

2015 Oklahoma State University and Langston University Combined Research and Extension Annual Report of Accomplishments and Results

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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. Langston University takes a similar approach to research and Extension, integrating these efforts into numerous planned programs responsive to the public needs and their mission. All 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 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 2015 are presented following.

Langston University's Research and Extension Programs work collaboratively to make a positive difference in the lives of stakeholders in Oklahoma, the nation and globally. The three major areas being reported on for 2015 are Goat Research/Extension; Aquaculture Research/Extension; 4-H and Youth Development and Family & Consumer Sciences.

Program areas included in this Executive Summary play vital roles in reaching and making a difference in the lives of youth, families, producers, consumers, communities, and citizens in the State of Oklahoma.

Executive Summary

1 Animal Enterprises

Oklahoma Quality Beef Network (OQBN) was developed to educate and capitalize on best management practices for producers across the state of Oklahoma. Cattle that are managed according to research based recommendations of OCES are verified and marketed at livestock markets across the state of Oklahoma. Final premiums have not been completely analyzed, but preliminary data shows \$11.18/100 lb increase in price over non-weaned cattle. The average price premium (on average for a 600 lb calf) is \$67.08/animal. The added weight gain over the 45 day preconditioning period on average is 90 lbs. That added gain cost producers \$10.80/calf with a value of gain at \$-0.12/lb for a gross increase in revenue of \$56.28/calf. The seasonal price increase was absent this fall that we traditionally see in the later part of the year. If the price of preconditioning is estimated at \$70.00/calf, a net loss to producers is \$13.72/calf. But in comparison to not participating in the Vac-45 program a non-weaned lost \$128.16/calf, **saving Oklahoma producers \$114.44/calf. With total enrollments of 8,891, OQBN contributed \$1,017,486 back to the Oklahoma Beef Industry.**

Frothy bloat of growing cattle grazing wheat pasture is a major herd health problem. While not a true bloat-preventive compound, monensin does decrease the incidence and severity of bloat of wheat pasture cattle. The challenge is getting an efficacious dosage of monensin into the cattle. OSU researchers conducted studies relative to delivery of an efficacious dosage of monensin to wheat pasture stocker cattle via a free-choice mineral (1620 grams monensin/ton). Consumption of the mineral mixture has averaged about 70 grams or 121 grams of monensin/steer/day. This program **increased daily gain of the cattle by about 0.45 lb, as compared with the negative control (wheat pasture and no**

supplement), and increased gross return per steer by \$35-\$55 depending on value of weight gain during the fall-winter wheat pasture grazing period. This supplementation program has huge potential to increase profitability of the approximately 5.5 million stocker cattle that are grown on wheat pasture in the southern Great Plains each year.

Beef and dairy cows must produce a calf every 12 months to be maximally profitable. **Fertility at insemination must be increased and interval from calving to ovulation must be reduced to enhance efficiency.** Molecular techniques have been utilized to determine factors (genes and proteins) that control growth and function of ovarian follicles. Discoveries have been used to develop management recommendations to increase reproductive efficiency. Cattle producers receive weekly updates on television (Cow Calf Corner) and on the web to enhance the use of current recommendations to increase profitability. Utilization of recommendations to increase reproductive efficiency of beef and dairy cows has increased pregnancy rates during the last 5 years. A 1% increase in US beef calf production has a value of more than \$200 million. A 30 day decrease in the number of days from calving to pregnancy in 10% of the US dairy cows has a value of more than \$100 million.

The 2015 OCES **Cow-calf Boot Camp** reaches **smaller and newer producers** with hands-on education. The of the 46 participants this was the first Extension program for 71%, 66% had 50 or fewer cows in their herd, and 63% manage fewer than 200 acres. When asked to rate the individual classes on a scale of 1 to 10, the average score was 9.1. Four of the classes received the highest average rating of 9.4: Cow BCS, Dentation, & Blood Samples; Forage Table Exercise; Pasture Tour; and Cattle Working. The overall value of this program is best determined by using the producer's own estimation of the average value (\$/head) gained from the workshop, the average number of cattle per participant and the total number of participants. By this estimation the **value of the OSU Cow/Calf Camp was \$137,691**. Pre-test and Post-test were summarized resulting in a 34% increase in knowledge as average percentage **correct went from 62.6% on the pretest to 83.9% on the post-test** and the minimum score went from 40% to 72%.

2 Crop Enterprises

Hessian fly has become a more prominent pest for Oklahoma's 5.6 million acres of winter wheat due to fly-susceptible varieties. Traditional "fly free" planting dates that were developed in the 1930's appears to be ineffective. Hessian fly monitoring from 2011-2013 demonstrated that Hessian 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 suggests that host plant resistance coupled with cultural controls should be the predominant method for Hessian fly management in Oklahoma. **Wheat breeders in Oklahoma have improved screening methods for Hessian fly resistance in variety development trials.** These methods will reduce the cost and time associated with breeding and thus releasing new varieties that are resistant to Hessian fly. 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, approximately 1.2 million acres in Oklahoma were planted to Hessian fly resistant wheat varieties. Producers who planted these varieties will recoup an estimated \$1.4 million in yield savings.**

Herbicide resistant weeds cost U.S. farmers \$2 billion annually and 60 million acres are infested. Oklahoma farmers sow 5.3 million acres of wheat annually, and grassy weeds, such as Italian ryegrass, significantly limit wheat grain yield and marketability. In 2014-15 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, marehail, 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.** It cost approximately \$20 per acre more to control ALS resistant Italian ryegrass as compared to non-resistant Italian ryegrass. Additionally, research has shown that Italian ryegrass reduces wheat yield by 12 bushels per acre. Thus, **managing to avoid resistance can potentially decrease input cost and also increase revenue.** Oklahoma has an

estimated 900,000 acres of wheat impacted by Italian ryegrass. **Modest progress in combatting herbicide-resistant Italian ryegrass could easily generate an additional \$20 million in Oklahoma farm revenue.**

Subsurface drip irrigation is expected to increase water use efficiency by 20-40%. However, subsurface drip irrigation adoption in the Oklahoma Panhandle has been limited, even though groundwater available for irrigation is declining. One reason for low adoption rates is the lack of locally generated data evaluating performance and economic return of these systems compared to traditional center pivot systems. **A comprehensive research and extension program centered on subsurface drip irrigation was initiated at the Oklahoma Panhandle Research and Extension Center in 2012 and continues today.** Work from this project has been presented at three field days and five grower meetings. Current activities include economic analysis comparