the pilot-testing phase of this project came to a close Oklahoma 4-H was proud to have submitted over 1000 youth evaluations and 34 adult evaluations to support the research project. Oklahoma 4-H was took lead (5 states involved) in developing a conference presentation at the National Association of 4-H Educators to promote TechXcite to educators from across the nation. Following this event, Oklahoma 4-H also led the charge to write an article for the Journal of Extension sharing the TechXcite materials. This article was accepted and will be published in 2015.

The Oklahoma 4-H STEM program was able to partner with NASA education programs to train county educators on the National Youth Science Day event, Rockets to the Rescue. Through this collaboration, three district in-services were held to train educators from across the state in the NYSD event and additional curriculum. Educators learned about all the Rocketry lessons which are available to them and we provided NYSD kits for them to use for the annual event. Plus the Oklahoma 4-H Rocketry webpage was enhanced with new lessons, curriculum and videos. The end result, County Educators report reaching almost 2000 youth with the National Youth Science Day event. As a part of the project NASA also funded a professional development trip for four educators (one from each OCES district) to the Kennedy Space Center which included a viewing of the latest space vehicle launch, Orion. The participating educators are very excited about 4-H science and sharing the science curriculum with other educators and volunteers within their districts.

In 2014, OCES educators reported working 3,028 hours on STEM programming to present 2,082 educational programs, involving 2,281 volunteers? hours to reach 13,352 contacts and 18,991 media contacts.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #10

1. Outcome Measures

Companion animal programs will focus on animal welfare and human-animal interaction.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	1997

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Companion animals serve to improve the both the physical and emotional well-being of individuals. 4-H Companion Animal Projects serve to facilitate positive youth development by providing youth the opportunity to develop leadership, mastery skills, develop friendships, and practice citizenship in a safe environment (both physical and emotional safe).

What has been done

Teen leadership opportunities have been provided through the State 4-H Amazing Small Animal Project (ASAP) teen leader group. The ASAP group planned and implemented a state-wide 4-H Pet Fun Day with the purpose of allowing 4-H youth the opportunity to exhibit their pets regardless of specie. Additionally, ASAP members have used their leadership skills to teach companion animal workshops dealing with good husbandry and training of pets.

A 4-H Master PetPALS leader training was conducted to develop PetPALS programs in three new counties. PetPALS is an intergenerational program teaching youth to interact with the elderly in assisted living centers and nursing homes while using their pets as a way to facilitate the interaction.

Results

As a result of the ASAP Pet Fun Day, Teen Leaders were provided the opportunity to practice leadership by organizing the activities of the day and they taught workshops in in dog obedience, dog rally, dog agility, rabbit showmanship, guinea pig care, animal training, dog grooming and care and pet nutrition to an audience of over 75 people.

ASAP Teen Members taught workshops across the state including; dog bite prevention, good husbandry and grooming of dogs, rabbit agility, dog showmanship clinics, and assisted at 5

statewide 4-H dog shows.

PetPALS clubs have begun teaching members in the training and care of their pets. Through the program members have had the opportunity to utilize mastery, citizenship, and leadership skills.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #11

1. Outcome Measures

Military families receiving support through 4-H partnerships will increase their use of local support networks

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	3104

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In 2014 the Oklahoma Operation: Military Kids team worked throughout the year to successfully support military youth and their families. There are currently about 33,236 military youth living in the state of Oklahoma. At any given time these youth will face the challenges of deployment, reconnecting with a family member, relocating to a new base, and integrating into a new community.

What has been done

Oklahoma 4-H/OMK implemented six military youth events, four briefings, and two state/local team planning meetings. Three overnight educational events, four day camps for the Air National Guard and promoted Welcome Home Gardens for returning service members.

In the summer of 2014, OMK worked with 314 Oklahoma military youth at four different kids camps.

- ?Kids Kamp (Camp Gruber)
- ?Camp Corral (Camp Classen)

- ?Air National Guard summer 3-day camps
- ?Air National Guard Youth Resiliency Camp

At these camps, OMK facilitated a variety of activities that improved teamwork, problem solving, and communication skills. These activities encouraged youth to set goals, solve problems, and make wise decision. This provides the building blocks that nurture the skills required to become a successful member of society.

Oklahoma 4-H has also made it a priority to keep 4-H clubs on each of Oklahoma's five military installations. These clubs teach youth STEM, Healthy living, gardening, and workforce skills.

Results

Operation: Military Kids hosted multiple events for 1028 military youth and their families throughout the state of Oklahoma. These events are about:

Making new connections with family members.

Reconnecting with their loved ones before and after a deployment

Building strong family bonds that lead to a more stable relationship between a service member and their loved ones.

Enabling military youth to effectively manage separation stressors that accompany deployments.

Meeting and interacting with other kids who are experiencing the same challenges of military life.

Sharing personal knowledge and experiences that empower youth with a sense of purpose.

OMK distributed 3,400 Burpee "Welcome Home Garden" seed packets as a healing tool for our recently returned troops and their loved ones. Military families received a package containing 10 seed packets, two flowers and eight vegetables. Cultivating these gardens helped families to express their resilience and hopes for the future.

In 2014, Oklahoma OMK successfully planned and executed multiple events that recognized and supported military children who are facing the challenges of deployment. The Oklahoma OMK team participated in many community-oriented events to raise awareness about the difficult issues encounter by military families and youth.

Each of Oklahoma's military installations is home to a 4-H club or clubs. These clubs served 641 4-H members. Club members have participated in a variety of 4-H projects including gardening, robotics, STEM, photography, food showdown and visual arts. Each of the Installation clubs participated in the National Youth Science Day event, Rockets to the Rescue.

At two of the military installations, Tinker Air Force Base and Vance Air Force Base, have successfully implemented raised garden beds. The gardens have been a major success this year and the 4-H members enjoyed making salsa with the vegetables that they grew. The Salsa competition was based off of a 4H Cooking curriculum.

Tinker Air Force Base implemented the TechXcite curriculum during their after school program. The educator expressed to us her appreciation of the simplicity of the kits and that the materials and curriculum were already prepared for her in an exciting way for the students. The youth

looked forward to their TechXcite curriculum each week and this increased their interaction and learning. Overall TechXcite was reviewed as a wonderful program that youth and educators were looking forward to using again in the future. The National Youth Science Day kits have been delivered for all of the military installations and the students and teachers enjoyed participating in the curriculum for this year.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

- Competing Programmatic Challenges
- Population changes (immigration, new cultural groupings, etc.)

V(I). Planned Program (Evaluation Studies)

Evaluation Results

In 2013, Oklahoma 4-H began collecting information from members to ensure that 4-H members are receiving quality positive youth development through their involvement in the Oklahoma 4-H Youth Development Program. Research has determined that positive youth development (PYD) occurs when youth develop competence, confidence, connection, character, and caring (the five C's). 4-H educators across the state administered and collected 587 PYD survey instruments in 2014. These instruments were collected at club meetings, educational events, and other 4-H functions. All participants are in at least 7th grade, are enrolled in 4-H, 89% attend public school and 72% live in a town with a population less than 10,000, 58% are white, 22% American Indian and 7% African American, 7% Hispanic, and 2% other.

Competence

72% Feel they have a lot of friends

72% Feel they do very well at the their class work

69% Like their looks

Confidence

90% are glad to be themselves

81%are happy with themselves

Connection

52% Agree they get a lot of encouragement at school

73% Feel useful and important to their family

48% Agree adults make then feel important

Character

65% Feel it is important to make the world a better place

78% Feel it is important to take responsibility for their actions when they make a mistake or get into trouble

76% Think others would say they enjoy being with people of a different race

57% Admit they do things they shouldn't do

Caring

66% Want to help someone who is being taken advantage of

70% Feel sorry for someone who is being picked on

74% Feel sorry for someone who is hurt or upset

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 8

1. Name of the Planned Program

Turfgrass Development and Management

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
111	Conservation and Efficient Use of Water	20%		10%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		5%	
202	Plant Genetic Resources	5%		10%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	10%		10%	
204	Plant Product Quality and Utility (Preharvest)	10%		5%	
205	Plant Management Systems	25%		15%	
206	Basic Plant Biology	0%		5%	
211	Insects, Mites, and Other Arthropods Affecting Plants	10%		10%	
212	Diseases and Nematodes Affecting Plants	10%		10%	
216	Integrated Pest Management Systems	10%		20%	
	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	1.5	0.0	2.0	0.0
Actual Paid	5.0	0.0	1.9	0.0
Actual Volunteer	0.2	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
74000	0	92423	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
74000	0	92423	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
638400	0	458073	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

New turf germplasm/varieties having improved abiotic and biotic stress resistance/tolerance will be generated and tested by our program. Research will identify the elite performing species and varieties from both our program and from industry. Elite performing material from our program will be commercialized over time. We will identify new or refined integrated management practices to achieve goals. Research and extension activities will be conducted to improved efficiency of water application and to reduce runoff.

Educational materials will be developed featuring improved varieties and how to properly install and maintain them in an environmentally sound manner. Highly effective educational programming and consultations will be conducted for professionals and consumers to help integrate this information into existing management programs.

2. Brief description of the target audience

Audiences include governmental, private industry and multiple end-user areas. Research audiences: basic and applied plant science/turf science researchers, including those from the American Society of Agronomy (ASA), Crop Science Society of America (CSSA), and American Society for Horticultural Science (ASHS). Funding agency audiences: USGA, GCSAA, USDA, OCAST, OTRF and many private corporations. New cultivars developed as well as products such as trade articles, fact sheets, and educational programming will be provided to the target audiences characterized as the turfgrass production sector (sod and seed producers), service sector (landscape/lawn care and pest control operators) and turf managers (which include the golf course, parks & grounds, right of way managers and home 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	6496	240000	200	14652

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

Patent Applications Submitted

Year: 2014
 Actual: 0

Patents listed

?Latitude 36 Turf Bermudagrass?(Cynodon dactylon X C. transvaalensis). US Plant Patent 24,271. Issued: 02-25-2014. Inventors: Wu, Y., D.L. Martin, C.M. Taliaferro, J.A. Anderson and J.Q. Moss. On-line at: <https://www.google.com/patents/USPP24271>.

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	6	8	14

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of final stage experimental bermudagrasses sent to national testing phase in the NTEP bermudagrass trial once every 5 years

Year	Actual
2014	0

Output #2

Output Measure

- Number of fine turf program and roadside vegetation management workshops conducted and trade presentations presented each year.

Year	Actual
2014	51

Output #3

Output Measure

- Number of new bermudagrasses developed by our program that are commercially released to the trade for production.

Year	Actual
2014	0

Output #4

Output Measure

- Number of cultivar evaluation trials; weed control trials; management factor trials; and physiological, morphological or other investigations conducted on turfgrass.

Year	Actual
2014	67

Output #5

Output Measure

- Number of scientific abstracts, posters or oral presentations presented to scientific audiences.

Year	Actual
2014	15

Output #6

Output Measure

- Number of turfgrass managers trained in recognition and selection of improved varieties and implementation of integrated turfgrass management systems

Year	Actual
2014	1610

Output #7

Output Measure

- Number of email news releases and fact sheets generated

Year	Actual
2014	55

Output #8

Output Measure

- Number of consultation phone calls and emails completed

Year	Actual
2014	6000

Output #9

Output Measure

- Number of improved experimental bermudagrass types developed by our program that are not yet commercially available but have been advance to USDA-SCRI regional trial testing

Year	Actual
2014	5

Output #10

Output Measure

- Number of new licensees recruited for existing commercialized releases.

Year	Actual
2014	10

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of sod/seed producers growing OSU turf bermudagrasses
2	Number of sod/seed producers growing Oklahoma State University suggested turf bermudagrasses
3	Percentage of professionally managed properties using improved turfgrasses
4	Percentage of professional fine turf managers continuing adoption of improved BMPs and IPM practices
5	Percentage of ODOT roadside vegetation managers continuing adoption of improved BMPs and IPM practices
6	Effect of Low Temperature and/or Drought on Turfgrass

Outcome #1

1. Outcome Measures

Number of sod/seed producers growing OSU turf bermudagrasses

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	52

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Once new varieties of turfgrass have been developed by teams of scientists and the varieties have been released by the University, new producers must be recruited to grow the improved varieties so they can be made conveniently available for both professionals and consumers to purchase at an affordable price with acceptable transportation/shipping costs.

What has been done

OSU Turfgrass Team faculty worked diligently with the existing exclusive licensees of Yukon, Riviera, Patriot, Latitude 36 and NorthBridge bermudagrasses to recruit new producers (sublicensees) of OSU bermudagrass products in 2014. Team members suggested prospective sublicensees to be added and assisted in answering questions of prospective sublicensees to facilitate new growers feeling comfortable in signing up to produce OSU products in pedigree stock certification in their respective states.

Results

Through the joint efforts of OSU selected licensing agent Sod Solutions, Inc, 10 new producers (sublicensees) of OSU bermudagrass products were signed on in 2014 to produce Latitude 36 and NorthBridge. Consultation by OSU faculty with existing producers and prospective new licensees resulted in retention of all existing sublicensees and the addition of 10 new sublicensees and two additional states of production being added. A total of 52 producers in the US and one producer in Europe are growing one or more of the five OSU proprietary, turf-type bermudagrasses with improve quality and cold-hardiness. Growers of the products in the southern US were able to sell to new target areas of installation in the northeastern US where winter-kill had led to common bermudagrass stand loss. Sod producers are able to make at least a three to five cent per square foot premium on production of high quality winter-hardy bermudagrasses and to somewhat escape the "commodity-like" market place of variety-not-stated

common bermudagrass sod production which keeps sale prices and grower profits reduced in the industry as a whole. By mid-2015 to early 2016 professional and homeowners will be able to purchase OSU bermudagrass sod products at a more affordable price from the new 2014 licensees due to less shipping distance from the nearest sod producer. In 2014, the OSU generated bermudagrass Latitude 36 was installed on the infield of the Kansas City Royals, who hosted over half of the games of the World Series. Additionally, NorthBridge was installed on the playing surface of Arrowhead Stadium, home of the Kansas City Chiefs. These installs show the high level of acceptance of the OSU bermudagrasses that demonstrated improved winter hardiness, visual quality and high levels of traffic tolerance. Replacement of winter-susceptible type bermudagrass will be a multi-year, on-going process.

4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems

Outcome #2

1. Outcome Measures

Number of sod/seed producers growing Oklahoma State University suggested turf bermudagrasses

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	15

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

For 5 decades, 90% of the square footage of warm-season varieties produced and sold as bermudagrass and zoysiagrass sod in Oklahoma consisted of common bermudagrass sold as U-3, Tifway (419) hybrid bermudagrass and Meyer (Z-52) zoysiagrass. These grasses were considered the standards for operating a successful sod production business and standards understood by the purchasing lawn and landscape industry. However, turfgrass cultivar development programs both within and outside of Oklahoma had generated a number of cultivars with superior quality and stand persistence that were either equal or better in performance than

the long term standards. Additionally, newer clonal lines tend to exhibiting higher genetic purity than the old standard lines.

What has been done

Research, demonstration and extension education efforts intensified in the early 1990s and continued in 2014 in an effort to increase product choice available for the consumer and professional alike. A series of 12 trials with newly commercialized and old standard variety bermudagrasses and zoysiagrasses were conducted over the last 25 growing seasons to demonstrate to sod producers, seed producers and end users the field performance of newly commercialized varieties compared to old industry standard types. A yearly turfgrass conference and trade show as well as alternate year field days, extension fact sheets and over 17,000 one on one consultations (average of >700 per year) have been conducted over 24 years to these customer groups to discuss new turfgrass options available for licensing, production and purchase.

Results

While U-3, Tifway and Meyer zoysiagrass still make up the greatest majority of square footage of sales to the construction market, approximately 36% (15 of 41 total producers) of the sod production industry in Oklahoma have diversified production to include Astro hybrid bermudagrass, El Toro zoysiagrass and various new tall fescue/Kentucky bluegrass blends and buffalograsses. Additionally, 7% of the total producers (3 of 41) producers have diversified to include new proprietary bermudagrasses Riviera, Patriot, Latitude 36 and Northbridge which have superior performance traits compared to old standard types. The new proprietary types offer a 3 to 5 cent per square foot profit potential over older standard types. Adoption of proprietary types is limited based on market structure, requirement for pedigree stock production standards and a cap set on number of producers licensed and in some cases limited access to markets due to presence of "no sole source bid" restrictions. It is hoped that the visibility of successes in production of new proprietary types will lead to increased willingness by producers to adopt additional new varieties in the future as they become available for production.

4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems

Outcome #3

1. Outcome Measures

Percentage of professionally managed properties using improved turfgrasses

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Percentage of professional fine turf managers continuing adoption of improved BMPs and IPM practices

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	94

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

A majority of both biotic and abiotic problems facing turfgrass managers can be reduced or completely controlled through the use of Best Management Practices (BMPs) and Integrated Pest Management (IPM) strategies. Use of the best adapted cultivars of turfgrass is the cornerstone of both a successful BMP and IPM program. Pests continue to evolve to exploit weaknesses in defense systems posed by turfgrasses. Because of this arms race between pest and host plant, continued development of and implementation of use of improved turfgrasses and improved management practices will be required for the foreseeable future, just as in any cropping system.

What has been done

In 2014, 250 turfgrass industry professionals attended the annual Oklahoma Turfgrass Conference and Trade Show. An estimated 1360 attended 13 turf and pest management sessions offered by various Turfgrass team members around the state. Over 6,000 professionals receive one-on-one consultations primarily through post-conference oral consultation, email, phone, US mail and site visits each year. Simple post conference surveys and oral surveys are administered at several of the sessions to assess adoption of improved turf management practices.

Results

Recent surveys following yearly education sessions to professional Turfgrass managers have revealed that 94% of attendees are employing techniques that are Best Management Practices. These practices can involve use of newer or best adapted cultivars/species, soil-test based fertility programs, selection of proper mowing and irrigation regimes as well as regular pest scouting and use of economic thresholds concerning treat or no treat decisions. Use of BMPs and IPM helps reduce un-necessary pesticide and reduce over use of fertilizers and irrigation, yield an acceptable Turfgrass stand at an affordable/acceptable cost.

4. Associated Knowledge Areas

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

Outcome #5

1. Outcome Measures

Percentage of ODOT roadside vegetation managers continuing adoption of improved BMPs and IPM practices

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	100

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

An erosion resistant, aesthetically pleasing, low growing, low maintenance vegetation is required for the 240,000 acres of state department of transportation maintained right of way adjacent to concrete and asphalt roads in Oklahoma. Plant community succession is an every present factor affecting species composition in the roadside right of way. ODOT Policy states that plant materials in the safety or clear zone must never exceed 12 inches in height and when mowed should not be mowed lower than four to six inches in height.

What has been done

For 28 years (since 1986) the Oklahoma State University Roadside Vegetation Management Team has been performing annual extension education aimed at development of Best Management Practices (BMP) as well as Integrated Pest Management Practices (IPM) for Oklahoma Department of Transportation vegetation management employees. Annual research projects on roadsides have been underway since 1963 and continued in 2014.

Results

The OSU RVM team annually trains over 630 ODOT employees in BMPs and IPM. Each employee trained (100%) has adopted at least one (and often several more) of the BMP and IPM techniques. These improved management techniques were taught in 2014 through three initial pesticide applicator certification schools (78 attendees), three annual herbicide sprayer calibration workshops (70 attendees) and 14 annual continuing education workshops (637 attendees). There

is no single practice or always a ridged set of practices to solve any given problem. ODOT uses an integrated vegetation selection, mowing and herbicide application program to manage the 240,000 acres of right of way. Each ODOT employee engaged in roadside management is using at the minimum at least one integrated practice. Adoption of BMPs and IPM techniques coupled with integration of the latest research results into product bid specifications followed by competitive bid process results annually in a savings of over \$120,000 in ODOT roadside vegetation maintenance costs.

4. Associated Knowledge Areas

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

Outcome #6

1. Outcome Measures

Effect of Low Temperature and/or Drought on Turfgrass

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Drought and cold temperature stresses are major limiting factors for sustainable specialty crop production in Oklahoma and the United States. Turfgrass occupies the largest acreage of intensively managed plant material in the U.S. Thus, developing resistant germplasm and elucidating the mechanisms of injury and resistance in response to combined or single stress is critical for economic, environmental, and societal benefit. The objectives of this research are to: 1) evaluate elite turfgrass germplasm with improved cold tolerance and drought resistance from Oklahoma State University Turfgrass Program and industry standards; and 2) elucidate specific physiological and molecular mechanisms associated with stresses.

What has been done

Membrane lipid molecules in "Premier", "Celebration" and "Latitude 36" bermudagrasses were profiled under well-watered and drought stressed conditions. Dehydrin protein expression differences in these grasses was identified, measured, and explained under well-watered

condition and drought stress. The response of "OKC1113", "Celebration", and "Tifway" to chilling stress was evaluated and their membrane lipid molecular species was also profiled and specific proteins related to chilling stress are still being identified.

Results

Lower monogalactosyldiacylglycerol (MGDG) and higher phospholipid contents contribute to drought resistance in bermudagrass. The 16- and 23-kDa dehydrin expressions could be associated with drought tolerance and contribute to drought tolerance in bermudagrass. Membrane stability is a core trait for cold and drought stresses in many plant systems. Identification of the responsiveness of membrane lipid composition to single and combined drought and low temperature stress will provide tools for marker-assisted breeding by screening germplasm for drought and low temperature stresses. Furthermore, integration of the lipidome and protein expression data will facilitate understanding the mechanisms of bermudagrass lines that are tolerant to multiple abiotic stresses.

4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
206	Basic Plant Biology

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

During 2014 there were very few factors that hindered adoption of IPM, BMPs and use of new or better adapted species with the exception of those areas that were plagued by persistent drought and where the cost of irrigation water for a new install or limitations on the availability of irrigation water negatively impacted the installation of new varieties. Due to drought in northcentral Oklahoma we postponed an ODOT-funded roadside vegetation management tour of right of way demonstration sites. This planned tour was rescheduled for summer of 2015. With respect to the implementation of BMPs, the persistent drought in southwestern Oklahoma and other western states increased the willingness to adopt future BMPs. This is due to the drought causing focus on the most fundamental problems (drought resistant varieties) and minor distractions such as lighter color or coarser leaf texture become tertiary compared to having a grass with improved stress tolerance and or lower water use rate. There were legal title issues that negatively impacted our ability to facilitate a new grower of buffalograss in western Oklahoma. Currently there are no buffalograss sod producers in Oklahoma west of I-35. The closest locations for buyers in

southwestern Oklahoma are the Ft. Worth area and Amarillo, TX. At least one new Oklahoma buffalograss producer is expected in western Oklahoma in the next two years.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Adoption of new cultivars and educational practices are informally assessed during one-on-one consultations by phone, email and site visits. Formal post-educational session adoption of new varieties and management techniques is regularly assessed at the OSU Turf TIP Team's premier educational event, the Oklahoma Turfgrass Conference and Trade Show as well as in one-on-one consultations following the annual Turfgrass Short Course, at Turfgrass Field Day and during the time of end-user site visits. Eight one-half day round table discussions are held around Oklahoma in September of each year to respond to concerns and questions posed by Oklahoma Department of Transportation field yard managers. This round table discussion yields insights following the preliminary annual survey of ODOT roadside programs and allows our team insight into the changes undertaken by ODOT during the current season and those planned in the upcoming year. Additionally an annual survey of Oklahoma Sod Producers is conducted and the varieties being offered for sale by producers are updated in the directory each year.

Key Items of Evaluation

Perceived quality and value of education offered, perceived quality and value of education offered by trade show vendors, was education valuable enough that you would participate in educational sessions in the future, increase in knowledge, increase in management effectiveness, use of new or improved varieties, use of scouting techniques, pest id prior to pesticide selection and use, and planned changes to management programs in the next calendar year.

V(A). Planned Program (Summary)

Program # 9

1. Name of the Planned Program

Community Resource and Economic 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
608	Community Resource Planning and Development	100%		100%	
	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	9.0	0.0	1.0	0.0
Actual Paid	13.0	0.0	2.9	0.0
Actual Volunteer	5.7	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
170000	0	142880	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
170000	0	142880	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
1596000	0	708157	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Strategic planning training and strategic planning for communiites, infrastructure planning, community service plans, medical facilities and services planning, training of county elected officials,

engineering and manufacturing consulting, community economic development studies, community leadership and agricultural leadership development, and entrepreneurs training and development.

2. Brief description of the target audience

The target audience includes community leaders (volunteer and elected), agricultural leadership participants and alums, and business owners/prospective owners, hospitals, schools, chambers of commerce, entrepreneurs, other agencies

3. How was eXtension used?

Members of CRED participate of the eXtension communities of practice indicated in parentheses: Notie Lansford (Local Government Education Training, Moodle Users), David Shideler (Community, Local, Regional Food Systems, Entrepreneurs and Their Communities, Enhancing Rural Capacity), Lynn Malley (Military Families), Mike Woods (Entrepreneurs and Their Communities, Financial Security for All, Health Insurance Literacy Ask an Expert), Susan Moffat (Diversity Equity and Inclusion, Entrepreneurs and Their Communities, EDEN, Financial Security for All, Network Literacy, Teen Leadership), and Merritt Taylor (Community, Local, Regional Food Systems)

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	26996	1816596	400	12000

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	7	7	14

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of community services plans completed

Year	Actual
2014	7

Output #2

Output Measure

- Number of education modules completed

Year	Actual
2014	0

Output #3

Output Measure

- Number of county officer training courses conducted

Year	Actual
2014	54

Output #4

Output Measure

- Number of manufacturing firms receiving applications engineering assistance

Year	Actual
2014	60

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number improving business skills
2	Number of manufacturing jobs created or retained
3	Number of communities where capacity was increased
4	Number of participants that plan to open/expand a business
5	Number of communities that build plans for growth and/or improvement
6	Number of leadership class graduates actively participating in community or industry
7	Organic Oklahoma Conference Attendees
8	Community Health Needs Assessment
9	Stronger Economies Together
10	Youth Community Recycling Training
11	Inventor's Assistance Service
12	Helping Small and Rural Manufacturers with Their Research Needs

Outcome #1

1. Outcome Measures

Number improving business skills

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	328

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Small businesses in rural areas tend to struggle to establish a market presence and compete in today's economy.

What has been done

During 2014, the Oklahoma State University e-commerce program provided training to 75 small businesses on how to plan, effectively set up, and promote their websites, which can help address these issues. We offered 3 workshops geared to those business owners without websites, and our "Websites 101" class was attended by 30 different people. We held 2 workshops targeted towards individuals or small businesses that might want to consider selling online via an online storefront (Amazon, eBay, or Etsy) instead of building a site themselves. We also held 3 workshops focused on small business owners who already had a website, but were interested in making it more visible.

Results

Of the 2014 participants, ratings for all relevant e-commerce workshops were quite high. These workshops on Search Engine Optimization proved to be quite popular. Response to each of these different workshops has been extremely positive. After the training, 92% of respondents planned on increasing their web efforts, and 93% indicated that they would be changing the way they marketed their website. These half-day, hands-on sessions are positively impacting rural businesses as evidenced by success stories of former attendees. These include those who used simple template-based software programs used in the workshops to set up their own websites (an example still in the works is Faith Creations Designs, an artist in Lawton; another example is the non-profit In a Good Way out of Idabel which developed a simple website), or made successful changes to their own site (for example, several small retailers in Seminole emailed to say that the SEO techniques we suggested increased their monthly website visits by 100%). Further, anecdotal evidence suggests that the improved advertising offered by a website can increase

small business sales anywhere from 20% to over 200%. With average sales of \$150,000 (which was the average displayed in a small business report by Mississippi State in 2007) this implies that the e-commerce program increased the revenue of small businesses in Oklahoma by between \$2.3M and \$23.0M during 2014.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #2

1. Outcome Measures

Number of manufacturing jobs created or retained

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	79

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Of the over 5000 manufacturers in Oklahoma, approximately half are located in rural areas and are extremely important to their local economies. The loss or downsizing of even one of these wealth-generating small- or mid-sized companies can have devastating consequences for the host and surrounding communities. With agriculture and energy industries no longer requiring large labor forces, rural manufacturers supply much needed jobs in rural communities. These rural manufacturers face particular difficulty in getting relevant and usable information and technical assistance that will keep them abreast of the rapid changes in manufacturing technology.

What has been done

To address the difficulties faced by our small- to medium-sized rural manufacturers, the College of Engineering, Architecture and Technology and the Division of Agricultural Sciences and Natural Resources at Oklahoma State University work in partnership to provide technical assistance through the Applications Engineering Program. Since 1997, Applications Engineers have been deployed in the state in collaboration with the Oklahoma Cooperative Extension Service and the Oklahoma Manufacturing Alliance to provide on-site engineering assistance.

Results

In order to receive engineering assistance the client must agree to a post-project impact assessment. This impact assessment is done using procedures developed by the National Institute of Standards and Technology for the Manufacturing Extension Partnership. The client is contacted some months after the completion of an activity and is asked a series of questions designed to assess the impact of the effort.

The impact of this program is measured in several ways. One is the economic value of the service to the company as reported by the client. Another measure is the number of jobs created or retained. Both impacts are measured by an independent survey of the client. Number of jobs created or retained is translated into economic impact using an income multiplier to compute the direct, indirect, and induced effects due to a change in the number of jobs in the manufacturing sector.

The multiplier was developed from data collected from two different sources. First, the average salary for manufacturing in Oklahoma (\$34,323) was taken from the U.S. Bureau of Labor Statistics published information for 2001. Secondly, the income multiplier of 2.2 was obtained from IMPLAN data for Oklahoma. The total economic impact can be computed by multiplying the average annual salary times the income multiplier to arrive at \$75,511 for each new or retained job in the manufacturing sector.

In 2014, the Applications Engineers client projects had the following impacts:

Sales increase \$6,184,500
Sales retained that would have otherwise been lost \$1,540,000
Cost savings \$644,400
Costs avoided \$1,536,472
37 new jobs created at \$75,511 per job \$2,793,907
42 jobs retained at \$75,511 per job \$3,171,462
Investment in new plant facilities and equipment \$2,542,999
Total impact \$18,413,740

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #3

1. Outcome Measures

Number of communities where capacity was increased

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	62

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Solid Waste facilities personnel have to maintain certification in their area of expertise. Furthermore, recycling activities and infrastructure are not equal across the state and there is a great advantage in bringing people who share this interest together to learn from one another. Communication among those with Environmental Law Enforcement authority is not always excellent, sometimes because one organization does not understand how another works, and this can result in ineffective enforcement.

What has been done

Extension helps organize and host the Oklahoma Indian Nations Chapter of the Solid Waste Management Association of North America (SWANA) annual symposium, which offers continuing education credits for SWM professionals. The Certificate Training offers SWM professionals the opportunity to become certified in a new area. The Facilities Tour offers all participants to see state of the art facilities. All offer SWM professionals the opportunity to network with other professionals and with vendors. The OK Recycling Association conference, which Extension also helps organize, was held on October 9, 2014. The theme was "Increasing Diversion: Events, Offices, Rural Areas," to educate participants of opportunities to decrease the fill rate of community landfills. Fifty two individuals participated in three Environmental Law Enforcement Trainings targeted at Officers, Tribal Environmental Officials, Storm Water Permittees, and citizens in general.

Results

One hundred twenty one individuals from around OK participated in the SWANA Symposium and 6 participated in the Certification course. All were pleased with the opportunity. A number requested a different location each year. There were 80 attendees from around the state at the OKRA Conference. Over 90% of the participants said that they had received the information that they hoped for. All attendees felt that the quality of the Environmental Law Enforcement training, the training facilities, and the handouts/resources were above average to excellent.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #4

1. Outcome Measures

Number of participants that plan to open/expand a business

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	15

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Small businesses in rural areas tend to struggle to establish a market presence and compete in today's economy.

What has been done

During 2014, the Oklahoma State University e-commerce program provided training to 75 small businesses on how to plan, effectively set up, and promote their websites, which can help address these issues.

Results

Of the 2014 participants, ratings for all relevant e-commerce workshops were quite high. We offered 3 workshops geared to those business owners without websites, and our "Websites 101" class was attended by 30 different people. We held 2 workshops targeted towards individuals or small businesses that might want to consider selling online via an online storefront (Amazon, eBay, or Etsy) instead of building a site themselves. We also held 3 workshops focused on small business owners who already had a website, but were interested in making it more visible. These workshops on Search Engine Optimization proved to be quite popular. Response to each of these different workshops has been extremely positive. After the training, 92% of respondents planned on increasing their web efforts, and 93% indicated that they would be changing the way they marketed their website. These half-day, hands-on sessions are positively impacting rural businesses as evidenced by success stories of former attendees. These include those who used simple template-based software programs used in the workshops to set up their own websites (an example still in the works is Faith Creations Designs, an artist in Lawton; another example is the non-profit In a Good Way out of Idabel which developed a simple website), or made successful changes to their own site (for example, several small retailers in Seminole emailed to say that the SEO techniques we suggested increased their monthly website visits by 100%). Further, anecdotal evidence suggests that the improved advertising offered by a website can increase

small business sales anywhere from 20% to over 200%. With average sales of \$150,000 (which was the average displayed in a small business report by Mississippi State in 2007) this implies that the e-commerce program provided the opportunity to increase the revenue of small businesses in Oklahoma by between \$2.3M and \$23.0M during 2014.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #5

1. Outcome Measures

Number of communities that build plans for growth and/or improvement

2. Associated Institution Types

- 1862 Extension

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)

The Community Health Needs Assessment (CHNA), is required for all nonprofit hospitals by the Affordable Care Act of 2010. Penalties for non-compliance are assessed through the IRS.

What has been done

The process developed by OCES meets this requirement and also provides a forum for a discussion on health between the hospital and community. The CHNA is a four-meeting process between the local hospital and a wide sampling of community members, and is typically completed in 2-4 months. Three different methods of gathering relevant information are used: (1) demographic, economic, and health indicator data from secondary sources; (2) a survey completed by local residents (available both in print and online); and (3) focus-group meetings of community members.

Results

OCES, in conjunction with the Oklahoma Office of Rural Health, led 7 communities through a facilitation process focused on community-level health in 2014. A total of 7 communities completed their CHNA in 2014 yielding 35 staff papers completed. A total of 21 community meetings were held during the year, with more than 300 individual participants, specifically for the

CHNA process. One continuing notable relationship created in 2014 was with Mercy-affiliated hospitals. Three of Mercy's rural facilities completed their CHNA during the year.

The CHNA process is offered at no cost to all facilities. Private-market vendors exist offering to meet the same needs, but their costs and products vary significantly some between \$10,000 and \$20,000. Other states (Kansas and Kentucky) with similar collaborations among state agencies and resources charge between \$5,000 and \$7,000 per community. Therefore, if the average of \$6,000 per community were applied, a total value of \$42,000 could be assumed in 2014 alone. Success stories emerged after the process was completed in several communities that participated. Summaries of these success stories were presented at an Oklahoma rural hospital conference to share with other potential hospital partners. The success stories included a pilot program on grief counseling, discussing poison education with local elementary schools, and diabetes education via lunch seminars.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #6

1. Outcome Measures

Number of leadership class graduates actively participating in community or industry

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	46

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The Oklahoma Agricultural Leadership Program empowers and develops emerging agricultural and community leaders. This is very important because members of OALP are strong advocates for Oklahoma agriculture. OALP graduates have a greater understanding of people and processes. They also have a greater understanding of various systems of economics and government, locally, nationally and internationally, and are able to solve problems and explore opportunities for Oklahoma agriculture and rural communities.

What has been done

During 2014, 22 members of Class XVI spent 16 days learning about leadership and empowering their leadership skills, especially during their trip to South Africa. The 24 members of Class XVII began their leadership experience and have spent 12 days learning about leadership and developing their skills to be better leaders.

Results

This experience gave participants the opportunity to learn about the economics and marketing systems of a foreign country and to share with Africans about how our economy and markets function. Some of them have gone back to their respective communities and/or businesses and shared what they learned during this trip. This experience resulted in participants being more vocal in sharing with their local representatives about issues that are important to Oklahoma agriculture and their rural communities. One current member of Class XVII has a new position as a Field Representative for Congressman Frank Lucas. Members of Classes XVI and XVII live in 37 different communities throughout the state and make an impact in their agricultural endeavors by being more knowledgeable about agricultural issues and can communicate these issues to members of their local community.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #7

1. Outcome Measures

Organic Oklahoma Conference Attendees

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	90

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

There had never been a statewide conference about organic production for small organic or sustainable producers. This is a small but growing segment of production in Oklahoma.

What has been done

The Organic OK Conference provides education including farm tours for persons interested and/or engaged in organic farming.

Results

There was a waiting list for registration. The room that was reserved would hold only 90. A second conference has been held in 2015 due to the demand following the conference in 2014. Two days of Organic Farm Tours have also been organized for summer of 2015 as a result of the 2014 conference

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #8

1. Outcome Measures

Community Health Needs Assessment

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The Community Health Needs Assessment (CHNA), is required for all nonprofit hospitals by the Affordable Care Act of 2010. Penalties for non-compliance are assessed through the IRS.

What has been done

The process developed by OCES meets this requirement and also provides a forum for a discussion on health between the hospital and community. The CHNA is a four-meeting process between the local hospital and a wide sampling of community members, and is typically completed in 2-4 months. Three different methods of gathering relevant information are used: (1) demographic, economic, and health indicator data from secondary sources; (2) a survey completed by local residents (available both in print and online); and (3) focus-group meetings of community members.

Results

OCES, in conjunction with the Oklahoma Office of Rural Health, led 7 communities through a facilitation process focused on community-level health in 2014. A total of 7 communities completed their CHNA in 2014 yielding 35 staff papers completed. A total of 21 community meetings were held during the year, with more than 300 individual participants, specifically for the CHNA process. One continuing notable relationship created in 2014 was with Mercy-affiliated hospitals. Three of Mercy's rural facilities completed their CHNA during the year.

The CHNA process is offered at no cost to all facilities. Private-market vendors exist offering to meet the same needs, but their costs and products vary significantly some between \$10,000 and \$20,000. Other states (Kansas and Kentucky) with similar collaborations among state agencies and resources charge between \$5,000 and \$7,000 per community. Therefore, if the average of \$6,000 per community were applied, a total value of \$42,000 could be assumed in 2014 alone. Success stories emerged after the process was completed in several communities that participated. Summaries of these success stories were presented at an Oklahoma rural hospital conference to share with other potential hospital partners. The success stories included a pilot program on grief counseling, discussing poison education with local elementary schools, and diabetes education via lunch seminars.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #9

1. Outcome Measures

Stronger Economies Together

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Rural communities often struggle with economic development efforts due to their isolation/lack of access to sizable markets, limited infrastructure and workforce, and limited human capacity. Stronger Economies Together (SET) is a program which brings together multiple counties to work

together and develop a regional economic development plan that builds upon the existing resources within the region.

What has been done

Oklahoma participated in Phases III and IV of USDA's Stronger Economies Together (SET) program, which is focused on developing regional partnerships among rural counties. These counties work together to build a high-quality regional plan that is focused on their economic strengths. Four regions in Oklahoma have completed the facilitation: Western OK I-40 Corridor team (4 counties along I-40 in western OK), and the Kiamichi regional team (6 counties in southeastern OK), South Central Oklahoma (5 counties to the south of Pontotoc County) and Route 66 Community Partners (Creek, Lincoln and Payne Counties).

Results

Only the Western I-40 region has completed its strategic plan as of the end of 2014. They have received \$10,000 in grant funding to implement that plan, seen the establishment of 2 daycare facilities, the opening of a commercial drivers' license facility, approval of a retirement community and demonstration of concept for drying canola using peanut equipment to increase farmer prices and yields. These represent significant improvements to the ability of employable persons in the region to work, increasing the region's available workforce and creating jobs.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #10

1. Outcome Measures

Youth Community Recycling Training

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)

Approximately 14 Extension Program Advisory Committees identified illegal dumping as a concern in their county in the fall 2013 report. Recycling infrastructure is missing in the rural areas of the state.

What has been done

Programs were delivered in each of the 4 Extension Districts and to several teachers? groups on matters related to solid waste management, including training on vermicomposting, water conservation, and aluminum recycling.

Results

Each group has been responsive to the program as delivered; these groups have included over 800 youth and nearly 400 Extension and K-12 educators. The water conservation program specifically particularly had a take home portion to be shared with the students? families, though no report backs were received about this.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #11

1. Outcome Measures

Inventor's Assistance Service

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahoma inventors frequently do not know how to evaluate the potential for their proposed inventions. Pursuing patents can cost \$12,000 to \$20,000 in legal and filing fees. In addition, proposed inventions with promise may need drawings, prototypes and/or marketing assistance.

What has been done

The O.S.U. Inventor's Assistance Service (IAS) provides preliminary market analysis and patent reports to 60-70 inventors per year. These reports describe current competing products as well as

existing patents that may be similar to the patent proposed by the inventors. Inventors are encouraged to use the information in these patents and information about competing products to improve their proposed inventions and make sure that they have sufficient differentiation to potentially make patenting their proposed invention viable and potentially profitable. IAS also offers on-line modules that inventors can complete to improve their ability to evaluate the potential for their own ideas. Also 15 to 20 percent of the inventions receive additional assistance with drawings, prototyping and marketing.

Results

For the July 1, 2013 to July 1, 2014, the inventor's assistance service received 63 applications for assistance and referred 13 for further development. We estimate cost avoidance impacts of \$600,000 that is created if, based on our reports, inventors do not attempt to patent or market ideas for which there would be the potential for patent infringement. Companies that received additional assistance are reporting impacts of approximately \$140,000 in impacts (some are in ranges and will depend on actual sales). Another 13 projects are at various stages in the development process, most from previous years.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #12

1. Outcome Measures

Helping Small and Rural Manufacturers with Their Research Needs

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	64

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Small and rural Oklahoma manufacturers are lagging in efficient and effect product and process innovation product innovation as compared to their larger counterparts.

What has been done

The Oklahoma Manufacturing Alliance (OMA) and Oklahoma State University New Product Development Center (NPDC) jointly became National Institute of Standards and Technology (NIST) engagement-competitive award recipients (E-CAR). The work was completed in September 2013 and project impact surveys were completed in 2014. The project was a three-year \$1.1 million cooperative agreement funded by National Institute of Standards and Technology (NIST), which grants awards to manufacturing extension partnership teams that provide the biggest impact and technological change.

The 2010 E-CAR award to the OMA and the OSU NPDC was for its proposal for sustainable manufacturing innovations and design teams and how these teams focused on the practical technology needed in the manufacturing industry. Through the E-CAR program, NPDC design engineers assisted manufacturers in developing proposals for state and federal funding, helped with the introduction of new products and provided process innovation support for small manufacturing companies in Oklahoma. They helped revolutionize productions and processes to keep manufacturers competitive in the marketplace.

The grant improved the department and colleges within OSU such as the College of Engineering Architecture and Technology (CEAT) and the Division of Agricultural Sciences and Natural Resources (DASNR). It also solidified the NPDC relationship with OMA.

The E-CAR program was instrumental in the NPDC's growth to five, full-time employees and 30 students. Student interns gain real-world experiences by helping develop products and solve problems. These new products are more affordable, reliable and durable now because of the work of students and staff. E-CAR also brought federal money to the state of Oklahoma for economic development. As a result of this grant, many company relationships have developed that continue to foster proposal generation.

Results

According to the Impact Accounting System of OMA, the E-CAR grant created and improved 79 projects; 64 companies were positively affected by E-CAR. The program created 117 jobs and retained 90 jobs. Additionally, the grant generated capital investment of more than \$3.3 million and avoided unnecessary investments by more than \$6.8 million.

The program also resulted in a change in sales of more than \$34 million and retention of sales of \$31 million.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Competing Public priorities

Brief Explanation

The county officers training program, which is funded in part by an annual state appropriation, had appropriations reduced by about 5%.

Some OALP donors reduced or eliminated financial support to the program during 2014 as a result of the effects of the continued drought and the decrease in farm/ranch income. The reduction was luckily made up by other donors stepping forward to support the program. However, the financial uncertainty is always a concern for our program. We were fortunate to obtain two grants during 2014 for a total of \$11,000 which was helpful to operate our program. State legislators also reduced appropriated support to OALP by \$10,000 in FY 2011 and this reduction has continued since then. This continued reduction has a negative impact on the educational and leadership experiences that can be provided to class members because of the continued increase in costs for transportation and lodging during seminars.

The ongoing serious drought in Oklahoma, especially the western part of the state, has affected producers drastically and was, in part, the genesis of the Organic Oklahoma Conference, scheduled for 2/28 and 3/1 of 2014.

Earthquake swarms have become commonplace in Oklahoma. This increase will likely affect the scope of the Environmental Law Enforcement Trainings in 2015.

The Solid Waste Management Grant for 2014-2015 was reduced by about 10% by the USDA. OCES stepped up to make up part of the difference.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Evaluations for county officer training courses were done via Survey Monkey to evaluate workshops presented at County Officers and Deputies Assoc. Among other things, respondents were asked to give each workshop a grade. Over 90% of respondents graded workshops as being worthy of a grade of 85% to 95%.

Surveys delivered immediately after each e-Commerce workshop validate the content and also provided input for related topics of interest for rural businesses. Evaluation results have been very positive for all "Website 101," "Introduction to PayPal," "Search Engine Optimization," and "The Ins and Outs of Online Storefronts" workshops.

The CHNA team (OCES and the Office of Rural Health) now meets with communities who have completed the process at regular intervals post-completion: 6 months, 12 months, and 18 months after the final community meeting. These meetings assess how well the hospital / community are meeting the goals laid out in their implementation plan. The CHNA team is preparing to share "best practices" from communities across the state in terms of programs and services implemented to better serve their local communities. The Affordable Care Act requires that 501(c)3 hospitals conduct a CHNA every 3 years, so this regular evaluation will be crucial in determining the future health needs of the community.

The CHNA team currently utilizes surveys at the completion of the economic impact and survey presentation meetings for the community members present. Also, the CHNA team encourages hospital administration to complete an overall evaluation of the process upon completion.

Note: As of December 2014, the Office of Rural Health has subsumed the federal contract for leading the CHNA effort in Oklahoma. This essentially means that 2014 is the last year that OCES will report measures associated with the CHNA

Key Items of Evaluation

Future e-Commerce workshops will continue to include suggestions from previous surveys and will seek to address hot e-commerce topics, such as Google advertising, Facebook advertising, and Web 2.0

techniques.

V(A). Planned Program (Summary)

Program # 10

1. Name of the Planned Program

Integrated Pest Management

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
133	Pollution Prevention and Mitigation	5%		10%	
202	Plant Genetic Resources	5%		5%	
205	Plant Management Systems	10%		10%	
211	Insects, Mites, and Other Arthropods Affecting Plants	16%		20%	
212	Diseases and Nematodes Affecting Plants	10%		20%	
213	Weeds Affecting Plants	16%		5%	
215	Biological Control of Pests Affecting Plants	11%		5%	
216	Integrated Pest Management Systems	20%		20%	
601	Economics of Agricultural Production and Farm Management	4%		5%	
901	Program and Project Design, and Statistics	3%		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	4.0	0.0	5.0	0.0
Actual Paid	6.0	0.0	3.1	0.0
Actual Volunteer	0.1	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
60000	0	156369	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
60000	0	156369	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
684600	0	775011	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Fulfill the specific Inputs and Activities outlined in the "Oklahoma State University Coordination Program for IPM Oklahoma!" (as made to USDA-NIFA "Extension Integrated Pest Management Coordination and Support Program (EIPM-CS)"), including the identification of new program priorities for future funding.
- Provide information on IPM upon request to stakeholder groups, and attend stakeholder sponsored meetings as invited.
- Conduct targeted research on pest status, suppression and IPM approaches for crop, animal, and urban systems in Oklahoma.
- Develop and deliver extension IPM programs to stakeholders, in the form of workshops, field demonstrations and meetings
- Develop pesticide applicator education and pesticide information through printed media, fact sheets and current reports.
- Assess impact of educational activities on stakeholder IPM

2. Brief description of the target audience

Agricultural Producers, Agricultural Groups, Commercial Growers, Retailers, Agricultural Professionals (private, commercial and non-commercial), and landowners, nurseries, individual stakeholders, storers and handlers of grain

3. How was eXtension used?

Dr. Boman is the subject matter editor for the Ginning and Classing section for the Cotton Community of Practice. All subject matter sections were updated in the fall of 2012 by the various editors. Dr. Guy Collins of the University of Georgia is handling coordination of content updating. We have a direct link on both websites we manage. URL: www.extension.org. Dr. Talley is a member and contributor of the eXtension Beef and eXtension Goat COP.

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	3300	256180	204	10005

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

Year: 2014
 Actual: 1

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	21	45	66

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Stakeholder assessment

Year	Actual
2014	2

Output #2

Output Measure

- Pesticide applicator education schools and workshops

Year	Actual
2014	42

Output #3

Output Measure

- County-based variety field tours of canola and wheat for growers

Year	Actual
------	--------

2014 41

Output #4

Output Measure

- Research demonstrations will be conducted on confined poultry farms demonstrating IPM strategies for managing litter beetles.

Year	Actual
2014	1

Output #5

Output Measure

- Extension publications will be created or revised

Year	Actual
2014	21

Output #6

Output Measure

- News releases on the subject of IPM in schools, horticulture crops, livestock, and agronomic crops

Year	Actual
2014	7

Output #7

Output Measure

- A summarized annual report will be developed for distribution to involved stakeholders demonstrating the impact of IPM programs to Oklahoma citizens.

Year	Actual
2014	1

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Increased use of pest management approaches for targeted cropping system acres
2	Number of trained certified pesticide applicators
3	Poultry producers will be informed on the utility of alternative IPM strategies for managing litter beetles.
4	Increase in percent of growers with knowledge and adoption of iWheat program for winter wheat.
5	Home gardeners will gain knowledge about IPM practices for their home gardens.
6	People will gain knowledge about IPM programs by visiting the IPM Oklahoma! booth at various meetings, including the Oklahoma Ag Expo and the Oklahoma School Plant Managers Association.
7	Biological Control of Musk Thistle
8	IPM Implementation for Agronomic Crops: Hessian Fly Management
9	Survey for phorid flies in SE Oklahoma

Outcome #1

1. Outcome Measures

Increased use of pest management approaches for targeted cropping system acres

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	12000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Sorghum is grown on 250,000-300,000 acres in Oklahoma. In 2013, sugarcane aphid switched to infesting sorghum in 2013, causing significant yield losses in sorghum in Texas, Louisiana, and Mississippi. Research conducted in 2013 indicated that currently registered products for aphid control in sorghum were ineffective. The aphid was found in one Oklahoma county in 2013.

What has been done

The discovery of this aphid in 2013 prompted the Oklahoma Sorghum Growers to ask the OSU IPM coordinator and the Pesticide Education Program coordinator to support an emergency Section 18 registration for the use of sulfoxaflor to help control them. In addition, a research/extension demonstration was established to evaluate chemical control options and the impact of the aphid on production. Two news releases were provided through OSU to assist growers in identifying sugarcane aphid, with suggestions for determining the need for control. In 2014, sugarcane aphid was found in 17 counties, infesting a minimum of 10,000 acres statewide. Based on the results of the research/extension demonstration that evaluated impact on yield, an uncontrolled infestation of sugarcane aphid reduced yield by an average of 18 bushels per acre.

Results

Sulfoxaflor was applied to 10,000-12,000 acres of grain sorghum in 2014. Based on an extension demonstration coordinated by the IPM Crops Insect Pest Management Team, this Emergency registration, the efforts of the Oklahoma State Row-crops Pest Management Team saved Oklahoma sorghum growers ca. \$500,000.00 to \$700,000.00 in lost grain yield.

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Diseases and Nematodes Affecting Plants
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems
601	Economics of Agricultural Production and Farm Management

Outcome #2

1. Outcome Measures

Number of trained certified pesticide applicators

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	3430

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Pesticide safety education provides classes for pesticide applicators to maintain and receive certification. This is in order to promote pesticide safety, protect our environment through responsible pesticide application, promote adhering to all Oklahoma Department of Agriculture, Food, and Forestry requirements, and sustain our pest control industry.

What has been done

Oklahoma Pesticide safety education program has provided certification courses for 230 individuals and continuing education for over 3,200 individuals in many different pesticide applicator categories. We continue to produce a monthly newsletter and maintain a website for the public and applicators to access important information related to pesticide safety and applicator training. We continue providing test help sessions and master gardener training. We also coordinate a container recycling program that resulted in 56,000 lbs of plastic collected in 2014

Results

It is estimated that the 230 individuals certified through our programs will bring over \$17 million to the Oklahoma economy through starting new businesses and providing services related to pest control. We provided education to 3,200 individuals to maintain their certification which represents \$240 million to the Oklahoma economy based on industry estimates. Complaints to the department of Agriculture continue to decline based on our educational programming.

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Diseases and Nematodes Affecting Plants
213	Weeds Affecting Plants
216	Integrated Pest Management Systems
901	Program and Project Design, and Statistics

Outcome #3

1. Outcome Measures

Poultry producers will be informed on the utility of alternative IPM strategies for managing litter beetles.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	120

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In the United States 17 states accounts for about 94% of broiler production. These states are primarily in the southeast part of the country. In Oklahoma broiler production is focused near the Arkansas border. The Economic Research Service estimates 2015 broiler meat production to be ~ 39.6 billion pounds. A typical poultry house will be between 12 and 19 m in width and about 90 to 180 m in length housing up to 25,000 broiler birds. The litter beetles *Alphitobius diaperinus*

(Panzer) originated from Sub-Saharan Africa and are currently found often in poultry buildings in the United States, Britain, Denmark, and Australia. Litter beetles cause damage to the poultry facility that results in \$4,000 worth of damage to facility insulation annually. Windrowing litter is a potential method to control litter beetles especially when utilized with chemical control, which may prove to be a more effective control program. Windrowing is a technique used inside poultry houses to compost the litter.

What has been done

The Oklahoma State University Integrated Pest Management Team has conducted field research to determine the effect of windrowing on litter beetle populations in broiler houses in Eastern Oklahoma. The field demonstrations were the only litter beetle work being done for the Oklahoma Broiler industry within the state of Oklahoma.

Results

The field demonstrations resulted in a new management option for Oklahoma Broiler Operators that also encourages limiting insecticide inputs which is the most commonly used method in controlling litter beetles in broiler houses. The results and updated litter beetle management techniques were presented to poultry operators at the Eastern Oklahoma Ag. Expo. Meeting in Poteau, OK which had approximately 120 attendees with at last 25% of the audience being Asian in descent.

4. Associated Knowledge Areas

KA Code	Knowledge Area
211	Insects, Mites, and Other Arthropods Affecting Plants
216	Integrated Pest Management Systems

Outcome #4

1. Outcome Measures

Increase in percent of growers with knowledge and adoption of iWheat program for winter wheat.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	15

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #5

1. Outcome Measures

Home gardeners will gain knowledge about IPM practices for their home gardens.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	54

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahoma home gardeners are interested in applying IPM principles to their yard, garden and landscape; however, they often have limited knowledge of what tactics are available, and how they can apply them.

What has been done

In 2014, the IPM team developed and delivered an Advanced IPM Workshop for Master Gardeners. 54 Master Gardeners were trained in 2 sessions lasting 6 hours each that included information on Scouting, Diagnosing problems, Cultural, Biological, Mechanical and Chemical Controls.

Results

Participants were allowed to evaluate the program and we measured changes using a pre and a post-test that evaluated Knowledge, Attitude and Skills changes of the participants with a Likert Scale:

Quality of instruction 1=Very High, 5 = Very low, Objective met 1 = Strongly Agree, 5 = Strongly Disagree. Participants agreed that the Instruction, Instructors were knowledgeable (1.15), organized (1.28), and Responsive (1.21). Participants believed that the workshop met the objectives (1.20) AND learned a lot from the workshop (1.31).

We also measured their Understanding of IPM, 1 = none, 5 = Complete, Attitude towards IPM, 1 = Strongly not Favor, 5 = Strongly Favor, and Skills Change 1 = Low, 5 = High.

On average, participants increased their Understanding of IPM (Before 2.85, After 4.13), and had a positive attitude change towards using IPM (3.13 Before, 3.69 After). They also increased their confidence about using and applying and teaching IPM principles (Skills Change) to their clientele (2.42 Before, 3.64 After).

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Diseases and Nematodes Affecting Plants
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems

Outcome #6

1. Outcome Measures

People will gain knowledge about IPM programs by visiting the IPM Oklahoma! booth at various meetings, including the Oklahoma Ag Expo and the Oklahoma School Plant Managers Association.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
-------------	---------------

2014 101

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
216	Integrated Pest Management Systems

Outcome #7

1. Outcome Measures

Biological Control of Musk Thistle

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The invasive weed, Musk thistle (*Carduus nutans* L) was first identified in Oklahoma in 1944, and is currently found in more than 62 counties. Infestations of musk thistle in improved pastures cause significant economic losses in Oklahoma. In 1998, Oklahoma legislators passed a law designating musk thistle, along with scotch and Canada thistles, as noxious weeds in all counties of the state.

What has been done

A musk thistle IPM program was developed in the early 1990s and has been implemented statewide through cooperative efforts of OSU researchers, OSU Extension personnel, and landowners. It focuses on increasing public awareness of the problem, development of

educational information, demonstrating various control options, and introducing new biological control agents. One demonstration and educational meeting was conducted in 2014 for landowners and NRCS employees. OSU Extension educators, landowners and NRCS personnel collected approximately 14,000 musk thistle head weevils and 1,000 musk thistle rosette weevils in Alfalfa and Grant counties in spring of 2014 for redistribution.

Results

To date, this program collected and redistributed more than 914,000 musk thistle head weevils and 46,710 musk thistle rosette weevils across the state. Landowners in NE Oklahoma have noted from 80% to 95 % decrease in number of musk thistle plants in areas where they are using an integrated approach that includes use of the musk thistle weevils. If the typical landowner applies 1 lb. active ingredient of herbicides per acre annually, biological control has decreased the amount of herbicides applied to the environment by 7.1 million lbs per year.

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems

Outcome #8

1. Outcome Measures

IPM Implementation for Agronomic Crops: Hessian Fly Management

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Winter wheat is grown on 5.6 million acres in Oklahoma for pasture, grain and dual purpose (pasture + grain). Hessian fly has become a more prominent pest due to fly-susceptible varieties. Traditional ?fly free? planting dates that were developed in the 1930?s appear to be ineffective.

What has been done

Estimates of yield loss suffered by Hessian fly infestations can reach 5 bushels per acre, when a susceptible variety is infested with 1 fly per stem. A Hessian fly screening program (lab and field) was instituted to evaluate new winter wheat releases through the Oklahoma State winter wheat breeding program. In 2015, 25.9% of the wheat acres in Oklahoma were planted to H fly resistant varieties. Two fully resistant varieties ?Duster? (released in 2006) and ?Gallagher? (released in 2011) are the most planted (14.1%) and 3rd most planted (5.8%) varieties in 2015. Additional varieties, ?Billings? (1.3% planted) which was released in 2009, ?Ruby Lee? (5.0% planted) released in 2011, are partially resistant. Results of H. fly monitoring from 2011-2013 demonstrated that H. fly emergence had two peaks, one in the fall, and one in the spring. Emergence occurred too late for insecticide seed treatments to be effective in the fall, and for too long of a period for foliar insecticides to be reliably effective. This work suggests that host plant resistance coupled with cultural controls will be the predominant method for Hessian fly management in Oklahoma.

Results

Approximately 1.2 million acres of the winter wheat acres were planted to ?Duster?, Billings or Gallagher in 2015. Of that, a minimum of 5% or 60,000 acres were planted in areas where Hessian fly was documented (from 2009-2011) to be a serious problem, resulting in an estimated \$1.5 million in yield savings.

4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
216	Integrated Pest Management Systems

Outcome #9

1. Outcome Measures

Survey for phorid flies in SE Oklahoma

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The red imported fire ant (RIFA), *Solenopsis invicta* Buren (Hymenoptera: Formicidae), was recorded in parts of Oklahoma as early as 1985, and has since been found at one time or another in 42 Oklahoma counties as of August 2008. In 2009, an additional 12 counties were added to the eight counties (Bryan, Carter, Choctaw, Comanche, Johnston, Love, Marshall and McCurtain) that are federally quarantined in Oklahoma. Distribution of RIFA occurrence in Oklahoma is disjunct, most likely due to variable climate and continual artificial movement of hay and nursery materials. An area wide RIFA management project was funded through 2007 that included release of two fire ant decapitating flies (*Pseudacteon tricuspis* and *P. curvatus*) as well as an evaluation of fire ant baits. Since red imported fire ant has been establishing in additional counties, it is important to provide updated information on fire ant management to interested ranchers in southern Oklahoma, since establishment is variable, and document the establishment and movement of *Pseudacteon* spp. into fire ant-infested areas of Oklahoma.

What has been done

Pseudacteon tricuspis was released in two counties (Bryan and Atoka) and *P. curvatus* was released in 4 counties (Bryan, LeFlore, Love and Pushmataha). However, establishment was confirmed only in Bryan and LeFlore. OSU researchers conducted a summer-long survey for phorid flies in seven counties (Atoka, Bryan, Carter, Choctaw, LeFlore, McCurtain, and Marshal).

Results

Pseudacteon curvatus was captured in 5 of the seven counties surveyed: (Atoka, Bryan, Carter, Choctaw, McCurtain). New records of establishment were found in Atoka, McCurtain, Carter and Choctaw). No *P. tricuspis* was collected. This survey documents that phorid flies have established and spread from their original release sites.

4. Associated Knowledge Areas

KA Code	Knowledge Area
211	Insects, Mites, and Other Arthropods Affecting Plants
216	Integrated Pest Management Systems

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

A severe drought began in 2010 and has significantly impacted our cotton, wheat production and canola production. Cotton production was decreased by more than 50% in 2011-2013, wheat production was reduced by 50% in 2013-2014, and canola production was decreased by more than 40% in 2013-14. Current conditions are that 98.5 percent of

Oklahoma is under abnormally dry conditions, 66% is under moderate drought, 48 percent under severe drought, and 28 percent of the state under extreme drought, and 4 counties (Harmon, Jackson, Greer and Tillman are under Exceptional Drought (the highest level of drought).

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Advanced IPM Workshop for Master Gardeners - participants were allowed to evaluate the program and we measured changes using a pre and a post-test that evaluated Knowledge, Attitude and Skills changes of the participants with a Likert Scale:

Quality of instruction 1=Very High, 5 = Very low, Objective met 1 = Strongly Agree, 5 = Strongly Disagree. Participants agreed that the Instruction, Instructors were knowledgeable (1.15), organized (1.28), and Responsive (1.21). Participants believed that the workshop met the objectives (1.20) AND learned a lot from the workshop (1.31).

We also measured their Understanding of IPM, 1 = none, 5 =, Complete, Attitude towards IPM, 1 = Strongly not Favor, 5 = Strongly Favor, and Skills Change 1 = Low, 5 = High.

On average, participants increased their Understanding of IPM (Before 2.85, After 4.13), and had a positive attitude change towards using IPM (3.13 Before, 3.69 After). They also increased their confidence about using and applying and teaching IPM principles (Skills Change) to their clientele (2.42 Before, 3.64 after).

Key Items of Evaluation

Master Gardeners want more information on IPM BMPs and other practices and did learn from the workshops. The MGs will share with thousands of other gardeners as they voluntarily present programs and answer questions.

V(A). Planned Program (Summary)

Program # 11

1. Name of the Planned Program

Food Safety - Agricultural Biosecurity

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
211	Insects, Mites, and Other Arthropods Affecting Plants	0%		5%	
212	Diseases and Nematodes Affecting Plants	0%		50%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	0%		35%	
903	Communication, Education, and Information Delivery	100%		10%	
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	0.7	0.0	2.0	0.0
Actual Paid	0.1	0.0	2.7	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
20073	0	134887	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
20073	0	134887	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
40000	0	743623	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

1. Maintain and expand, as appropriate, the OSU National Institute for Microbial Forensics & Food and Agricultural Biosecurity, a multi-disciplinary unit to support and address issues of crop and food safety and biosecurity, and their impacts.
2. Conduct scientific research targeted specifically towards plant pathogen forensics, produce safety, sociological impacts of terrorism and other areas of agricultural biosecurity.
3. Continue to offer targeted coursework for students seeking M.S. or Ph.D. degrees in established programs such as Plant Pathology, Biochemistry, Plant Sciences or Forensic Sciences, who seek plant pathogen forensics. Consider establishing an academic "track" leading to a certificate or Minor in this area.
4. Work with other members of the Entomology & Plant Pathology Department to revise and enhance the Bioforensics Option within the undergraduate Entomology Degree Program.
5. Participate on/in local and national grant panels, advisory boards, review committees, expert bodies and other activities, as appropriate, to maintain visibility of OSU and NIMFFAB in the national biosecurity, homeland security, microbial forensics, and food safety communities.

2. Brief description of the target audience

- Key members of National and Oklahoma homeland security community (DHS, FBI, CIA, etc)
- Key members of National and Oklahoma agricultural leaders and representatives
- Oklahoma extension personnel
- Master gardeners
- Oklahoma producers and crop consultants
- OSU students and faculty
- Professional/scientific societies
- Key industries
- The public

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	747	0	64	0

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

Year: 2014
 Actual: 1

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	1	23	23

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of OSU faculty, students and staff affiliated with, or collaborating with NIMFFAB.

Year	Actual
2014	31

Output #2

Output Measure

- Number of outside-OSU researchers, agencies and entities sponsoring, collaborating with or benefiting from NIMFFAB activities.

Year	Actual
2014	60

Output #3

Output Measure

- Number of grant/contract proposals submitted in agricultural microbial forensics and biosecurity, and food safety.

Year	Actual
2014	26

Output #4

Output Measure

- Number of grants/contracts awarded in those areas.

Year	Actual
------	--------

2014 6

Output #5

Output Measure

- Number of journal articles submitted with emphasis on agricultural microbial forensics and biosecurity.

Year	Actual
2014	23

Output #6

Output Measure

- Number of students taking classes or seminars developed as part of the OSU Agricultural Biosecurity initiative.

Year	Actual
2014	64

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of invitations to agricultural biosecurity team members for participation in initiatives, programs, presentations, and consultations related to agricultural biosecurity and microbial forensics
2	Number of team-associated individuals who a. Performed a project related internship b. Were hired into a professional position in the biosecurity or food safety field c. Served on agricultural biosecurity or food safety review committees or panels
3	Graduate students who will populate laboratories whose testing is related to the protection of human, animal, and plant health from infection by pathogenic organisms
4	Number of students enrolled in courses that contain a significant portion of material on agro-terrorism, bio-terrorism, or food safety
5	Disaster Preparedness

Outcome #1

1. Outcome Measures

Number of invitations to agricultural biosecurity team members for participation in initiatives, programs, presentations, and consultations related to agricultural biosecurity and microbial forensics

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	56

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
212	Diseases and Nematodes Affecting Plants
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
903	Communication, Education, and Information Delivery

Outcome #2

1. Outcome Measures

Number of team-associated individuals who a. Performed a project related internship b. Were hired into a professional position in the biosecurity or food safety field c. Served on agricultural biosecurity or food safety review committees or panels

2. Associated Institution Types

- 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
212	Diseases and Nematodes Affecting Plants
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
903	Communication, Education, and Information Delivery

Outcome #3

1. Outcome Measures

Graduate students who will populate laboratories whose testing is related to the protection of human, animal, and plant health from infection by pathogenic organisms

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	10

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Diseases and Nematodes Affecting Plants
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
903	Communication, Education, and Information Delivery

Outcome #4

1. Outcome Measures

Number of students enrolled in courses that contain a significant portion of material on agro-terrorism, bio-terrorism, or food safety

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)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
----------------	-----------------------

- 211 Insects, Mites, and Other Arthropods Affecting Plants
- 212 Diseases and Nematodes Affecting Plants
- 712 Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #5

1. Outcome Measures

Disaster Preparedness

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)

As a state with one of the highest rates of emergencies and disasters in the U.S., efficient disaster preparedness, response, recovery, and mitigation are vital to increasing the resilience of Oklahoma communities to disasters. Achieving efficiency throughout and specific goals in each of the phases of the disaster cycle requires identification of existing local and state resources, recognition of gaps between recommendations and practices, and development of partnerships to address existing gaps that interfere with communities' abilities to manage disasters.

What has been done

OSU Specialists developed relationships with potential partners and community stakeholders who can assist in addressing shortfalls in implementation of disaster cycle activities. Current contacts include Extension Disaster Education Network delegates from 15 states, including those bordering Oklahoma; approximately 20 American Red Cross paid staff and leadership volunteers; one Catholic Charities representative; two Oklahoma Department of Commerce representatives; one FEMA Region VI director; 20 Oklahoma Medical Reserve Corps paid staff and volunteers; 10 Oklahoma Disaster Recovery Project paid staff; seven local and state emergency management officials; and two American Quarter Horse Association employees. These partners will facilitate access to rural populations, including communities affected by recent disasters (e.g., May 2013 tornadoes), Hispanic populations, and tribal populations.

In addition, a disaster management graduate course was developed focusing on identifying and addressing vulnerabilities in rural areas. Course topics include the incident command system (ICS), national incident management system (NIMS), public affairs during disasters and

emergencies, disaster impacts on rural areas and agriculture, and exercise development and evaluation. For their final projects, students identify disaster-related needs in rural areas and then use those needs to develop, conduct, and evaluate exercises.

Descriptions of relationships developed were provided to contacts within the Extension Disaster Education Network, American Red Cross, Oklahoma Department of Commerce, FEMA Region VI, and Oklahoma Medical Reserve Corps through presentations and discussions at meetings and via email. In addition, ideas for research studies and training were shared with these contacts.

Results

The partner relationships developed to date will directly impact 61 counties in Oklahoma, as well as counties in Arkansas, Texas, Nebraska, Kansas, and North Dakota. Four research studies to be conducted in Oklahoma, in partnership with the American Red Cross, are in various stages of planning and/or are under way. In addition, two planning grant proposals were submitted to develop case studies and a National Science Foundation grant proposal; each planning grant proposal includes investigators from North Dakota, Nebraska, and Kansas. In addition, six students enrolled in the disaster management graduate course had opportunities to develop relationships with community stakeholders. Two of those students assisted with planning of and participated in the Payne County (Oklahoma) portion of the 2014 statewide emergency management exercise.

4. Associated Knowledge Areas

KA Code	Knowledge Area
903	Communication, Education, and Information Delivery

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
- Other (exotic pathogens, terrorism)

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

None

Key Items of Evaluation

None

V(A). Planned Program (Summary)

Program # 12

1. Name of the Planned Program

Farm and Agribusiness Systems Economics

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
601	Economics of Agricultural Production and Farm Management	28%		60%	
602	Business Management, Finance, and Taxation	25%		10%	
603	Market Economics	22%		10%	
607	Consumer Economics	5%		10%	
610	Domestic Policy Analysis	20%		10%	
	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	6.0	0.0	4.0	0.0
Actual Paid	8.0	0.0	1.3	0.0
Actual Volunteer	0.1	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
130000	0	65948	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
130000	0	65948	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
1260000	0	326842	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Develop and communicate research based information that farm and agribusiness managers can use to improve decisions.
 Develop decision aids developed that assist farm and agribusiness managers in improved decisions.
 Conduct educational programs that improve the management skills of farm and agribusiness managers.
 Farm and agribusiness managers are able to better understand economic consequences and make more informed decisions.

2. Brief description of the target audience

Managers, owners, and employees of farms and agribusinesses; policy makers; agency leadership

3. How was eXtension used?

The cooperatives community of practice (COP) on eXtension was used extensively in 2014. It was used to develop and deliver information to cooperative managers, board of director members and producer members. During 2014 a national webinars was conducted on eXtension. Ten articles were also published in a new blog titled "Farmer Cooperative Commentary" . Seventeen articles were also published in the general section of the Cooperatives COP on eXtension.

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	17806	777787	280	3000

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	35	24	59
---------------	----	----	----

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of board members of farmer-owned cooperatives receiving credentialed director training for board governance

Year	Actual
2014	35

Output #2

Output Measure

- Number of software decision analysis aids developed

Year	Actual
2014	6

Output #3

Output Measure

- Number of manuscripts submitted to refereed journals

Year	Actual
2014	48

Output #4

Output Measure

- Number of farm income tax management schools conducted

Year	Actual
2014	11

Output #5

Output Measure

- Number of participatory experiential learning workshops conducted

Year	Actual
2014	3

Output #6

Output Measure

- Number of extension fact sheets, current reports, department staff papers, newsletter articles and other reports developed.

Year	Actual
2014	55

Output #7

Output Measure

- Number of articles published, questions answered, and webinars conducted through eXtension system

Year	Actual
2014	77

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of tax preparers using information from OCES tax schools
2	Number of credentialed board members serving on agricultural cooperative boards (cumulative)
3	Number of beef producers applying some level of financial management decision skills learned through Master Cattleman certification
4	Number of producers and agribusiness managers using OSU developed decision aids
5	Number of producers gaining an improved understanding of risk management through participatory experiential learning experiences

Outcome #1

1. Outcome Measures

Number of tax preparers using information from OCES tax schools

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	1900

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Frequent changes in Federal and Oklahoma State Tax Laws create a need to keep tax preparers informed of the impact of the changes and how to best help their clients utilize the tax planning and management opportunities available in the current tax laws. These tax schools are designed to update tax preparers about new laws and regulations covering farm, non-farm business and individual taxpayer issues.

What has been done

This program has been conducted for the past 48 years. It has grown from a one-day seminar to its present form of two days per location for the fall Farm and Business Tax Institutes and the summer Tax Clinic. The combination of all the schools allows a preparer to get the full 40 hours of CPE/CLE as required by state. Topics covered range from presentation of new tax laws and their implications, agricultural issues, business issues, tax planning opportunities, professional ethics, retirement, and social security to name a few. Twelve two day sessions are conducted each year with two of these in the summer and ten in the fall and two one day special topics courses. Total 2014 attendance for the schools was approximately 1,900 tax preparers in 11 workshops. Certified public accountants make up 46 percent of the attendance, 27 percent are tax preparers and bookkeepers, 10 percent are enrolled agents, 2 percent are attorneys, and the remaining 15 percent come from a variety of backgrounds. These tax preparers file roughly 80 percent of the farm returns for taxpayers in the state of Oklahoma.

Results

High quality, professional instruction is provided to make continuing education credit available for Certified Public Accountants, Enrolled Agents, and Tax Attorneys. Many of those attending have stated that they have been coming to these programs since they began. Participants filed more than 37,645 Federal farm tax returns and 255,428 Federal non-farm tax returns as reported by the participants in the most recent program evaluations. Most of the tax preparers that attend are

from Oklahoma however there have been preparers from Kansas, Texas, New Mexico, Arkansas, Florida, and California attending the program in order to maintain their Oklahoma accreditation.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Number of credentialed board members serving on agricultural cooperative boards (cumulative)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	50

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The board of directors of an agricultural cooperative has responsibility for strategic decisions and for safeguarding the organizations assets. Agricultural cooperative board members are producers who are elected by the membership to serve with only token remuneration. In recent times, all board members, including cooperative board members are under intense scrutiny. The incidence of legal proceedings against board members has increased dramatically. These litigations are typically initiated by owner (member) groups and they focus on the competency and diligence of the board. The severe repercussions from errant business decisions and the intense scrutiny of board member competency have created a critical need for educational programs.

What has been done

In response to the critical need to improve the competencies of cooperative board members the Oklahoma Credential Cooperative Director (OCCD) program was created. The OCCD program involves two days of training on finance, legal responsibilities, parliamentary procedure, effective meeting management, strategic planning and other related topics. In designing the OCCD curriculum, board of director training material from across the U.S. was examined. OCCD instructors include OCES faculty as well as industry experts including bankers, auditors, attorneys and consultants. The OCCD program is supplemented with advanced training open only to directors completing the credentialed training.

The OCCD program was initiated in November of 2001. Since then it has been offered eleven times (spring and fall) with nine advanced sessions. Over 3600 directors have attended the Credentialing sessions and over 1,800 directors have returned for advanced training.

Results

The directors completing the OCCD program have a better understanding of financial management and the legal roles and responsibilities of the board of directors and are able to make better business decisions and to safeguard the assets of their cooperative organizations. The OCCD program impacts thousands of Oklahoma producers by enhancing the board's ability to manage and safeguard cooperative assets.

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

Number of beef producers applying some level of financial management decision skills learned through Master Cattleman certification

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	71

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Production management, business planning, risk management and marketing are major issues for the beef producers who comprise Oklahoma's #1 agricultural industry.

What has been done

OSU specialists from Animal Science and Agricultural Economics developed a comprehensive educational program in cooperation with others in Animal Science, Plant and Soil Science, Vet Med, Biosystems and Ag Engineering. The OSU Master Cattleman Program was launched in 2004 with the objective of enhancing the profitability of beef operations and the quality of life of beef producers by equipping them with vital information on many aspects of beef production, business planning, risk management and marketing. The educational curriculum is based on the

Oklahoma Beef Cattle Manual. PPTs and lesson plans are available to educators via the Master Cattleman website. Producers must complete 4 hours in each of 6 subject matter areas plus an additional four hours of instruction or special projects. Local Extension educators plan and organize the Master Cattleman educational series and select the specific curriculum offered.

Results

70 producers were certified under the OSU Master Cattleman Program in 2014. Approximately 1,016 farmers and ranchers have enrolled in the Master Cattleman program since 2004 and, to date, 815 have completed the program. In program evaluation surveys, graduates estimate annual improvement in their cattle operation's profitability at approximately \$3,500. With an average of 81 producers graduating per year, the impact is approximately \$280,000 each year for 10 years for a total impact of \$2.8 million over the program's history if the increase is a one-time event. Arguably, the \$3,500 impact per producer could be in perpetuity for the individual operation, resulting in a much bigger impact. On average, graduates indicate that they use the Beef Cattle Manual at least once monthly and that they have referred 5 additional people to the Beef Cattle Manual and three people to the Master Cattleman program.

Approximately 9,000 manuals have been distributed through local Extension offices, area, state and national meetings and from the Master Cattleman website. Beef manual requests have been filled to 37 states and 5 foreign countries. The manual has been used as a textbook in 8 universities and community colleges in 5 states.

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation

Outcome #4

1. Outcome Measures

Number of producers and agribusiness managers using OSU developed decision aids

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	1300

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

While tax reporting is often the primary motivation for record-keeping for many producers, records that support farm and ranch decisions can be invaluable.

What has been done

Quicken is software that is user-friendly, widely available, and inexpensive and can be adapted for farm use where only cash records are required. OSU Extension Specialists updated a Quicken instruction manual and developed a quarterly newsletter for past workshop participants and notebook purchasers.

Results

Approximately 1,300 individuals are receiving financial information via the newsletter. Team members are also responding to phone, mail, e-mail requests for assistance and/or support. Extension educators who participated in a fall 2014 in-service training estimated the economic benefits (reduction in tax preparation charges, value in supporting decisions, etc.) from workshop participation at \$500 per person. This estimate is perhaps conservative given estimated bookkeeping cost savings of \$35-50 per month plus \$100 per hour for tax preparation as noted by professional tax preparers. Assuming that 75 in-state workshop participants and one-quarter of the 1,300 website users gained a \$500 benefit, the economic impact exceeded \$187,500 for 2014. Arguably, this estimate is conservative in that savings would also be derived in future years through the life of the business--once skills are gained, they are likely to continue to be applied. OSU Farm Quicken website has more than 4,000 page views per year and is one of the most frequently accessed departmental Extension sites. Educators in other states are frequent users and adopters of our material as they recognize the practicality and quality of the materials. This saves scarce Extension resources nationwide as they are not creating similar materials.

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation
603	Market Economics
610	Domestic Policy Analysis

Outcome #5

1. Outcome Measures

Number of producers gaining an improved understanding of risk management through participatory experiential learning experiences

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	70

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Production management, business planning, risk management and marketing are major issues for the beef producers who comprise Oklahoma's #1 agricultural industry.

What has been done

OSU Specialists in Animal Science and Agricultural Economics developed a comprehensive educational program in cooperation with Animal Science, Plant and Soil Science, Vet Med, Biosystems and Ag Engineering . The OSU Master Cattleman Program was launched in 2004 with the objective of enhancing the profitability of beef operations and the quality of life of beef producers by equipping them with vital information on many aspects of beef production, business planning, risk management and marketing. The educational curriculum is based on the Oklahoma Beef Cattle Manual. PPTs and lesson plans are available to educators via the Master Cattleman website. Producers must complete 4 hours in each of 6 subject matter areas plus an additional four hours of instruction or special projects. Local Extension educators plan and organize the Master Cattleman educational series and select the specific curriculum offered.

Results

70 producers were certified under the OSU Master Cattleman Program in 2014

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation
603	Market 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
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Master Cattleman program - since 2004 and 815 have completed the program. In 2014, 14 graduated and 62 additional students are progressing towards graduation. In program evaluation surveys, graduates estimate annual improvement in their cattle operation's profitability at approximately \$3,500. With an average of 81 producers graduating per year, the impact is approximately \$280,000 each year for 10 years for a total impact of \$2.8 million over the program's history if the increase is a one-time event. Arguably, the \$3,500 impact per producer could be in perpetuity for the individual operation, resulting in a much bigger impact.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 13

1. Name of the Planned Program

Integrated Bioenergy and BioBased Products 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
511	New and Improved Non-Food Products and Processes	100%		100%	
	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	2.0	0.0	4.0	0.0
Actual Paid	0.5	0.0	5.8	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
25000	0	292255	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
25000	0	292255	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
189000	0	1448503	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

· Partnerships with universities, industry, and federal laboratories:

- **University: 7**

Brigham Young University, Ohio State University, University of Oklahoma, Arkansas State University, Texas A&M University, Kansas State University, University of Arkansas

- **Industry: 7**

C-Tech; Byogy Renewables, Inc.; AGCO; Stinger, Inc.; Forest Concepts, LLC; Compact Membrane Systems, Inc.; CMS Inc.; PFI Biotechnology in Pirmasens, Germany

- **Federal Laboratories: 1**

Idaho National Laboratory (INL)

- **Others: 2**

The Samuel Roberts Noble Foundation; ICRISAT, India

- Project proposals: **26**
- Technical papers, including posters: **63**
- Journal articles (indicate which are Extension or Research)

- **Research: 51**

- **Extension: 0**

- Licenses awarded (List complete citation of awarded patents.)

None

- Patent applications submitted and/or awarded (List complete citation of awarded patents.)

- **Awarded: 1**

- Patil, K.N., R.L. Huhnke, and D.D. Bellmer. 2014. Downdraft Gasifier with Internal Cyclonic Combustion Chamber, U.S. Patent 8,657,892 issued 02/25/2014.

- **Patent Applications: 2**

See Section V(E).

- **Provisional Patent Applications: 2**

See Section V(E).

- **Provisional Patent Applications: 2**

- Atiyeh, H. K., J. R. Phillips and R. L. Huhnke. Fermentation Control for Optimization of Syngas Utilization. US Provisional Patent Application, Filed: 11/13/2014.

- Kumar, A., K. Qian, D. D. Bellmer, H. Zhang, and K. N. Patil. Biomass-derived catalyst for conditioning syngas and other applications. Provisional Patent filed to US Patent Office - May 28, 2014.

- New and/or improved products to pre-commercialization

Technology Briefs-Marketing of Inventions: 3

- Atiyeh, H. K., J. R. Phillips and R. L. Huhnke. Methods to Sustain Culture Activity, Gas Uptake and Improve Selectivity for Alcohol Production During Syngas or Producer Gas Fermentation in Bioreactors. Oklahoma State University-Technology Development Center, OSU Inventions 2013.026 & 2013.52.

- Atiyeh, H. K., J. R. Phillips and R. L. Huhnke. Feedback Control Algorithm for Alcohol Production via Syngas Fermentation. Oklahoma State University-Technology Development Center, OSU Invention 2013.51.

- Craige, C. and Buser, M.D. Geospatial Logistics and Agricultural Decision Integration System (GLADIS). Beta released December 2014.

- Educational materials developed: 3

Peer-Reviewed Book Chapters in 2014

- Epplin, Francis M., Andrew P. Griffith, and Mohua Haque. 2014. Economics of Switchgrass

Feedstock Production for the Emerging Cellulosic Biofuel Industry. In: H. Luo, Y. Wu and C. Kole (eds.). Compendium of Bioenergy Plants - Switchgrass. CRC Press, Taylor & Francis Group, Boca Raton, FL.

- Kumar, A. and R. Huhnke. 2014. Biomass thermochemical conversion technologies for production of fuels, power and chemicals. In: H. Luo, Y. Wu and C. Kole (eds.). Compendium of Bioenergy Plants - Switchgrass. CRC Press, Taylor & Francis Group, Boca Raton, FL.

Peer-Reviewed Book Chapter in Review in 2014

- Wilkins, M. R., H. K. Atiyeh and S. K. Khanal, "Syngas Fermentation", in "Bioenergy: Principles and Applications", Y. Li and S. K. Khanal, Eds., Wiley-Blackwell, IW, USA. In review. Expected publication date is in 2015.

- Meetings and workshops held: 1

- Dani Bellmer hosted Summer Camp for 25 Middle School students for one week in June, 2014. Focus of the camp was 'Biology and Engineering for a Sustainable Tomorrow'.

.

.

2. Brief description of the target audience

Other scientists, industry, agricultural producers, commercial developers

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	51	0	0	0

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

Patent Applications Submitted

Year: 2014

Actual: 4

Patents listed

?Patent Applications: 2

oAtiyeh, H. K., R. S. Lewis, J. R. Phillips and R. L. Huhnke. Method Improving Producer Gas Fermentation. International Patent Application No. PCT/US2014/049608, Filed: 08/04/2014.

oMueller, M., M.R. Wilkins, R. Prade. 2014. System and method for continuous enzyme production using a filamentous fungus with inhibited growth. United States Patent Application 61/839,973. Filed June 27, 2014.

?Provisional Patent Applications: 2

oAtiyeh, H. K., J. R. Phillips and R. L. Huhnke. Fermentation Control for Optimization of Syngas Utilization. US Provisional Patent Application, Filed: 11/13/2014.

oKumar, A., K. Qian, D. D. Bellmer, H. Zhang, and K. N. Patil. Biomass-derived catalyst for conditioning syngas and other applications. Provisional Patent filed to US Patent Office ? May 28, 2014.

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	0	51	51

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Technical papers and presentations

Year	Actual
2014	51

Output #2

Output Measure

- New processes or products developed
- Not reporting on this Output for this Annual Report

Output #3

Output Measure

- Technology demonstrations conducted

Year	Actual
2014	0

Output #4

Output Measure

- Educational Publications

Year	Actual
2014	0

Output #5

Output Measure

- Extension programs developed

Year	Actual
2014	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Release and commercialization of new feedstocks varieties
2	Best management practices identified for sustainable feedstock production
3	Fundamental knowledge of engineering or science gained in developing biobased products
4	Number of students graduated (masters and doctoral)
5	New processes or products developed
6	Products/processes taken to pre-commercialization

Outcome #1

1. Outcome Measures

Release and commercialization of new feedstocks varieties

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Most current ethanol plants in the U.S. are corn-based, but in the state of Oklahoma corn production is not a major agricultural activity. Switchgrass, a plant native to Oklahoma, has been deemed one of the best options as a sustainable feedstock to support a biorefinery. Switchgrass, other native perennial grasses and annual forage species can be grown on marginal soils for producing large amounts of feedstocks in Oklahoma. The production potential, if realized, will likely bring in huge economic benefits to the rural communities in the state.

What has been done

Switchgrass (*Panicum virgatum* L.) is a naturally allogamous species. However, efficient and reliable bagging methods are unavailable for inbred development. Four northern lowland (NL) inbreds, four NL non-inbreds, two southern lowland (SL) non-inbreds, and 16 upland-lowland (interecotypic) F1 hybrids were self-pollinated by enclosing their inflorescences in polyester bags in the field, and on 14 F1 interecotypic hybrid plants potted in a greenhouse. The reliability of the bags was determined using 8-10 SSR markers that distinguished the genetic parentage of the pollen. Contaminants were identified in two groups: outcrossing contaminants (OCs) and physical contaminants (PCs) based on amplified alleles of progeny and their seed parents.

Results

Of 39 polyester bags tested in 2012 in the field, 35 bags showed 100 % selfed progeny, four showed PCs and no OCs were identified. Similarly, of 61 bags tested in 2013 in two field plots, 50 bags produced 100% selfed progeny, while four bags produced OCs, five produced PCs and the other two produced both OCs and PCs. No contaminants were identified from the progeny of 18 bags used in the greenhouse, suggesting that high wind speed, physical damage or handling errors may have resulted in the contaminations of bagged progeny in the field. The result of this experiment establishes the increased reliability of the polyester bagging method over previously tested methods for selfing switchgrass under field and greenhouse conditions. Additionally, the

S1, S2 and S3 inbreds produced in this study will contribute to developing completely or near completely homozygous inbred lines in the future.

4. Associated Knowledge Areas

KA Code	Knowledge Area
511	New and Improved Non-Food Products and Processes

Outcome #2

1. Outcome Measures

Best management practices identified for sustainable feedstock production

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Logistics is a critical issue and can make or break a sustainable bioenergy and/or biobased products system. Logistical systems are highly dependent on the type of feedstock material and the biorefinery or biobased products industry material specifications. Currently one of the major logistics issues is the lack of industry material specifications. Another critical issue is the current cellulosic feedstock value of \$45 per delivered ton. Delivering feedstocks to the biorefinery at \$45/ton is virtually impossible with traditional harvesting, packaging and storage practices unless the feedstocks being delivered are residues such as corn stover. Even delivering feedstocks such as corn stover at \$45/ton using conventional practices is challenging

What has been done

Large scale harvesting and storage studies on forage sorghum, switchgrass and mixed grasses from CRP lands have been conducted over the last 3 years. The harvesting component included 6 harvesting locations; 4 harvesting dates; 3 years of harvesting data; use of commercial size equipment; 3 biomass feedstocks that included about 1074, 498 and 130 acres of switchgrass, perennial grasses and forage sorghum, respectively. The storage studies include: 4 locations; 4 harvest dates; 3 storage treatments; and 5 storage times. A total of 117 stacks were included and more than 23,000 core samples were pulled during the study. To date all the field work has been completed and the team is focused on data analyses and developing manuscripts.

Results

It was demonstrated that a common set of commercially available equipment could be used in a production scale biomass collection system in Oklahoma

We are solidifying the economic data in the logistics components of the cellulosic bioenergy supply chain

We are developing best management practices for Oklahoma producers

This research will be used in developing the best management practices for storing switchgrass, forage sorghum and mixed grass as a bioenergy feedstock.

This research will be used in determining the expected accuracy of moisture content measurements taken in large format square bale switchgrass, forage sorghum and mixed grass bales.

This research will provided the basis for a just-in-time delivery and logistics system

38 outreach YouTube videos that were developed to share the status of current bioenergy logistics research with Oklahoma producers, potential biorefinery venture capitalists and other researchers across the country.

4. Associated Knowledge Areas

KA Code	Knowledge Area
511	New and Improved Non-Food Products and Processes

Outcome #3

1. Outcome Measures

Fundamental knowledge of engineering or science gained in developing biobased products

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Number of students graduated (masters and doctoral)

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

New processes or products developed

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The development and production of biofuels and biobased chemicals from readily available renewable resources is essential to minimize the cost of shifting from a petroleum-based economy to a more environmentally sustainable biobased economy and improve energy security of the U.S. The Renewable Fuels Standard (RFS2) mandates production of 16 billion gallons per year (GPY) renewable cellulosic biofuels by 2022, without significantly affecting our current agricultural production. Besides being an energy-producing state, Oklahoma is well-positioned to take a leading role in the biobased economy to meet part of the demand for cellulosic biofuels to enhance rural farm economy and attract capital ventures.

Thermochemical, biochemical and hybrid conversion technologies for the production of biofuels and biobased products are in early stages of development. These technologies can be employed in different parts of the U.S. and abroad, based on the type of feedstock used and availability of other resources to sustain the biorefinery. Currently, high capital costs and technological obstacles hinder the development of a viable biorefinery industry. As such, advancing the knowledge base in various aspects of the conversion processes to make this industry profitable is critical for sustainable biorefineries.

What has been done

The DASNR biomass conversion team is actively developing solutions to these challenges to make cellulosic biofuel and biobased chemical production a reality in Oklahoma and elsewhere. Technologies being developed include hybrid conversion, which is the conversion of biomass syngas components (carbon monoxide, carbon dioxide and hydrogen) into liquid biofuels and chemicals, syngas cleanup using biochar catalysts, biomass pretreatments to improve gasification, fungal pretreatments to improve enzymatic hydrolysis of biomass, and biochemical conversion of biomass to biofuels. Cellulosic feedstocks being converted are switchgrass, sorghum and Eastern redcedar.

Results

Current research efforts will impact conversion efficiency, cost of production, reactor design, and process development of the hybrid conversion technology for implementation in sustainable biorefineries in Oklahoma, the nation, and the world. The developed tools represent a breakthrough characterization of the production mechanisms that underline the commercially deployed hybrid conversion process, and can be implemented in industrial control systems for process operation. These tools can be used on an industrial scale to maintain high conversion of syngas components to alcohols, which also requires moderately skilled operators and potentially reduce

capital and operating costs.

4. Associated Knowledge Areas

KA Code	Knowledge Area
511	New and Improved Non-Food Products and Processes

Outcome #6

1. Outcome Measures

Products/processes taken to pre-commercialization

Not Reporting on this Outcome Measure

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

Brief Explanation

External factors which affected outcomes

- Low funding levels.
- Accounting issues within departments and division.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Studies are planned but has not been conducted.

Key Items of Evaluation

- Numerous breeding lines were bred and evaluated for their potential in the development of new cultivars in switchgrass for the south central states.
- Organized Symposium-- "Plants Helping Plants: Bioenergy Feedstock Based Systems for Sustainable Production Environments" at our International Annual Meeting held on November 2-5, 2014 in Long Beach, CA.

V(A). Planned Program (Summary)

Program # 14

1. Name of the Planned Program

Childhood Obesity - Hunger / Health / Risky Behaviors / Resilience Issue Teams

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
134	Outdoor Recreation	10%		0%	
703	Nutrition Education and Behavior	40%		0%	
724	Healthy Lifestyle	20%		0%	
802	Human Development and Family Well-Being	20%		0%	
806	Youth Development	10%		0%	
	Total	100%		0%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	35.0	0.0	0.0	0.0
Actual Paid	15.0	0.0	0.0	0.0
Actual Volunteer	9.3	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
210000	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
210000	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
2217600	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Development and introduction of new curricula
- Outreach to families, schools, child care providers, direct assistance, demonstrations, and educational opportunities to food, healthy, eating, exercise, diet, etc.
- Development of surveys, evaluation tools
- Delivery through classes, One-on-One, News Releases/TV/Radio, Participation in Events, Displays
- Provide training and other staff development opportunities to county educators

2. Brief description of the target audience

Youth, children; parents; teachers; adult volunteers; middle to low income families; race and ethnicity will also be recognized as an identifier of audiences; caretakers, agencies & service providers, schools, policy makers.

3. How was eXtension used?

- Development and introduction of new curricula
 - Outreach to families, schools, child care providers, direct assistance, demonstrations, and educational opportunities to food, healthy, eating, exercise, diet, etc.
 - Development of surveys, evaluation tools
 - Delivery through classes, One-on-One, News Releases/TV/Radio, Participation in Events, Displays
 - Provide training and other staff development opportunities to county educators

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	191306	3000000	108040	1900000

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

Patent Applications Submitted

Year: 2014
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	2	3	5

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of OSU Facts published

Year	Actual
2014	4

Output #2

Output Measure

- Number of other publications including but not limited to Bulletins, Technical Manuals, Reports as well as PowerPoint presentation and Spreadsheets, etc. distributed for use by others

Year	Actual
2014	31

Output #3

Output Measure

- Number of in-service training sessions

Year	Actual
2014	12

Output #4

Output Measure

- Number of certification training sessions

Year	Actual
2014	1

Output #5

Output Measure

- Number of other training sessions, workshops, etc. conducted

Year	Actual
2014	1

Output #6

Output Measure

- Number of presentations at Extension organized meetings

Year	Actual
2014	3

Output #7

Output Measure

- Number of presentations at other meetings and events (professional meetings, invitations to speak to community groups, etc.)

Year	Actual
2014	7

Output #8

Output Measure

- Number of workshops, conferences, etc. organized

Year	Actual
2014	0

Output #9

Output Measure

- Number of posters or displays

Year	Actual
2014	2

Output #10

Output Measure

- Number of other demonstrations, displays, exhibits, and models

Year	Actual
-------------	---------------

2014 3

Output #11

Output Measure

- Number of newsletters

Year	Actual
2014	2

Output #12

Output Measure

- Number of website hits

Year	Actual
2014	21090

Output #13

Output Measure

- Number of radio and television presentations

Year	Actual
2014	0

Output #14

Output Measure

- Number of newspaper, and magazine articles written

Year	Actual
2014	5

Output #15

Output Measure

- Average number of phone calls and/or email requests responded to on a weekly basis

Year	Actual
2014	16

Output #16

Output Measure

- Number of websites

Year	Actual
2014	4

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Percentage increase in consumption of fruits
2	Percentage increase in the consumption of vegetables
3	Percentage increase in the consumption of whole grains
4	Percentage increase in the consumption of dairy foods
5	Percentage decrease in consumption of foods high in fat, sugar and salt
6	Percentage decrease in the consumption of sugar-sweetened beverages
7	Percentage increase in physical activity
8	Percentage increase in safe food handling practices
9	Percentage increase in positive parenting skills
10	Percentage increase in youth positive peer involvement
11	Percentage increase in parenting competence
12	Percentage increase in child competent behaviors
13	Percentage increase in access to affordable, healthy foods
14	Percentage increase in opportunities for physical activity

Outcome #1

1. Outcome Measures

Percentage increase in consumption of fruits

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	135

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahoma ranks as the 6th most obese state in the nation, with 27% of Oklahoma youth considered overweight or obese. This ranking reflects the state's high density of fast food establishments and low fruit consumption. Oklahoma ranks 50th for fruit consumption nationally; 44% of Oklahoma youth reported they did not eat at least one piece of fruit each day.

What has been done

Oklahoma Cooperative Extension Service programs are committed to the physical, mental and emotional health of our nation's youth so they may lead healthy and productive lives into and throughout adulthood. In order to advance the socio-economic development of the state, and have an impact on issues that address childhood obesity, educational programs have been created and implemented to educate Oklahomans on how to attain a better quality of life related to the critical areas of food, nutrition, and health.

Results

In 2014, 460 programs were presented to 22,927 participants. Oklahoma youth attended programs through 15 different curriculums. Programs presented include:

OrganWise Guys program. Based on 582 pre-post tests, improvements were reported among participating Oklahoman youth in the areas of increasing servings of fruit and vegetables, skim milk and physically activity. Youth also reported decreased consumption of sweets, fat eaten and less screen time which can play a role in reducing overweight and risk of related chronic diseases.

Growing Strong Bodies and Minds aims to promote the development of healthful food

preferences, physically active lifestyles and literacy skills in young children. Specific goals include: use of pre-reading and reading strategies to teach nutrition and health messages; promote consumption of whole grains, fruits, vegetables, low-fat dairy foods, and increase time spent in active play; and support parents of young children in offering economical, nutrient dense foods to their children and increasing time spent in active play. 2,148 youth across the state participated in this program. In addition to increasing their knowledge of healthy foods, the students are discussing the foods they eat during lunch and talking to their families about the new foods they try.

The Farm to You exhibit was experienced by over 11,500 students in 20 counties in Oklahoma. It has also been featured at summer camps, county fairs and community events. This brings the five year total to over 41,000 youth in 167 schools. The exhibit, when combined with the classroom-based nutrition program, enhanced nutrition behavior change for upper-elementary grade students beyond that achieved with only the classroom-based program.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Percentage increase in the consumption of vegetables

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	74

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahoma ranks as the 6th most obese state in the nation, with 27% of Oklahoma youth considered overweight or obese. This ranking reflects the state's high density of fast food establishments and low fruit vegetable consumption. Oklahoma ranks 44th for vegetable consumption nationally; 40% of Oklahoma youth reported they did not eat at least one vegetable every day.

What has been done

Oklahoma Cooperative Extension Service programs are committed to the physical, mental and emotional health of our nation's youth so they may lead healthy and productive lives into and throughout adulthood. In order to advance the socio-economic development of the state, and have an impact on issues that address childhood obesity, educational programs have been created and implemented to educate Oklahomans on how to attain a better quality of life related to the critical areas of food, nutrition, and health.

Results

In 2014, 460 programs were presented to 22,927 participants. Oklahoma youth attended programs through 15 different curriculums. Programs presented include:

OrganWise Guys program. Based on 582 pre-post tests, improvements were reported among participating Oklahoman youth in the areas of increasing servings of fruit and vegetables, skim milk and physically activity. Youth also reported decreased consumption of sweets, fat eaten and less screen time which can play a role in reducing overweight and risk of related chronic diseases.

Growing Strong Bodies and Minds aims to promote the development of healthful food preferences, physically active lifestyles and literacy skills in young children. Specific goals include: use of pre-reading and reading strategies to teach nutrition and health messages; promote consumption of whole grains, fruits, vegetables, low-fat dairy foods, and increase time spent in active play; and support parents of young children in offering economical, nutrient dense foods to their children and increasing time spent in active play. 2,148 youth across the state participated in this program. In addition to increasing their knowledge of healthy foods, the students are discussing the foods they eat during lunch and talking to their families about the new foods they try.

The Farm to You exhibit was experienced by over 11,500 students in 20 counties in Oklahoma. It has also been featured at summer camps, county fairs and community events. This brings the five year total to over 41,000 youth in 167 schools. The exhibit, when combined with the classroom-based nutrition program, enhanced nutrition behavior change for upper-elementary grade students beyond that achieved with only the classroom-based program.

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

Percentage increase in the consumption of whole grains

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	94

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahoma ranks as the 6th most obese state in the nation, with 27% of Oklahoma youth considered overweight or obese. This ranking reflects the state's high density of fast food establishments and poor food choices of its residents.

What has been done

Oklahoma Cooperative Extension Service programs are committed to the physical, mental and emotional health of our nation's youth so they may lead healthy and productive lives into and throughout adulthood. In order to advance the socio-economic development of the state, and have an impact on issues that address childhood obesity, educational programs have been created and implemented to educate Oklahomans on how to attain a better quality of life related to the critical areas of food, nutrition, and health.

Results

In 2014, 460 programs were presented to 22,927 participants. Oklahoma youth attended programs through 15 different curriculums. Programs presented include:

OrganWise Guys program. Based on 582 pre-post tests, improvements were reported among participating Oklahoman youth in the areas of increasing servings of fruit and vegetables, skim milk and physically activity. Youth also reported decreased consumption of sweets, fat eaten and less screen time which can play a role in reducing overweight and risk of related chronic diseases.

Growing Strong Bodies and Minds aims to promote the development of healthful food preferences, physically active lifestyles and literacy skills in young children. Specific goals include: use of pre-reading and reading strategies to teach nutrition and health messages; promote consumption of whole grains, fruits, vegetables, low-fat dairy foods, and increase time spent in active play; and support parents of young children in offering economical, nutrient dense foods to their children and increasing time spent in active play. 2,148 youth across the state participated in this program. In addition to increasing their knowledge of healthy foods, the students are discussing the foods they eat during lunch and talking to their families about the new foods they try.

The Farm to You exhibit was experienced by over 11,500 students in 20 counties in Oklahoma. It has also been featured at summer camps, county fairs and community events. This brings the five year total to over 41,000 youth in 167 schools. The exhibit, when combined with the

classroom-based nutrition program, enhanced nutrition behavior change for upper-elementary grade students beyond that achieved with only the classroom-based program.

4. Associated Knowledge Areas

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

Outcome #4

1. Outcome Measures

Percentage increase in the consumption of dairy foods

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	39

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahoma ranks as the 6th most obese state in the nation, with 27% of Oklahoma youth considered overweight or obese. This ranking reflects the state's high density of fast food establishments and poor food choices of its residents.

What has been done

Oklahoma Cooperative Extension Service programs are committed to the physical, mental and emotional health of our nation's youth so they may lead healthy and productive lives into and throughout adulthood. In order to advance the socio-economic development of the state, and have an impact on issues that address childhood obesity, educational programs have been created and implemented to educate Oklahomans on how to attain a better quality of life related to the critical areas of food, nutrition, and health.

Results

In 2014, 460 programs were presented to 22,927 participants. Oklahoma youth attended programs through 15 different curriculums. Programs presented include:

OrganWise Guys program. Based on 582 pre-post tests, improvements were reported among participating Oklahoman youth in the areas of increasing servings of fruit and vegetables, skim milk and physically activity. Youth also reported decreased consumption of sweets, fat eaten and less screen time which can play a role in reducing overweight and risk of related chronic diseases.

Growing Strong Bodies and Minds aims to promote the development of healthful food preferences, physically active lifestyles and literacy skills in young children. Specific goals include: use of pre-reading and reading strategies to teach nutrition and health messages; promote consumption of whole grains, fruits, vegetables, low-fat dairy foods, and increase time spent in active play; and support parents of young children in offering economical, nutrient dense foods to their children and increasing time spent in active play. 2,148 youth across the state participated in this program. In addition to increasing their knowledge of healthy foods, the students are discussing the foods they eat during lunch and talking to their families about the new foods they try.

The Farm to You exhibit was experienced by over 11,500 students in 20 counties in Oklahoma. It has also been featured at summer camps, county fairs and community events. This brings the five year total to over 41,000 youth in 167 schools. The exhibit, when combined with the classroom-based nutrition program, enhanced nutrition behavior change for upper-elementary grade students beyond that achieved with only the classroom-based program.

4. Associated Knowledge Areas

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

Outcome #5

1. Outcome Measures

Percentage decrease in consumption of foods high in fat, sugar and salt

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	39

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahoma ranks as the 6th most obese state in the nation, with 27% of Oklahoma youth considered overweight or obese. This ranking reflects the state's high density of fast food establishments and poor food choices of its residents.

What has been done

Oklahoma Cooperative Extension Service programs are committed to the physical, mental and emotional health of our nation's youth so they may lead healthy and productive lives into and throughout adulthood. In order to advance the socio-economic development of the state, and have an impact on issues that address childhood obesity, educational programs have been created and implemented to educate Oklahomans on how to attain a better quality of life related to the critical areas of food, nutrition, and health.

Results

In 2014, 460 programs were presented to 22,927 participants. Oklahoma youth attended programs through 15 different curriculums. Programs presented include:

?OrganWise Guys program. Based on 582 pre-post tests, improvements were reported among participating Oklahoman youth in the areas of increasing servings of fruit and vegetables, skim milk and physically activity. Youth also reported decreased consumption of sweets, fat eaten and less screen time which can play a role in reducing overweight and risk of related chronic diseases.

?Growing Strong Bodies and Minds aims to promote the development of healthful food preferences, physically active lifestyles and literacy skills in young children. Specific goals include: use of pre-reading and reading strategies to teach nutrition and health messages; promote consumption of whole grains, fruits, vegetables, low-fat dairy foods, and increase time spent in active play; and support parents of young children in offering economical, nutrient dense foods to their children and increasing time spent in active play. 2,148 youth across the state participated in this program. In addition to increasing their knowledge of healthy foods, the students are discussing the foods they eat during lunch and talking to their families about the new foods they try.

?The Farm to You exhibit was experienced by over 11,500 students in 20 counties in Oklahoma. It has also been featured at summer camps, county fairs and community events. This brings the five year total to over 41,000 youth in 167 schools. The exhibit, when combined with the classroom-based nutrition program, enhanced nutrition behavior change for upper-elementary grade students beyond that achieved with only the classroom-based program.

4. Associated Knowledge Areas

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

Outcome #6

1. Outcome Measures

Percentage decrease in the consumption of sugar-sweetened beverages

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	24

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahoma ranks as the 6th most obese state in the nation, with 27% of Oklahoma youth considered overweight or obese. This ranking reflects the state's high density of fast food establishments and poor food choices of its residents.

What has been done

Oklahoma Cooperative Extension Service programs are committed to the physical, mental and emotional health of our nation's youth so they may lead healthy and productive lives into and throughout adulthood. In order to advance the socio-economic development of the state, and have an impact on issues that address childhood obesity, educational programs have been created and implemented to educate Oklahomans on how to attain a better quality of life related to the critical areas of food, nutrition, and health.

Results

In 2014, 460 programs were presented to 22,927 participants. Oklahoma youth attended programs through 15 different curriculums. Programs presented include:

OrganWise Guys program. Based on 582 pre-post tests, improvements were reported among participating Oklahoman youth in the areas of increasing servings of fruit and vegetables, skim milk and physically activity. Youth also reported decreased consumption of sweets, fat eaten and less screen time which can play a role in reducing overweight and risk of related chronic diseases.

Growing Strong Bodies and Minds aims to promote the development of healthful food preferences, physically active lifestyles and literacy skills in young children. Specific goals

include: use of pre-reading and reading strategies to teach nutrition and health messages; promote consumption of whole grains, fruits, vegetables, low-fat dairy foods, and increase time spent in active play; and support parents of young children in offering economical, nutrient dense foods to their children and increasing time spent in active play. 2,148 youth across the state participated in this program. In addition to increasing their knowledge of healthy foods, the students are discussing the foods they eat during lunch and talking to their families about the new foods they try.

The Farm to You exhibit was experienced by over 11,500 students in 20 counties in Oklahoma. It has also been featured at summer camps, county fairs and community events. This brings the five year total to over 41,000 youth in 167 schools. The exhibit, when combined with the classroom-based nutrition program, enhanced nutrition behavior change for upper-elementary grade students beyond that achieved with only the classroom-based program.

4. Associated Knowledge Areas

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

Outcome #7

1. Outcome Measures

Percentage increase in physical activity

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	36

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahoma ranks as the 6th most obese state in the nation, with 27% of Oklahoma youth considered overweight or obese. This ranking reflects the state's low levels of physical activity. Only 37% of Oklahoma high school students had a physical education class at least once per week, and only 31% had daily physical education.

What has been done

Oklahoma Cooperative Extension Service programs are committed to the physical, mental and emotional health of our nation's youth so they may lead healthy and productive lives into and throughout adulthood. In order to advance the socio-economic development of the state, and have an impact on issues that address childhood obesity, educational programs have been created and implemented to educate Oklahomans on how to attain a better quality of life related to the critical areas of food, nutrition, and health.

Results

In 2014, 460 programs were presented to 22,927 participants. Oklahoma youth attended programs through 15 different curriculums. Programs presented include:

OrganWise Guys program. Based on 582 pre-post tests, improvements were reported among participating Oklahoman youth in the areas of increasing servings of fruit and vegetables, skim milk and physically activity. Youth also reported decreased consumption of sweets, fat eaten and less screen time which can play a role in reducing overweight and risk of related chronic diseases.

Growing Strong Bodies and Minds aims to promote the development of healthful food preferences, physically active lifestyles and literacy skills in young children. Specific goals include: use of pre-reading and reading strategies to teach nutrition and health messages; promote consumption of whole grains, fruits, vegetables, low-fat dairy foods, and increase time spent in active play; and support parents of young children in offering economical, nutrient dense foods to their children and increasing time spent in active play. 2,148 youth across the state participated in this program. In addition to increasing their knowledge of healthy foods, the students are discussing the foods they eat during lunch and talking to their families about the new foods they try.

The Farm to You exhibit was experienced by over 11,500 students in 20 counties in Oklahoma. It has also been featured at summer camps, county fairs and community events. This brings the five year total to over 41,000 youth in 167 schools. The exhibit, when combined with the classroom-based nutrition program, enhanced nutrition behavior change for upper-elementary grade students beyond that achieved with only the classroom-based program.

4. Associated Knowledge Areas

KA Code	Knowledge Area
134	Outdoor Recreation
724	Healthy Lifestyle

Outcome #8

1. Outcome Measures

Percentage increase in safe food handling practices

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	33

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahoma ranks as the 6th most obese state in the nation, with 27% of Oklahoma youth considered overweight or obese. This ranking reflects the state's high density of fast food establishments and poor food choices by its residents.

What has been done

Oklahoma Cooperative Extension Service programs are committed to the physical, mental and emotional health of our nation's youth so they may lead healthy and productive lives into and throughout adulthood. In order to advance the socio-economic development of the state, and have an impact on issues that address childhood obesity, educational programs have been created and implemented to educate Oklahomans on how to attain a better quality of life related to the critical areas of food, nutrition, and health.

Results

In 2014, 460 programs were presented to 22,927 participants. Oklahoma youth attended programs through 15 different curriculums. Programs presented include:

OrganWise Guys program. Based on 582 pre-post tests, improvements were reported among participating Oklahoman youth in the areas of increasing servings of fruit and vegetables, skim milk and physically activity. Youth also reported decreased consumption of sweets, fat eaten and less screen time which can play a role in reducing overweight and risk of related chronic diseases.

Growing Strong Bodies and Minds aims to promote the development of healthful food preferences, physically active lifestyles and literacy skills in young children. Specific goals include: use of pre-reading and reading strategies to teach nutrition and health messages; promote consumption of whole grains, fruits, vegetables, low-fat dairy foods, and increase time spent in active play; and support parents of young children in offering economical, nutrient dense foods to their children and increasing time spent in active play. 2,148 youth across the state participated in this program. In addition to increasing their knowledge of healthy foods, the students are discussing the foods they eat during lunch and talking to their families about the new foods they try.

The Farm to You exhibit was experienced by over 11,500 students in 20 counties in Oklahoma. It has also been featured at summer camps, county fairs and community events. This brings the five year total to over 41,000 youth in 167 schools. The exhibit, when combined with the

classroom-based nutrition program, enhanced nutrition behavior change for upper-elementary grade students beyond that achieved with only the classroom-based program.

4. Associated Knowledge Areas

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

Outcome #9

1. Outcome Measures

Percentage increase in positive parenting skills

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	69

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

It is critical to address not only the prevention of childhood obesity but also the social and emotional impacts obesity can have on youth who are already obese.

While obese teens engage in high-risk behaviors at the same rate as their healthy weight peers, they do so in more dangerous ways, such as earlier onset of smoking, and engaging in sexual activity while under the influence of drugs or alcohol before the age of 13. Obese girls are also at increased risk of earlier onset of sex, having more sexual partners, and less consistent use of contraception. These increased risks compound their already elevated health risks due to obesity with recent publications by the Centers for Disease Control and Prevention suggesting that overweight and obesity may be indicators of increased risk for sexually transmitted diseases including HIV. In Oklahoma every year on average: close to 6,400 babies are born to school-age teens, the state has the second highest teen birth rate in the nation for 15-to-19-year-olds; and more teens engage in smoking, sexual activity than the national average.

Obese teens also are more likely to drop out of school due to health problems, bullying, and social withdrawal related to poor body image, and poor self-esteem. For the previous year in Oklahoma, 3,911 youth statewide dropped out of high school; there were 16,357 arrests for violent crimes involved children or adolescents between 10-17 years, and more teens engaged in weapon carrying than the national average.

Oklahoma ranks among the top 5 in all states for number of divorces. Divorce has negative impacts on parents and youth and increases the risk of negative outcomes in youth. Youth whose parents divorce have a 25-30% increased risk of suffering a mental health condition.

What has been done

Oklahoma Cooperative Extension Service programs are committed to the physical, mental and emotional health of our nation's youth so they may lead healthy and productive lives into and throughout adulthood. In order to advance the socio-economic development of the state, and have an impact on issues that address the critical areas of risky behaviors of youth and family resilience, educational programs have been created and implemented to educate Oklahomans on how to attain a better quality of life.

Results

In 2014, 92 parenting and youth resilience programs were presented to 6,059 participants through 10 different curricula. Programs presented include:

512 Oklahoma parents participated in resilience programs including curricula such as Active Parenting Now/Active Parenting Now in 3, Active Parenting for Teens, and Conscious Discipline. These curricula are part of the parenting skills and parent-child relationship program for Oklahoma families. Outcomes improved by these programs include: parental attitudes and beliefs, parent-child relationship problems, and positive and negative child behaviors.

Programs such as Character Critters and Character Counts provided lessons on topics such as respect, fairness, and responsibility to 4,757 Oklahoma youth.

Bullying prevention programs which include Take a Stand and Bully Proof were presented to 707 Oklahoma youth.

Oklahoma Cooperative Extension conducted the award-winning Co-Parenting for Resilience classes in 30 counties to over 1,020 parents.

4. Associated Knowledge Areas

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

Outcome #10

1. Outcome Measures

Percentage increase in youth positive peer involvement

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	80

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

It is critical to address not only the prevention of childhood obesity but also the social and emotional impacts obesity can have on youth who are already obese. While obese teens engage in high-risk behaviors at the same rate as their healthy weight peers, they do so in more dangerous ways, such as earlier onset of smoking, and engaging in sexual activity while under the influence of drugs or alcohol before the age of 13. Obese girls are also at increased risk of earlier onset of sex, having more sexual partners, and less consistent use of contraception.

These increased risks compound their already elevated health risks due to obesity with recent publications by the Centers for Disease Control and Prevention suggesting that overweight and obesity may be indicators of increased risk for sexually transmitted diseases including HIV. In Oklahoma every year on average: close to 6,400 babies are born to school-age teens, the state has the second highest teen birth rate in the nation for 15-to-19-year-olds; and more teens engage in smoking, sexual activity than the national average.

Obese teens also are more likely to drop out of school due to health problems, bullying, and social withdrawal related to poor body image, and poor self-esteem. For the previous year in Oklahoma, 3,911 youth statewide dropped out of high school; there were 16,357 arrests for violent crimes involving children or adolescents between 10-17 years, and more teens engaged in weapon carrying than the national average.

Oklahoma ranks among the top 5 in all states for number of divorces. Divorce has negative impacts on parents and youth and increases the risk of negative outcomes in youth. Youth whose parents divorce have a 25-30% increased risk of suffering a mental health condition.

What has been done

Oklahoma Cooperative Extension Service programs are committed to the physical, mental and emotional health of our nation's youth so they may lead healthy and productive lives into and throughout adulthood. In order to advance the socio-economic development of the state, and have an impact on issues that address the critical areas of risky behaviors of youth and family resilience, educational programs have been created and implemented to educate Oklahomans on how to attain a better quality of life.

Results

In 2014, 92 parenting and youth resilience programs were presented to 6,059 participants through 10 different curricula. Programs presented include:

512 Oklahoma parents participated in resilience programs including curricula such as Active

Parenting Now/Active Parenting Now in 3, Active Parenting for Teens, and Conscious Discipline. These curricula are part of the parenting skills and parent-child relationship program for Oklahoma families. Outcomes improved by these programs include: parental attitudes and beliefs, parent-child relationship problems, and positive and negative child behaviors.

Programs such as Character Critters and Character Counts provided lessons on topics such as respect, fairness, and responsibility to 4,757 Oklahoma youth.

Bullying prevention programs which include Take a Stand and Bully Proof were presented to 707 Oklahoma youth.

Oklahoma Cooperative Extension conducted the award-winning Co-Parenting for Resilience classes in 30 counties to over 1,020 parents.

4. Associated Knowledge Areas

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

Outcome #11

1. Outcome Measures

Percentage increase in parenting competence

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	400

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

It is critical to address not only the prevention of childhood obesity but also the social and emotional impacts obesity can have on youth who are already obese. While obese teens engage in high-risk behaviors at the same rate as their healthy weight peers, they do so in more dangerous ways, such as earlier onset of smoking, and engaging in sexual activity while under the influence of drugs or alcohol before the age of 13. Obese girls are also at increased risk of earlier onset of sex, having more sexual partners, and less consistent use of contraception.

These increased risks compound their already elevated health risks due to obesity with recent publications by the Centers for Disease Control and Prevention suggesting that overweight and obesity may be indicators of increased risk for sexually transmitted diseases including HIV. In Oklahoma every year on average: close to 6,400 babies are born to school-age teens, the state has the second highest teen birth rate in the nation for 15-to-19-year-olds; and more teens engage in smoking, sexual activity than the national average. Obese teens also are more likely to drop out of school due to health problems, bullying, and social withdrawal related to poor body image, and poor self-esteem. For the previous year in Oklahoma, 3,911 youth statewide dropped out of high school; there were 16,357 arrests for violent crimes involved children or adolescents between 10-17 years, and more teens engaged in weapon carrying than the national average.

What has been done

Oklahoma Cooperative Extension Service programs are committed to the physical, mental and emotional health of our nation's youth so they may lead healthy and productive lives into and throughout adulthood. In order to advance the socio-economic development of the state, and have an impact on issues that address the critical areas of risky behaviors of youth and family resilience, educational programs have been created and implemented to educate Oklahomans on how to attain a better quality of life.

Results

In 2014, 92 parenting and youth resilience programs were presented to 6,059 participants through 10 different curricula. Programs presented include:

512 Oklahoma parents participated in resilience programs including curricula such as Active Parenting Now/Active Parenting Now in 3, Active Parenting for Teens, and Conscious Discipline. These curricula are part of the parenting skills and parent-child relationship program for Oklahoma families. Outcomes improved by these programs include: parental attitudes and beliefs, parent-child relationship problems, and positive and negative child behaviors.

Programs such as Character Critters and Character Counts provided lessons on topics such as respect, fairness, and responsibility to 4,757 Oklahoma youth.

Bullying prevention programs which include Take a Stand and Bully Proof were presented to 707 Oklahoma youth.

4. Associated Knowledge Areas

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

Outcome #12

1. Outcome Measures

Percentage increase in child competent behaviors

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	114

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

It is critical to address not only the prevention of childhood obesity but also the social and emotional impacts obesity can have on youth who are already obese.

While obese teens engage in high-risk behaviors at the same rate as their healthy weight peers, they do so in more dangerous ways, such as earlier onset of smoking, and engaging in sexual activity while under the influence of drugs or alcohol before the age of 13. Obese girls are also at increased risk of earlier onset of sex, having more sexual partners, and less consistent use of contraception. These increased risks compound their already elevated health risks due to obesity with recent publications by the Centers for Disease Control and Prevention suggesting that overweight and obesity may be indicators of increased risk for sexually transmitted diseases including HIV. In Oklahoma every year on average: close to 6,400 babies are born to school-age teens, the state has the second highest teen birth rate in the nation for 15-to-19-year-olds; and more teens engage in smoking, sexual activity than the national average.

Obese teens also are more likely to drop out of school due to health problems, bullying, and social withdrawal related to poor body image, and poor self-esteem. For the previous year in Oklahoma, 3,911 youth statewide dropped out of high school; there were 16,357 arrests for violent crimes involving children or adolescents between 10-17 years, and more teens engaged in weapon carrying than the national average.

Oklahoma ranks among the top 5 in all states for number of divorces. Divorce has negative impacts on parents and youth and increases the risk of negative outcomes in youth. Youth whose parents divorce have a 25-30% increased risk of suffering a mental health condition.

What has been done

Oklahoma Cooperative Extension Service programs are committed to the physical, mental and emotional health of our nation's youth so they may lead healthy and productive lives into and throughout adulthood. In order to advance the socio-economic development of the state, and have an impact on issues that address the critical areas of risky behaviors of youth and family resilience, educational programs have been created and implemented to educate Oklahomans on how to attain a better quality of life.

Results

In 2014, 92 parenting and youth resilience programs were presented to 6,059 participants through 10 different curricula. Programs presented include:

512 Oklahoma parents participated in resilience programs including curricula such as Active

Parenting Now/Active Parenting Now in 3, Active Parenting for Teens, and Conscious Discipline. These curricula are part of the parenting skills and parent-child relationship program for Oklahoma families. Outcomes improved by these programs include: parental attitudes and beliefs, parent-child relationship problems, and positive and negative child behaviors.

Programs such as Character Critters and Character Counts provided lessons on topics such as respect, fairness, and responsibility to 4,757 Oklahoma youth.

Bullying prevention programs which include Take a Stand and Bully Proof were presented to 707 Oklahoma youth.

Oklahoma Cooperative Extension conducted the award-winning Co-Parenting for Resilience classes in 30 counties to over 1,020 parents.

4. Associated Knowledge Areas

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

Outcome #13

1. Outcome Measures

Percentage increase in access to affordable, healthy foods

Not Reporting on this Outcome Measure

Outcome #14

1. Outcome Measures

Percentage increase in opportunities for physical activity

Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes
- Public Policy changes

Brief Explanation

Statewide issue team format has changed educator focus and reduced activity in some planned programs.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Issue team evaluation items for the above outcomes include:

251 youth respondents to health issue team evaluations reported the following planned behavior changes after participating in the program:

- 135% increase in those who plan to eat a serving of fruit 2 or more times each day
- 74% increase in those who plan to eat a serving of vegetables 3 or more times each day
- 94% increase in those who plan to eat a whole grain food 3 or more times each day
- 39% increase in those who plan to eat or drink a serving of calcium-rich food 2 or 3 times each day
- 39% decrease in those who plan to eat snack foods (chips, cookies, candy, etc.) 1 or more times a day
- 24% decrease in those who plan to drink 1 or more sugar-sweetened drinks each day
- 36% increase in those who plan to be physically active at least 60 minutes throughout the day
- 33% increase in those who plan to use safe food handling practices

28 adult respondents to family resilience issue team evaluations reported the following changes after participating in the programs:

- 69% increase in belief that children need encouragement as much as they need discipline
- 54% increase in belief that parents should monitor their children's activities
- 82% increase in disagreement with the belief that sometimes yelling at children is the only way to get them to do what you want
- 200% increase in disagreement with the belief that parents should control their children
- 80% increase in child's sharing readily with other children, for example toys, treats, pencils
- 400% increase in feeling sure of self as a mother/father
- 300% increase in knowing they are doing a good job as a mother/father
- 214%% increase in persistence in trying to solve problems between their child and themselves
- 114% increase in child being considerate of other people's feelings

Based on 582 pre-post tests for the OrganWise Guys program, improvements were reported among participating Oklahoman youth in the areas of increasing servings of fruit and vegetables, skim milk and physically activity.

836 participants in the Co-Parenting for Resilience program completed program evaluations. Of this group, a subset of 120 participants completed follow-up interviews; when compared with their initial responses the following changes were reported:

- 36% increase in parents setting clear rules for their child and enforcing them consistently
- 15% increase in parents explaining to their children why the rules they make are important
- 9% increase in child being helpful if someone is hurt, upset, or feeling ill
- 26% increase in child having at least one good friend
- 25% increase in child having a good attention span, seeing work through to the end

Key Items of Evaluation

In 2014, Issue Team-specific Evaluation Questionnaires were collected after planned program curriculum delivery. These questions utilized a retrospective approach.

V(A). Planned Program (Summary)

Program # 15

1. Name of the Planned Program

Structure and Function of Macromolecules

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
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		5%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%		5%	
206	Basic Plant Biology	0%		20%	
211	Insects, Mites, and Other Arthropods Affecting Plants	0%		5%	
212	Diseases and Nematodes Affecting Plants	0%		5%	
304	Animal Genome	0%		5%	
305	Animal Physiological Processes	0%		45%	
311	Animal Diseases	0%		5%	
312	External Parasites and Pests of Animals	0%		5%	
	Total	0%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	8.0	0.0
Actual Paid	0.0	0.0	5.7	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	284262	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	284262	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	1408886	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Basic research will be conducted that will make fundamental discoveries which will enhance our understanding of molecular mechanisms involved in the regulation of physiological processes in plant and animal systems.

New faculty and staff will be recruited to build, foster and maintain a cohesive critical mass of research faculty with a diverse set of expertise that focuses on the study of structural biology.

Grant proposals will be written to acquire and maintain state of the art equipment to enhance the research capabilities relating to protein structure/ function/ interactions on the OSU campus.

Funds will be solicited from national, state and university sources to acquire, and maintain support for "Core" facilities that are critical to the research mission of DASNR and Oklahoma State University.

Design and conduct basic research to fill critical gaps in scientific knowledge that will address needs, issues and problems that ultimately can be translated into an improvement in plant and animal health.

Develop new research methods and procedures.

Train undergraduate and graduate students, and postdoctoral associates.

Publish scientific articles.

Write and submit grant proposals.

Attend and present scientific findings at professional conferences.

File patents for protection of intellectual property and negotiate licensing agreements for technology transfer.

Interact with other researchers both on and off the OSU campus.

2. Brief description of the target audience

Departments and department heads

- OSU administrators
- Other faculty and other scientific researchers in DASNR, at OSU & the scientific community
- Students and post-docs
- Federal, state, and private funding agencies
- Scientific journal editors, readers & the scientific community
- Candidates for open faculty and staff positions.
- Patent officers
- Agricultural, environmental, life, and human science industries
- General public and elected officials

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

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

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

Patent Applications Submitted

Year: 2014
 Actual: 1

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	0	31	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Research discoveries, procedural and technological advances, and dissemination of results of research efforts.

Year	Actual
2014	31

Output #2

Output Measure

- Filing patents for protection of intellectual property and negotiation of licensing agreements for technology transfer.

Year	Actual
2014	1

Output #3

Output Measure

- Training of students and post-docs.

Year	Actual
2014	23

Output #4

Output Measure

- Research discoveries, procedural and technological advances, and solicitation of support for research efforts.

Year	Actual
2014	18

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of manuscripts published from research efforts.
2	Number of licensing agreements negotiated for transfer patented technology to industry.
3	Numbers of graduate students graduated and postdoctoral associates mentored with training in structural biology and placed/hired into appropriate professional level positions.
4	Number of new extramural grants funded.
5	Number of instrumentation proposals funded and new instruments obtained.
6	Number of invitations that faculty members received to present research findings at universities and colleges, and to national and international meetings.
7	Number of Trainees attending workshops in structural biology, proteomics, and bioinformatics

Outcome #1

1. Outcome Measures

Number of manuscripts published from research efforts.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	26

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The leading cause of mastitis in dairy cattle is the pathogen *Staphylococcus aureus*, and mastitis caused by this organism has a huge impact on milk production throughout the country.

What has been done

Tea tree oil (TTO) is a very popular over the counter antiseptic/disinfectant that contains > 100 separate hydrocarbons. TTO-reduced susceptibility (TTORS) mutants were isolated and characterized. All TTORS mutants demonstrated a small colony variant (SCV) phenotype and demonstrated reduced susceptibility to alcohols ? which are utilized in hand-disinfection procedures that prevent the spread of *S. aureus* in hospital and dairy environments. Additional work was published that implies that human multiple antibiotic-resistant *S. aureus* strains are moving from human hospitals into dairies.

Results

The published findings increases our understanding of evolution of antibiotic/ antiseptic-resistance of pathogens that are becoming increasingly problematic in both the health and livestock industries, and how these pathogens are moving from human hospitals into dairies.

4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
206	Basic Plant Biology
304	Animal Genome
305	Animal Physiological Processes

Outcome #2

1. Outcome Measures

Number of licensing agreements negotiated for transfer patented technology to industry.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
206	Basic Plant Biology
304	Animal Genome
305	Animal Physiological Processes

Outcome #3

1. Outcome Measures

Numbers of graduate students graduated and postdoctoral associates mentored with training in structural biology and placed/hired into appropriate professional level positions.

2. Associated Institution Types

- 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)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
206	Basic Plant Biology
304	Animal Genome
305	Animal Physiological Processes

Outcome #4

1. Outcome Measures

Number of new extramural grants funded.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
-------------	---------------

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Antibiotics are used extensively in the large agricultural industries in Oklahoma. Antibiotics are added to the feeds of cattle, hogs, and chickens, to prevent bacterial infections and to promote body growth in these animals. In the U.S., Oklahoma has among the highest rates of antibiotic-resistant bacteria in farms. In addition, antibiotic-resistant *E. coli* can easily move from livestock to humans, and mobile genes conferring antibiotic resistance can move from *E. coli* to pathogenic bacteria.

What has been done

A grant has been obtained to study how bacterial persisters (rare, phenotypically distinct cells that survive exposure to multiple antibiotics) emerge and maintain their phenotype. Preliminary studies funded by the OAES provided support for the funded grant. The data obtained indicated that differences in the translational apparatus, specifically the structure of the ribosome, occurs in *E. coli* exposed to antibiotics.

Results

The funded grant will identify the differences in the translational apparatus in *E. coli* exposed to antibiotics. This new knowledge is expected to provide insights into how bacteria can survive antibiotic exposure that lead to full-blown antibiotic-resistant bacteria. This knowledge may provide new targets for eradicating these bacterial survivors before they become resisters.

4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
206	Basic Plant Biology
304	Animal Genome
305	Animal Physiological Processes

Outcome #5

1. Outcome Measures

Number of instrumentation proposals funded and new instruments obtained.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
206	Basic Plant Biology
304	Animal Genome
305	Animal Physiological Processes

Outcome #6

1. Outcome Measures

Number of invitations that faculty members received to present research findings at universities and colleges, and to national and international meetings.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	13

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
206	Basic Plant Biology
304	Animal Genome
305	Animal Physiological Processes

Outcome #7

1. Outcome Measures

Number of Trainees attending workshops in structural biology, proteomics, and bioinformatics

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	195

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
----------------	-----------------------

201	Plant Genome, Genetics, and Genetic Mechanisms
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
206	Basic Plant Biology
304	Animal Genome
305	Animal Physiological Processes

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

Brief Explanation

Appropriations for support of research have been shrinking at both the state and federal levels for all of the reasons listed above. As a result there are fewer grant dollars available, and competition for funding is strong. While increased grant dollars were generated by the team this year, they for the most part represent short term seed money to gather preliminary data for submission of competitive grants.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Despite shrinking appropriations and increased competition for research funding, team members have maintained their newly acquired funding at 2013 levels. However, overall funding in comparison to grant funding acquired prior to 2012 is down reflecting the external factors discussed above. The result of this is that fewer graduate students are being supported, and fewer postdoctoral fellows are being hired. In addition, the number of faculty members on the Structure and Function of Macromolecules Team has decreased and faculty lines to replace them have not been approved. The impact of this situation on the current evaluations compared to 2013 has been minimal, with the exception of the mentoring of postdoctoral associates.

1. We will evaluate percentage increases in number of manuscripts published as stated in Outcome #1. 104%
2. We will evaluate percentage increases in number of licensing agreements negotiated for transfer-patented technology to industry as stated in Outcome #2. No Change
3. We will evaluate percentage increases in numbers of graduate students graduated and postdoctoral associates mentored with training in structural biology and placed/ hired into appropriate professional level positions as stated in Outcome #3. 233% and 60%
4. We will evaluate percentage increases in numbers of new extramural grants funded as stated in Outcome #4. No change
5. We will evaluate percentage increases in numbers of instrumentation proposals funded and new instruments obtained as stated in Outcome #5. 0%
6. We will evaluate percentage increases in numbers of invitations that faculty

members received to present research findings at universities and colleges, and to national and international meetings as stated in Outcome #6. No change

7. We will evaluate the percentage increases in workshop attendance as stated in Outcome #7. New evaluation for 2014.

Key Items of Evaluation

Compare percent change in output measures with output measures from 2013

V(A). Planned Program (Summary)

Program # 16

1. Name of the Planned Program

Environmental Family and Youth Issues

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
403	Waste Disposal, Recycling, and Reuse	70%		0%	
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures	30%		0%	
	Total	100%		0%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	2.5	0.0	0.0	0.0
Actual Paid	2.0	0.0	0.0	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
40000	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
40000	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
316000	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Development and introduction of new curricula
- Outreach to families, schools, child care providers, direct assistance, demonstrations, and educational opportunities to food, healthy, eating, exercise, diet, etc.
- Development of surveys, evaluation tools
- Delivery through classes, One-on-One, News Releases/TV/Radio, Participation in Events, Displays
- Provide training and other staff development opportunities to county educators

2. Brief description of the target audience

Homeowners, youth, adults, families, community leaders

3. How was eXtension used?

eXtension is provided as an educator resource

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	924	750	1000	750

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

Patent Applications Submitted

Year: 2014

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	1	2	3

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of OSU Facts published

Year	Actual
2014	1

Output #2

Output Measure

- Number of other publications including but not limited to Bulletins, Technical Manuals, Reports as well as PowerPoint presentation and Spreadsheets, etc. distributed for use by others

Year	Actual
2014	15

Output #3

Output Measure

- Number of in-service training sessions

Year	Actual
2014	2

Output #4

Output Measure

- Number of certification Training sessions

Year	Actual
2014	0

Output #5

Output Measure

- Number of other training sessions, workshops, etc. conducted

Year	Actual
2014	0

Output #6

Output Measure

- Number of presentations at Extension organized meetings

Year	Actual
-------------	---------------

2014 3

Output #7

Output Measure

- Number of presentations at other meetings and events (professional meetings, invitations to speak to community groups, etc.)

Year	Actual
2014	10

Output #8

Output Measure

- Number of workshops, conferences, etc. organized

Year	Actual
2014	2

Output #9

Output Measure

- Number of posters or displays

Year	Actual
2014	0

Output #10

Output Measure

- Number of other demonstrations, displays, exhibits, and models

Year	Actual
2014	0

Output #11

Output Measure

- Number of newsletters

Year	Actual
2014	0

Output #12

Output Measure

- Number of radio and television presentations

Year	Actual
2014	0

Output #13

Output Measure

- Number of newspaper, and magazine articles written

Year	Actual
2014	8

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Percentage increase in composting, donation of goods for others to use, repurpose, and recycle
2	Percentage increase in energy efficiency
3	Percentage decrease in food and packaging waste and use of disposable products
4	Percentage increase in maintenance, conservation, and protection of natural resources (air, land, water)
5	Percentage increase in communities that establish or continue collection points/times for recycling or reuse of consumer and agriculture goods

Outcome #1

1. Outcome Measures

Percentage increase in composting, donation of goods for others to use, repurpose, and recycle

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahoma ranks 11th in the nation in total energy consumption per capita. The average American produces 4.4 pounds of garbage every day. 40% of municipal garbage is made up of kitchen and garden waste. Two-thirds of Oklahomans have access to drop-off or curbside recycling.

What has been done

Abuse of the state's natural resources can have far-reaching and long-lasting consequences for Oklahoma's economy and the well-being of its citizens. In order to advance the socio-economic development of the state, educational programs have been created and implemented to educate Oklahomans on how to be better stewards of the environment.

Results

In 2014 175 individuals attended educational programs which taught them how to repurpose and upcycle items such as books, china and glassware, and textiles.

4. Associated Knowledge Areas

KA Code	Knowledge Area
403	Waste Disposal, Recycling, and Reuse

Outcome #2

1. Outcome Measures

Percentage increase in energy efficiency

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Percentage decrease in food and packaging waste and use of disposable products

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahoma ranks 11th in the nation in total energy consumption per capita. The average American produces 4.4 pounds of garbage every day. 40% of municipal garbage is made up of kitchen and garden waste. Two-thirds of Oklahomans have access to drop-off or curbside recycling.

What has been done

Abuse of the state's natural resources can have far-reaching and long-lasting consequences for Oklahoma's economy and the well-being of its citizens. In order to advance the socio-economic development of the state, educational programs have been created and implemented to educate Oklahomans on how to be better stewards of the environment.

Results

In 2014 175 individuals attended educational programs which taught them how to repurpose and upcycle items such as books, china and glassware, and textiles.

4. Associated Knowledge Areas

KA Code	Knowledge Area
----------------	-----------------------

403 Waste Disposal, Recycling, and Reuse

Outcome #4

1. Outcome Measures

Percentage increase in maintenance, conservation, and protection of natural resources (air, land, water)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahoma ranks 11th in the nation in total energy consumption per capita. The average American produces 4.4 pounds of garbage every day. 40% of municipal garbage is made up of kitchen and garden waste. Two-thirds of Oklahomans have access to drop-off or curbside recycling.

What has been done

Abuse of the state's natural resources can have far-reaching and long-lasting consequences for Oklahoma's economy and the well-being of its citizens. In order to advance the socio-economic development of the state, educational programs have been created and implemented to educate Oklahomans on how to be better stewards of the environment.

Results

In 2014 21 individuals attended programming on green cleaning.

4. Associated Knowledge Areas

KA Code	Knowledge Area
403	Waste Disposal, Recycling, and Reuse
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures

Outcome #5

1. Outcome Measures

Percentage increase in communities that establish or continue collection points/times for recycling or reuse of consumer and agriculture goods

Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

Statewide issue team format has changed educator focus and reduced activity in some planned programs.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Even though no Oklahoma Family and Consumer Sciences educators chose Environment as an issue team and therefore did not participate in issue team evaluation, some educators still conducted environment activities.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 17

1. Name of the Planned Program

Family and Youth Environmental and Safety Issues

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	5%		0%	
111	Conservation and Efficient Use of Water	5%		0%	
133	Pollution Prevention and Mitigation	20%		0%	
134	Outdoor Recreation	21%		0%	
141	Air Resource Protection and Management	8%		0%	
723	Hazards to Human Health and Safety	26%		0%	
805	Community Institutions and Social Services	15%		0%	
	Total	100%		0%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	5.5	0.0	0.0	0.0
Actual Paid	5.0	0.0	0.0	0.0
Actual Volunteer	0.2	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
65000	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
65000	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
638400	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Development and introduction of new curricula
 - Outreach to families, schools, child care providers, direct assistance, demonstrations, and educational opportunities to food, healthy, eating, exercise, diet, etc.
 - Development of surveys, evaluation tools
 - Delivery through classes, One-on-One, News Releases/TV/Radio, Participation in Events, Displays
 - Provide training and other staff development opportunities to county educators

2. Brief description of the target audience

Youth, homeowners, families, children, teachers, communities, community leaders

3. How was eXtension used?

eXtension is provided as an educator resource

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	4100	0	1551	0

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

Year: 2014
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	1	0	1

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of OSU Fact s published

Year	Actual
2014	2

Output #2

Output Measure

- Number of other publications including but not limited to Bulletins, Technical Manuals, Reports as well as PowerPoint presentation and Spreadsheets, etc. distributed for use by others

Year	Actual
2014	6

Output #3

Output Measure

- Number of in-service training sessions

Year	Actual
2014	7

Output #4

Output Measure

- Number of certification training sessions

Year	Actual
2014	0

Output #5

Output Measure

- Number of other training sessions, workshops, etc. conducted

Year	Actual
2014	11

Output #6

Output Measure

- Number of presentations at Extension organized meetings

Year	Actual
2014	3

Output #7

Output Measure

- Number of presentations at other meetings and events (professional meetings, invitations to speak to community groups, etc.)

Year	Actual
2014	9

Output #8

Output Measure

- Number of workshops, conferences, etc. organized

Year	Actual
2014	0

Output #9

Output Measure

- Number of posters or displays

Year	Actual
2014	0

Output #10

Output Measure

- Number of other demonstrations, displays, exhibits, and models

Year	Actual
-------------	---------------

2014 0

Output #11

Output Measure

- Number of newsletters

Year	Actual
2014	0

Output #12

Output Measure

- Number of radio and television presentations

Year	Actual
2014	0

Output #13

Output Measure

- Number of newspaper, and magazine articles written

Year	Actual
2014	8

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Percentage increase in selection and home preservation of home, locally and regionally produced foods
2	Percentage increase in composting, donation of goods for others to use, repurpose, and recycle
3	Percentage decrease in food and packaging waste and use of disposable products
4	Percentage increase in maintenance, conservation, and protection of natural resources (air, land, water)
5	Percentage increase in preparation for emergencies
6	Percentage increase in communities that establish or continue collection points/times for recycling/reuse of consumer and agriculture goods
7	Percentage increase in communities that inaugurate a county beautification campaign

Outcome #1

1. Outcome Measures

Percentage increase in selection and home preservation of home, locally and regionally produced foods

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)

Oklahoma is the sixth unhealthiest state in the nation. This poor health ranking is reflected by our high density of fast food restaurants. Total annual health-related costs of food borne illness in Oklahoma are estimated at \$1.7 million. The cost per case is estimated at \$1,796.

What has been done

In order to advance the socio-economic development of the state, educational programs have been created and implemented to educate Oklahomans on how to be better stewards of their home and natural environment and resources.

Results

Across the state 172 Oklahomans learned how to grow, use, and preserve their own herbs.

4. Associated Knowledge Areas

KA Code	Knowledge Area
805	Community Institutions and Social Services

Outcome #2

1. Outcome Measures

Percentage increase in composting, donation of goods for others to use, repurpose, and recycle

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahoma ranks 11th in the nation in total energy consumption per capita. The average American produces 4.4 pounds of garbage every day. 40% of municipal garbage is made up of kitchen and garden waste. Two-thirds of Oklahomans have access to drop-off or curbside recycling.

What has been done

Abuse of the state's natural resources can have far-reaching and long-lasting consequences for Oklahoma's economy and the well being of its citizens. In order to advance the socio-economic development of the state, educational programs have been created and implemented to educate Oklahomans on how to be better stewards of the environment.

Results

In 2014 175 individuals attended educational programs which taught them how to repurpose and upcycle items such as books, china and glassware, and textiles.

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

Percentage decrease in food and packaging waste and use of disposable products

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Percentage increase in maintenance, conservation, and protection of natural resources (air, land, water)

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

Percentage increase in preparation for emergencies

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	450

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahoma is vulnerable to many natural disasters each year such as tornadoes, ice storms, floods and wildfires. These disasters can cause significant financial loss by destroying homes and businesses. Many Oklahomans lack information about how to maintain their health, well being, and safety as it relates to their homes and the near environment.

What has been done

In order to advance the socio-economic development of the state, and have an impact on issues that address safety, educational programs have been created and implemented to educate Oklahomans on how to improve their quality of life.

Results

A total of 1,213 individuals were reached through emergency preparedness programs such as EDEN Grab and Go Emergency Preparedness and Build an Emergency Preparedness Kit on a Budget, and 109 people created emergency kits.

4. Associated Knowledge Areas

KA Code	Knowledge Area
723	Hazards to Human Health and Safety
805	Community Institutions and Social Services

Outcome #6

1. Outcome Measures

Percentage increase in communities that establish or continue collection points/times for recycling/reuse of consumer and agriculture goods

Not Reporting on this Outcome Measure

Outcome #7

1. Outcome Measures

Percentage increase in communities that inaugurate a county beautification campaign

Not Reporting on this Outcome Measure

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 Programmatic Challenges

Brief Explanation

Statewide issue team format has changed educator focus and reduced activity in some planned programs.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

27 adult respondents to safety issue team evaluations reported the following planned behavior changes after participating in the program:

- 850% increase in those who plan to prepare a 3-day emergency kit
- 220% increase in those who plan to prepare a home evacuation plan
- 300% increase in those who plan to write an emergency preparedness plan

Even though no Oklahoma Family and Consumer Sciences educators chose Environment as an issue team and therefore did not participate in issue team evaluation, some educators still completed environment activities.

Key Items of Evaluation

In 2014, Issue Team-specific Evaluation Questionnaires were collected after planned program curriculum delivery. These questions utilized a retrospective approach.

V(A). Planned Program (Summary)

Program # 18

1. Name of the Planned Program

Food Safety - Hunger, Health and Safety

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
607	Consumer Economics	19%		0%	
703	Nutrition Education and Behavior	16%		0%	
704	Nutrition and Hunger in the Population	20%		0%	
723	Hazards to Human Health and Safety	20%		0%	
801	Individual and Family Resource Management	5%		0%	
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures	10%		0%	
805	Community Institutions and Social Services	10%		0%	
	Total	100%		0%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	19.0	0.0	0.0	0.0
Actual Paid	13.0	0.0	0.0	0.0
Actual Volunteer	5.8	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
187000	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
187000	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
1787520	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Development and introduction of new curricula
- Outreach to families, schools, child care providers, direct assistance, demonstrations, and educational opportunities to food, healthy, eating, exercise, diet, etc.
- Development of surveys, evaluation tools
- Delivery through classes, One-on-One, News Releases/TV/Radio, Participation in Events, Displays
- Provide training and other staff development opportunities to county educators

2. Brief description of the target audience

Families, youth, restruant employees, food handlers, children, communities, community leaders

3. How was eXtension used?

eXtension is provided as an educator resource

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	62090	3051000	5001	800080

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

Patent Applications Submitted

Year: 2014

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	1	0	1

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of OSU Fact s published

Year	Actual
2014	0

Output #2

Output Measure

- Number of other publications including but not limited to Bulletins, Technical Manuals, Reports as well as PowerPoint presentation and Spreadsheets, etc. distributed for use by others

Year	Actual
2014	22

Output #3

Output Measure

- Number of in-service training sessions

Year	Actual
2014	2

Output #4

Output Measure

- Number of certification Training sessions

Year	Actual
2014	0

Output #5

Output Measure

- Number of other training sessions, workshops, etc. conducted

Year	Actual
2014	9

Output #6

Output Measure

- Number of presentations at Extension organized meetings

Year	Actual
2014	0

Output #7

Output Measure

- Number of presentations at other meetings and events (professional meetings, invitations to speak to community groups, etc.)

Year	Actual
2014	1

Output #8

Output Measure

- Number of workshops, conferences, etc. organized

Year	Actual
2014	0

Output #9

Output Measure

- Number of posters or displays

Year	Actual
2014	0

Output #10

Output Measure

- Number of other demonstrations, displays, exhibits, and models

Year	Actual
-------------	---------------

2014 0

Output #11

Output Measure

- Number of newsletters

Year	Actual
2014	0

Output #12

Output Measure

- Number of radio and television presentations

Year	Actual
2014	30

Output #13

Output Measure

- Number of newspaper, and magazine articles written

Year	Actual
2014	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Percentage increase in meals prepared at home
2	Percentage increase in food cooking skills
3	Percentage increase in safe food handling practices
4	Percentage increase in safe and effective food preservation practices
5	Percentage increase in the number of safety audits completed to identify potential hazards in the home/homestead
6	Percentage increase in practice of safety and injury/secondary injury prevention
7	Percentage increase in use of assistive technology as necessary
8	Percentage increase in use of available assistance by persons with injury/disability

Outcome #1

1. Outcome Measures

Percentage increase in meals prepared at home

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	14

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahoma ranks as the 6th most obese state in the nation, with 27% of Oklahoma youth considered overweight or obese. This ranking reflects the state's high density of fast food establishments, low levels of physical activity, and low fruit and vegetable consumption. Oklahoma ranks 50th for fruit consumption nationally; 44% of Oklahoma youth reported they did not eat at least one piece of fruit each day. Oklahoma ranks 44th for vegetable consumption nationally; 40% of Oklahoma youth reported they did not eat at least one vegetable every day. Total annual health-related costs of food borne illness in the United States, including medical expenses, lost productivity, and even death, totals \$6.9 billion. Total annual health-related costs of food borne illness in Oklahoma were estimated at \$1.7 million by the Produce Safety Project at Georgetown University in 2010.

What has been done

In order to advance the socio-economic development of the state, and have an impact on issues that address maintaining or improving health through safe food choices, educational programs have been created and implemented to educate Oklahomans on how to attain a better quality of life.

Results

In 2014, 1,240 youth and adult participants across Oklahomans learned safe food handling and food preparation practices through programs such as Food Safety Basics, and youth and adult cooking schools.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

Outcome #2

1. Outcome Measures

Percentage increase in food cooking skills

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	51

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahoma ranks as the 6th most obese state in the nation, with 27% of Oklahoma youth considered overweight or obese. This ranking reflects the state's high density of fast food establishments, low levels of physical activity, and low fruit and vegetable consumption. Oklahoma ranks 50th for fruit consumption nationally; 44% of Oklahoma youth reported they did not eat at least one piece of fruit each day. Oklahoma ranks 44th for vegetable consumption nationally; 40% of Oklahoma youth reported they did not eat at least one vegetable every day. Total annual health-related costs of food borne illness in the United States, including medical expenses, lost productivity, and even death, totals \$6.9 billion. Total annual health-related costs of food borne illness in Oklahoma were estimated at \$1.7 million by the Produce Safety Project at Georgetown University in 2010.

What has been done

In order to advance the socio-economic development of the state, and have an impact on issues that address maintaining or improving health through safe food choices, educational programs have been created and implemented to educate Oklahomans on how to attain a better quality of life.

Results

In 2014, 1,240 youth and adult participants across Oklahomans learned safe food handling and food preparation practices through programs such as Food Safety Basics, and youth and adult cooking schools.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

Outcome #3

1. Outcome Measures

Percentage increase in safe food handling practices

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	13

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahoma ranks as the 6th most obese state in the nation, with 27% of Oklahoma youth considered overweight or obese. This ranking reflects the state's high density of fast food establishments, low levels of physical activity, and low fruit and vegetable consumption. Oklahoma ranks 50th for fruit consumption nationally; 44% of Oklahoma youth reported they did not eat at least one piece of fruit each day. Oklahoma ranks 44th for vegetable consumption nationally; 40% of Oklahoma youth reported they did not eat at least one vegetable every day. Total annual health-related costs of food borne illness in the United States, including medical expenses, lost productivity, and even death, totals \$6.9 billion. Total annual health-related costs of food borne illness in Oklahoma were estimated at \$1.7 million by the Produce Safety Project at Georgetown University in 2010.

What has been done

In order to advance the socio-economic development of the state, and have an impact on issues that address maintaining or improving health through safe food choices, educational programs have been created and implemented to educate Oklahomans on how to attain a better quality of life.

Results

In 2014, 1,240 youth and adult participants across Oklahomans learned safe food handling and food preparation practices through programs such as Food Safety Basics, and youth and adult cooking schools.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

Outcome #4

1. Outcome Measures

Percentage increase in safe and effective food preservation practices

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	17

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahoma ranks as the 6th most obese state in the nation, with 27% of Oklahoma youth considered overweight or obese. This ranking reflects the state's high density of fast food establishments, low levels of physical activity, and low fruit and vegetable consumption. Oklahoma ranks 50th for fruit consumption nationally; 44% of Oklahoma youth reported they did not eat at least one piece of fruit each day. Oklahoma ranks 44th for vegetable consumption nationally; 40% of Oklahoma youth reported they did not eat at least one vegetable every day. Total annual health-related costs of food borne illness in the United States, including medical expenses, lost productivity, and even death, totals \$6.9 billion. Total annual health-related costs of food borne illness in Oklahoma were estimated at \$1.7 million by the Produce Safety Project at Georgetown University in 2010.

What has been done

In order to advance the socio-economic development of the state, and have an impact on issues that address maintaining or improving health through safe food choices, educational programs have been created and implemented to educate Oklahomans on how to attain a better quality of life.

Results

In 2014, 51 programs were presented to 546 youth and adult participants across the state. Oklahomans learned safe food preservation and storage practices through programs such as Home Food Preservation, Canning for Beginners, and workshops on specific topics of pickling, salsa, and jelly making.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
723	Hazards to Human Health and Safety

Outcome #5

1. Outcome Measures

Percentage increase in the number of safety audits completed to identify potential hazards in the home/homestead

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	450

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In Oklahoma, falls, fires/burns, and poisonings account for the majority of unintentional home injury deaths among all age groups. Among all age groups, older adults are most likely to die due to home injury. Over 14% of Oklahoma's population is age 65 years and older, and of those, 9.6% live alone. It is estimated that between 15 and 30 percent of American farm operators and farm workers have physical disabilities, many of them sustained on the farm.

What has been done

In order to advance the socio-economic development of the state, and have an impact on issues that address reducing risks that could harm health, well-being, and safety in homes, homesteads and communities, educational programs have been created and implemented to educate Oklahomans on how to attain a better quality of life.

Results

In 2014, 116 individuals participated in programs that taught them how to avoid hazards and stay safe in their homes. Safety audits were conducted for those individuals who have chosen to remain in their homes and "age in place".

4. Associated Knowledge Areas

KA Code	Knowledge Area
723	Hazards to Human Health and Safety

804 Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures

Outcome #6

1. Outcome Measures

Percentage increase in practice of safety and injury/secondary injury prevention

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	230

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In Oklahoma, falls, fires/burns, and poisonings account for the majority of unintentional home injury deaths among all age groups. Among all age groups, older adults are most likely to die due to home injury. Over 14% of Oklahoma's population is age 65 years and older, and of those, 9.6% live alone. It is estimated that between 15 and 30 percent of American farm operators and farm workers have physical disabilities, many of them sustained on the farm.

What has been done

In order to advance the socio-economic development of the state, and have an impact on issues that address reducing risks that could harm health, well-being, and safety in homes, homesteads and communities, educational programs have been created and implemented to educate Oklahomans on how to attain a better quality of life.

Results

In 2014, 116 individuals participated in programs that taught them how to avoid hazards and stay safe in their homes. Safety audits were conducted for those individuals who have chosen to remain in their homes and "age in place". Programs addressing healthy housing, home safety, and bedbugs were attended by 246 Oklahomans, and 304 Oklahomans participated in Progressive Ag Safety Days.

In 2014, 3,100 Oklahoma adults participated in the Arthritis Foundation Land Exercise and Tai Chi: Moving for Better Balance programs which are a series of low-impact exercises to increase balance and mobility.

4. Associated Knowledge Areas

KA Code	Knowledge Area
723	Hazards to Human Health and Safety

Outcome #7

1. Outcome Measures

Percentage increase in use of assistive technology as necessary

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	265

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In Oklahoma, falls, fires/burns, and poisonings account for the majority of unintentional home injury deaths among all age groups. Among all age groups, older adults are most likely to die due to home injury. Over 14% of Oklahoma's population is age 65 years and older, and of those, 9.6% live alone. It is estimated that between 15 and 30 percent of American farm operators and farm workers have physical disabilities, many of them sustained on the farm.

What has been done

In order to advance the socio-economic development of the state, and have an impact on issues that address reducing risks that could harm health, well-being, and safety in homes, homesteads and communities, educational programs have been created and implemented to educate Oklahomans on how to attain a better quality of life.

Results

In 2014, 116 individuals participated in programs that taught them how to avoid hazards and stay safe in their homes. Safety audits were conducted for those individuals who have chosen to remain in their homes and "age in place".

4. Associated Knowledge Areas

KA Code	Knowledge Area
723	Hazards to Human Health and Safety
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures
805	Community Institutions and Social Services

Outcome #8

1. Outcome Measures

Percentage increase in use of available assistance by persons with injury/disability

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	80

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In Oklahoma, falls, fires/burns, and poisonings account for the majority of unintentional home injury deaths among all age groups. Among all age groups, older adults are most likely to die due to home injury. Over 14% of Oklahoma's population is age 65 years and older, and of those, 9.6% live alone. It is estimated that between 15 and 30 percent of American farm operators and farm workers have physical disabilities, many of them sustained on the farm.

What has been done

In order to advance the socio-economic development of the state, and have an impact on issues that address reducing risks that could harm health, well-being, and safety in homes, homesteads and communities, educational programs have been created and implemented to educate Oklahomans on how to attain a better quality of life.

Results

In 2014, 116 individuals participated in programs that taught them how to avoid hazards and stay safe in their homes. Safety audits were conducted for those individuals who have chosen to remain in their homes and "age in place".

4. Associated Knowledge Areas

KA Code	Knowledge Area
723	Hazards to Human Health and Safety
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures
805	Community Institutions and Social Services

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

Statewide issue team format has changed educator focus and reduced activity in some planned programs.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Issue team evaluation items for the above outcomes include:

91 adult respondents to hunger issue team evaluations and 336 adult respondents to health issue team evaluations reported the following planned behavior changes after participating in the program:

- 14% increase in those planning to cook meals at home
- 51% increase in those planning to use simple recipes to cook food
- 13% increase in those planning to use safe food handling practices
- 9% increase in those planning to use safe food storage practices
- 17% increase in using planning to use safe and effective food preservation practices

13 youth respondents to hunger issue team evaluations and 251 youth respondents to health issue team evaluations reported the following planned behavior changes after participating in the program:

- 42% increase in those who plan to cook food at home
- 123% increase in those who plan to use simple recipes to cook food
- 34% increase in those who plan to use safe food handling practices
- 28% increase in those who plan to use safe food storage practices
- 43% increase in those who plan to use safe food preservation practices

27 adult respondents to safety issue team evaluations reported the following planned behavior changes after participating in the program:

- 230% increase in those who plan to manage safety hazards in or near their home
- 450% increase in those who plan to conduct a basic safety audit
- 90% increase in those who have confidence in their ability to be safe
- 62% increase in those who are able to move without the risk of injury in spite of their

current health condition

- 67% increase in those who are able to perform common activities of daily living with minimal difficulty
- 265% increase in those who know where to find appropriate assistive technology for their needs
- 80% increase in those who are seeking assistance for their injury/disability

Key Items of Evaluation

In 2014, Issue Team-specific evaluation questionnaires were collected after planned program curriculum delivery. These questions utilized a retrospective approach.

V(A). Planned Program (Summary)

Program # 19

1. Name of the Planned Program

Global Food Security and Hunger - Families and 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
604	Marketing and Distribution Practices	5%		0%	
607	Consumer Economics	20%		0%	
608	Community Resource Planning and Development	5%		0%	
724	Healthy Lifestyle	10%		0%	
801	Individual and Family Resource Management	10%		0%	
802	Human Development and Family Well-Being	25%		0%	
805	Community Institutions and Social Services	15%		0%	
806	Youth Development	10%		0%	
	Total	100%		0%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	33.0	0.0	0.0	0.0
Actual Paid	20.0	0.0	0.0	0.0
Actual Volunteer	11.9	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
242000	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
242000	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
2607000	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Development and introduction of new curricula
- Outreach to families, schools, child care providers, direct assistance, demonstrations, and educational opportunities to food, healthy, eating, exercise, diet, etc.
- Development of surveys, evaluation tools
- Delivery through classes, One-on-One, News Releases/TV/Radio, Participation in Events, Displays
- Provide training and other staff development opportunities to county educators

2. Brief description of the target audience

Families, communities, youth, children, parents, community leaders, teachers, job seekers, businesses

3. How was eXtension used?

eXtension is provided as an educator resource

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	92900	2900000	29065	800000

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	3	1	4

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of OSU Fact s published

Year	Actual
2014	3

Output #2

Output Measure

- Number of other publications including but not limited to Bulletins, Technical Manuals, Reports as well as PowerPoint presentation and Spreadsheets, etc. distributed for use by others

Year	Actual
2014	46

Output #3

Output Measure

- Number of in-service training sessions

Year	Actual
2014	26

Output #4

Output Measure

- Number of certification training sessions

Year	Actual
2014	2

Output #5

Output Measure

- Number of other training sessions, workshops, etc. conducted

Year	Actual
2014	7

Output #6

Output Measure

- Number of presentations at Extension organized meetings

Year	Actual
2014	12

Output #7

Output Measure

- Number of presentations at other meetings and events (professional meetings, invitations to speak to community groups, etc.)

Year	Actual
2014	32

Output #8

Output Measure

- Number of workshops, conferences, etc. organized

Year	Actual
2014	3

Output #9

Output Measure

- Number of posters or displays

Year	Actual
2014	0

Output #10

Output Measure

- Number of other demonstrations, displays, exhibits, and models

Year	Actual
-------------	---------------

2014 5

Output #11

Output Measure

- Number of newsletters

Year	Actual
2014	3

Output #12

Output Measure

- Number of radio and television presentations

Year	Actual
2014	2

Output #13

Output Measure

- Number of newspaper, and magazine articles written

Year	Actual
2014	13

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Percentage increase in money saving meal planning or food shopping practices
2	Percentage increase in food money management practices
3	Percentage increase growing, producing, hunting, or fishing for some food
4	Percentage decrease in likelihood of using high-risk negative financial practices such as overusing credit, failing to save money or planning for the future
5	Percentage decrease in the risk of default on loans, credit card debt, unpaid bills, mortgage foreclosure, and identity theft
6	Percentage increase in financial planning practices across the life cycle and skills to manage financial risk
7	Percentage increase in readiness for employment opportunities
8	Percentage increase in readiness for life changes
9	Percentage increase in life skills for personal competence
10	Percentage increase in ability to manage personal and family finances
11	Percentage increase in utilization by parents, volunteers, and primary caregivers of best practices that enhance the well-being and life skill development of children and youth
12	Percentage increase in use of creativity and lifelong learning by youth and adults to become resilient in their personal and family life
13	Percentage increase in life skills such as critical thinking, problem solving, nurturing relationships, social skills, responsible citizenship, self-discipline, stress management, and self-esteem
14	Percentage increase in youth giving back to their community through entrepreneurial/service learning projects
15	Percentage increase in partnership of agencies and organizations interested in reducing hunger
16	Percentage increase in action to develop and sustain assets that support employment and economic opportunities
17	Percentage increase in use of creativity and innovation to address social problems

18	Community Nutrition Education Programs
----	--

Outcome #1

1. Outcome Measures

Percentage increase in money saving meal planning or food shopping practices

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	35

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

According to a recent USDA report, for the 3 year period of 2011-2013 an average of 15.5% of Oklahoma's population was classified as food insecure or very low food security. The Regional Food Bank in Oklahoma serves over 110,000 people each week, while the Community Food Bank of Eastern Oklahoma provides 335,000 meals each week. Sixty-two percent of Oklahoma students are eligible for free or reduced-price school lunch. Sixteen percent of Oklahoma's adult population receives monthly benefits from the Supplemental Nutrition Assistance Program. Food insecurity and hunger are on the rise across Oklahoma, especially in families with children; 1 in 4 children and 1 in 6 adults struggle with hunger daily.

What has been done

In order to advance the socio-economic development of the state, and have an impact on issues that address food insecurity & hunger, educational programs have been created and implemented to educate Oklahomans on how to attain a better quality of life.

Results

In 2014, 510 Oklahomans participated in educational programs including Eat Right When Money is Tight and Stretching Your Food Dollar; that focused on reducing hunger. Programs like Adults Need Dairy, Too were taught to TANF clients at a work preparation class. Loving Your Family, Feeding Their Future offered cooking principles budget friendly recipes.

The Learn to Grow gardening project for Child Care facilities and Head Start programs was presented in partnership with Extension, Cherokee Nation, and Department of Human Services. 82% facilities in the five partnering counties participated. In 2014, 222 garden beds were planted in 102 facilities, reaching over 3,249 children and impacting 11,721 family members.

4. Associated Knowledge Areas

KA Code	Knowledge Area
607	Consumer Economics
801	Individual and Family Resource Management

Outcome #2

1. Outcome Measures

Percentage increase in food money management practices

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	45

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

According to a recent USDA report, for the 3 year period of 2011-2013 an average of 15.5% of Oklahoma's population was classified as food insecure or very low food security. The Regional Food Bank in Oklahoma serves over 110,000 people each week, while the Community Food Bank of Eastern Oklahoma provides 335,000 meals each week. Sixty-two percent of Oklahoma students are eligible for free or reduced-price school lunch. Sixteen percent of Oklahoma's adult population receives monthly benefits from the Supplemental Nutrition Assistance Program. Food insecurity and hunger are on the rise across Oklahoma, especially in families with children; 1 in 4 children and 1 in 6 adults struggle with hunger daily.

What has been done

In order to advance the socio-economic development of the state, and have an impact on issues that address food insecurity & hunger, educational programs have been created and implemented to educate Oklahomans on how to attain a better quality of life.

Results

In 2014, 510 Oklahomans participated in educational programs including Eat Right When Money is Tight and Stretching Your Food Dollar; that focused on reducing hunger. Programs like Adults Need Dairy, Too were taught to TANF clients at a work preparation class. Loving Your Family, Feeding Their Future offered cooking principles budget friendly recipes.

4. Associated Knowledge Areas

KA Code	Knowledge Area
607	Consumer Economics
801	Individual and Family Resource Management

Outcome #3

1. Outcome Measures

Percentage increase growing, producing, hunting, or fishing for some food

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	64

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

According to a recent USDA report, for the 3 year period of 2011-2013 an average of 15.5% of Oklahoma's population was classified as food insecure or very low food security. The Regional Food Bank in Oklahoma serves over 110,000 people each week, while the Community Food Bank of Eastern Oklahoma provides 335,000 meals each week. Sixty-two percent of Oklahoma students are eligible for free or reduced-price school lunch. Sixteen percent of Oklahoma's adult population receives monthly benefits from the Supplemental Nutrition Assistance Program. Food insecurity and hunger are on the rise across Oklahoma, especially in families with children; 1 in 4 children and 1 in 6 adults struggle with hunger daily.

What has been done

In order to advance the socio-economic development of the state, and have an impact on issues that address food insecurity & hunger, educational programs have been created and implemented to educate Oklahomans on how to attain a better quality of life.

Results

In 2014, 510 Oklahomans participated in educational programs including Eat Right When Money is Tight and Stretching Your Food Dollar; that focused on reducing hunger. Programs like Adults Need Dairy, Too were taught to TANF clients at a work preparation class. Loving Your Family, Feeding Their Future offered cooking principles budget friendly recipes.

The Learn to Grow gardening project for Child Care facilities and Head Start programs was presented in partnership with Extension, Cherokee Nation, and Department of Human Services. 82% facilities in the five partnering counties participated. In 2014, 222 garden beds were planted in 102 facilities, reaching over 3,249 children and impacting 11,721 family members.

4. Associated Knowledge Areas

KA Code	Knowledge Area
607	Consumer Economics
801	Individual and Family Resource Management

Outcome #4

1. Outcome Measures

Percentage decrease in likelihood of using high-risk negative financial practices such as overusing credit, failing to save money or planning for the future

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahoma has some of the nation's highest populations of unbanked and underbanked households, families without savings accounts, and consumers with subprime credit. Forty-nine percent of Oklahoma households are considered "asset poor", having little or no financial cushion to subsist at the poverty level for three months in the event of unemployment or other emergency. The state ranks 42nd in unbanked households and 44th in consumers with subprime credit.

Nearly 17% of Oklahomans have an annual income below the federal poverty threshold. The state ranks 40th in average annual pay.

Nationally, Oklahoma ranks 48th in residents with low-wage jobs. Unemployed Oklahomans may have more than a bad economy working against them; irresponsible use of social media such as Facebook, YouTube, and Twitter can eliminate a job applicant from consideration for employment. A lack of business etiquette can cost not only job applicants but also employers, who can lose profits due to a decrease in business and eventual increase in employee turnover.

What has been done

In order to advance the socio-economic development of the state, and have an impact on issues that address financial management and planning skills, jobs and employment, and families, educational programs have been created and implemented to educate Oklahomans on how to attain a better quality of life.

Results

In 2014, 209 programs using various curricula were presented to 3,400 individuals across Oklahoma. Programs presented include: Making Sense of Money Management classes are offered as an alternative to having bogus check charges filed in district court. Program evaluations show 77% plan to regularly track their income and spending, while 46% plan to have an emergency savings fund equal to at least three months' pay. Money Habitudes cards are a fun, easy tool for participants to talk about money and understand their money personality type. Money Habitudes help individuals understand their money personality and spending habits. As a result, 79% plan to regularly track their income and spending, while 51% plan to have an emergency savings fund equal to at least three months' pay.

4. Associated Knowledge Areas

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

Outcome #5

1. Outcome Measures

Percentage decrease in the risk of default on loans, credit card debt, unpaid bills, mortgage foreclosure, and identity theft

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	71

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahoma has some of the nation's highest populations of unbanked and underbanked households, families without savings accounts, and consumers with subprime credit. Forty-nine percent of Oklahoma households are considered "asset poor", having little or no financial cushion to subsist at the poverty level for three months in the event of unemployment or other emergency. The state ranks 42nd in unbanked households and 44th in consumers with subprime credit.

Nearly 17% of Oklahomans have an annual income below the federal poverty threshold. The state ranks 40th in average annual pay.

Nationally, Oklahoma ranks 48th in residents with low-wage jobs. Unemployed Oklahomans may have more than a bad economy working against them; irresponsible use of social media such as Facebook, YouTube, and Twitter can eliminate a job applicant from consideration for employment. A lack of business etiquette can cost not only job applicants but also employers, who can lose profits due to a decrease in business and eventual increase in employee turnover.

What has been done

In order to advance the socio-economic development of the state, and have an impact on issues that address financial management and planning skills, jobs and employment, and families, educational programs have been created and implemented to educate Oklahomans on how to attain a better quality of life.

Results

In 2014, 209 programs using various curricula were presented to 3,400 individuals across Oklahoma. Programs presented include:

Making Sense of Money Management classes are offered as an alternative to having bogus check charges filed in district court. Program evaluations show 77% plan to regularly track their income and spending, while 46% plan to have an emergency savings fund equal to at least three months' pay.

Money Habitudes cards are a fun, easy tool for participants to talk about money and understand their money personality type. Money Habitudes help individuals understand their money personality and spending habits. As a result, 79% plan to regularly track their income and spending, while 51% plan to have an emergency savings fund equal to at least three months' pay.

4. Associated Knowledge Areas

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

Outcome #6

1. Outcome Measures

Percentage increase in financial planning practices across the life cycle and skills to manage financial risk

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)

Oklahoma has some of the nation's highest populations of unbanked and underbanked households, families without savings accounts, and consumers with subprime credit. Forty-nine percent of Oklahoma households are considered "asset poor", having little or no financial cushion to subsist at the poverty level for three months in the event of unemployment or other emergency. The state ranks 42nd in unbanked households and 44th in consumers with subprime credit.

Nearly 17% of Oklahomans have an annual income below the federal poverty threshold. The state ranks 40th in average annual pay.

Nationally, Oklahoma ranks 48th in residents with low-wage jobs. Unemployed Oklahomans may have more than a bad economy working against them; irresponsible use of social media such as Facebook, YouTube, and Twitter can eliminate a job applicant from consideration for employment. A lack of business etiquette can cost not only job applicants but also employers, who can lose profits due to a decrease in business and eventual increase in employee turnover.

What has been done

In order to advance the socio-economic development of the state, and have an impact on issues that address financial management and planning skills, jobs and employment, and families, educational programs have been created and implemented to educate Oklahomans on how to attain a better quality of life.

Results

In 2014, 209 programs using various curricula were presented to 3,400 individuals across Oklahoma. Programs presented include:
Making Sense of Money Management classes are offered as an alternative to having bogus

check charges filed in district court. Program evaluations show 77% plan to regularly track their income and spending, while 46% plan to have an emergency savings fund equal to at least three months' pay.

Money Habitudes cards are a fun, easy tool for participants to talk about money and understand their money personality type. Money Habitudes help individuals understand their money personality and spending habits. As a result, 79% plan to regularly track their income and spending, while 51% plan to have an emergency savings fund equal to at least three months' pay.

4. Associated Knowledge Areas

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

Outcome #7

1. Outcome Measures

Percentage increase in readiness for employment opportunities

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	75

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahoma has some of the nation's highest populations of unbanked and underbanked households, families without savings accounts, and consumers with subprime credit. Forty-nine percent of Oklahoma households are considered "asset poor", having little or no financial cushion to subsist at the poverty level for three months in the event of unemployment or other emergency. The state ranks 42nd in unbanked households and 44th in consumers with subprime credit.

Nearly 17% of Oklahomans have an annual income below the federal poverty threshold. The state ranks 40th in average annual pay.

Nationally, Oklahoma ranks 48th in residents with low-wage jobs. Unemployed Oklahomans may

have more than a bad economy working against them; irresponsible use of social media such as Facebook, YouTube, and Twitter can eliminate a job applicant from consideration for employment. A lack of business etiquette can cost not only job applicants but also employers, who can lose profits due to a decrease in business and eventual increase in employee turnover.

What has been done

In order to advance the socio-economic development of the state, and have an impact on issues that address financial management and planning skills, jobs and employment, and families, educational programs have been created and implemented to educate Oklahomans on how to attain a better quality of life.

Results

In 2014, 887 participants attended programs such as: Overcoming Obstacles which teaches important life skills such as communication, decision making and goal setting. High school students participating in the program also focus on planning of continuing education and career readiness, as well how to excel on the job and develop financial responsibility.

PRIDE (Producing Resourceful Informed Dedicated Employees) is a customer service program designed to enhance rural and community development. Frontline employees learn quality customer service techniques and helps employees learn about highlights and tourist attractions in their community, county, region and state.

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management
802	Human Development and Family Well-Being
806	Youth Development

Outcome #8

1. Outcome Measures

Percentage increase in readiness for life changes

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
-------------	---------------

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahoma has some of the nation's highest populations of unbanked and underbanked households, families without savings accounts, and consumers with subprime credit. Forty-nine percent of Oklahoma households are considered "asset poor", having little or no financial cushion to subsist at the poverty level for three months in the event of unemployment or other emergency. The state ranks 42nd in unbanked households and 44th in consumers with subprime credit.

Nearly 17% of Oklahomans have an annual income below the federal poverty threshold. The state ranks 40th in average annual pay.

Nationally, Oklahoma ranks 48th in residents with low-wage jobs. Unemployed Oklahomans may have more than a bad economy working against them; irresponsible use of social media such as Facebook, YouTube, and Twitter can eliminate a job applicant from consideration for employment. A lack of business etiquette can cost not only job applicants but also employers, who can lose profits due to a decrease in business and eventual increase in employee turnover.

What has been done

In order to advance the socio-economic development of the state, and have an impact on issues that address financial management and planning skills, jobs and employment, and families, educational programs have been created and implemented to educate Oklahomans on how to attain a better quality of life.

Results

In 2014, 887 participants attended programs such as: Overcoming Obstacles which teaches important life skills such as communication, decision making and goal setting. High school students participating in the program also focus on planning of continuing education and career readiness, as well how to excel on the job and develop financial responsibility.

PRIDE (Producing Resourceful Informed Dedicated Employees) is a customer service program designed to enhance rural and community development. Frontline employees learn quality customer service techniques and helps employees learn about highlights and tourist attractions in their community, county, region and state.

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle
801	Individual and Family Resource Management
802	Human Development and Family Well-Being
806	Youth Development

Outcome #9

1. Outcome Measures

Percentage increase in life skills for personal competence

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	82

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahoma has some of the nation's highest populations of unbanked and underbanked households, families without savings accounts, and consumers with subprime credit. Forty-nine percent of Oklahoma households are considered "asset poor", having little or no financial cushion to subsist at the poverty level for three months in the event of unemployment or other emergency. The state ranks 42nd in unbanked households and 44th in consumers with subprime credit.

Nearly 17% of Oklahomans have an annual income below the federal poverty threshold. The state ranks 40th in average annual pay.

Nationally, Oklahoma ranks 48th in residents with low-wage jobs. Unemployed Oklahomans may have more than a bad economy working against them; irresponsible use of social media such as Facebook, YouTube, and Twitter can eliminate a job applicant from consideration for employment. A lack of business etiquette can cost not only job applicants but also employers, who can lose profits due to a decrease in business and eventual increase in employee turnover.

Oklahoma ranks among the top 5 in all states for number of divorces. Oklahomans marry an average of 2.5 years younger than the national median age at first marriage, and those marrying under the age of 20 are the most likely to have gotten a divorce. Oklahoma families with children and headed by single mothers are 4.5 times more likely to be in poverty than families headed by married couples.

What has been done

In order to advance the socio-economic development of the state, and have an impact on issues that address financial management and planning skills, jobs and employment, and families, educational programs have been created and implemented to educate Oklahomans on how to

attain a better quality of life

Results

Overcoming Obstacles which teaches important life skills such as communication, decision making and goal setting. High school students participating in the program also focus on planning of continuing education and career readiness, as well how to excel on the job and develop financial responsibility.

PRIDE (Producing Resourceful Informed Dedicated Employees) is a customer service program designed to enhance rural and community development. Frontline employees learn quality customer service techniques and helps employees learn about highlights and tourist attractions in their community, county, region and state.

?Oklahoma Cooperative Extension conducted the award-winning Co-Parenting for Resilience classes in 30 counties to over 1,020 parents.

4. Associated Knowledge Areas

KA Code	Knowledge Area
607	Consumer Economics
724	Healthy Lifestyle
801	Individual and Family Resource Management
802	Human Development and Family Well-Being
806	Youth Development

Outcome #10

1. Outcome Measures

Percentage increase in ability to manage personal and family finances

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	119

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahoma has some of the nation's highest populations of unbanked and underbanked households, families without savings accounts, and consumers with subprime credit. Forty-nine percent of Oklahoma households are considered "asset poor", having little or no financial cushion to subsist at the poverty level for three months in the event of unemployment or other emergency. The state ranks 42nd in unbanked households and 44th in consumers with subprime credit.

Nearly 17% of Oklahomans have an annual income below the federal poverty threshold. The state ranks 40th in average annual pay.

Nationally, Oklahoma ranks 48th in residents with low-wage jobs. Unemployed Oklahomans may have more than a bad economy working against them; irresponsible use of social media such as Facebook, YouTube, and Twitter can eliminate a job applicant from consideration for employment. A lack of business etiquette can cost not only job applicants but also employers, who can lose profits due to a decrease in business and eventual increase in employee turnover.

What has been done

In order to advance the socio-economic development of the state, and have an impact on issues that address financial management and planning skills, jobs and employment, and families, educational programs have been created and implemented to educate Oklahomans on how to attain a better quality of life.

Results

In 2014, 209 programs using various curricula were presented to 3,400 individuals across Oklahoma. Programs presented include:

Making Sense of Money Management classes are offered as an alternative to having bogus check charges filed in district court. Program evaluations show 77% plan to regularly track their income and spending, while 46% plan to have an emergency savings fund equal to at least three months' pay.

Money Habitudes cards are a fun, easy tool for participants to talk about money and understand their money personality type. Money Habitudes help individuals understand their money personality and spending habits. As a result, 79% plan to regularly track their income and spending, while 51% plan to have an emergency savings fund equal to at least three months' pay.

4. Associated Knowledge Areas

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

Outcome #11

1. Outcome Measures

Percentage increase in utilization by parents, volunteers, and primary caregivers of best practices that enhance the well-being and life skill development of children and youth

Not Reporting on this Outcome Measure

Outcome #12

1. Outcome Measures

Percentage increase in use of creativity and lifelong learning by youth and adults to become resilient in their personal and family life

Not Reporting on this Outcome Measure

Outcome #13

1. Outcome Measures

Percentage increase in life skills such as critical thinking, problem solving, nurturing relationships, social skills, responsible citizenship, self-discipline, stress management, and self-esteem

Not Reporting on this Outcome Measure

Outcome #14

1. Outcome Measures

Percentage increase in youth giving back to their community through entrepreneurial/service learning projects

Not Reporting on this Outcome Measure

Outcome #15

1. Outcome Measures

Percentage increase in partnership of agencies and organizations interested in reducing hunger

Not Reporting on this Outcome Measure

Outcome #16

1. Outcome Measures

Percentage increase in action to develop and sustain assets that support employment and economic opportunities

Not Reporting on this Outcome Measure

Outcome #17

1. Outcome Measures

Percentage increase in use of creativity and innovation to address social problems

Not Reporting on this Outcome Measure

Outcome #18

1. Outcome Measures

Community Nutrition Education Programs

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)

Oklahoma consistently ranks in the top ten states in the number of people who are hungry and more than 1 in 5 Oklahomans and 1 in 4 Oklahoma children struggle with hunger on a daily basis.

What has been done

Through the Community Nutrition Education Programs (CNEP), OCES has leveraged state monies to provide more than \$2.6 million (FFY14) in federal nutrition education program funds. This funding supports 74 jobs in 29 Oklahoma counties. CNEP is a voluntary program for adults participating in federal food assistance programs as well as impoverished youth in qualifying schools and communities. Program participants learn to feed their families in order to promote

good health and to plan and budget their food dollars so their family will not go hungry at the end of the month. CNEP also educates Oklahoma youth on healthy food choices, safe food practices and physical activity with the purpose of reducing obesity and the associated risk of related chronic diseases.

Results

In FY14, CNEP had a positive impact on the health and wellness of 3,054 low-income Oklahoma families. More than 94% of adult graduates demonstrate a positive change towards a healthy diet. In addition, 39% of graduates less often ran out of food by the end of the month and 41% report that their children ate breakfast more often. In addition, CNEP staff provided a total of 3,176 hours of nutrition information on healthy eating practices, food preparation and food safety to 16,841 qualifying Oklahoma youth during the 2014 fiscal year. And over 83% of the youth increased their knowledge or ability to choose healthy foods and 30% increased their frequency of fruit consumption.

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle
806	Youth Development

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities

Brief Explanation

Statewide issue team format has changed educator focus and reduced activity in some planned programs.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Issue team evaluation items for the above outcomes include:

91 adult respondents to hunger issue team evaluations reported the following planned behavior changes after participating in the program:

- 35% increase in those who plan to use money saving meal planning or food shopping practices
- 45% increase in those who plan to not run out of money for food
- 64% increase in those who plan to grow, produce, hunt or fish for some of their own food

119 child care directors/ teachers responding to hunger issue team evaluations, reported

the following planned behavior changes after participating in the program:

- 61% increase in those who plan to use money saving meal planning or food shopping practices
- 137% increase in those who plan to grow, produce, hunt or fish for some of their own food

127 adult respondents to finance issue team evaluations reported the following planned behavior changes after participating in the program:

- 119% increase in those to plan to regularly track income and spending
- 254% increase in those who plan to regularly make a written spending plan
- 71% decrease in those who do not plan on paying off their credit card balance each month
- 91% decrease in those who do not plan to take steps to prevent identity theft
- 91% decrease in those adults who do not plan to order a copy of their credit report on a regular basis

- 350% increase in those who plan to establish or update estate plans
- 123% increase in those who plan to regularly write down financial goals

59 youth respondents to finance issue team evaluations reported the following planned changes after participating in the program:

- 141% increase in caution in how money is spent
- 90% increase in knowing importance of putting money in the bank
- 59% increase in knowledge that the best time to start saving money is now
- 17% increase in those who would rather have \$15 a week from now than \$10 now

32 adult respondents to jobs and employment readiness issue team evaluations reported the following planned changes after participating in the program:

- 75% increase in confidence of ability to get a job
- 36% in confidence of ability to keep a job
- 77% increase in preparation to balance family and job needs during major life changes
- 120% increase in ability to positively respond to stress
- 53% increase in preparation to manage finances during major life changes
- 82% increase in competence of life skills

836 participants in the Co-Parenting for Resilience program completed program evaluations. Of this group, a subset of 120 participants completed follow-up interviews; when compared with their initial responses the following changes were reported:

- 28% increase in ability to control irritations in life
- 23% increase in feeling on top of things

Key Items of Evaluation

In 2014, Issue Team-specific Evaluation Questionnaires were collected after planned program curriculum delivery. These questions utilized a retrospective approach.

VI. National Outcomes and Indicators

1. NIFA Selected Outcomes and Indicators

Childhood Obesity (Outcome 1, Indicator 1.c)	
250	Number of children and youth who reported eating more of healthy foods.
Climate Change (Outcome 1, Indicator 4)	
5	Number of new crop varieties, animal breeds, and genotypes with climate adaptive traits.
Global Food Security and Hunger (Outcome 1, Indicator 4.a)	
25000	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)	
3	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.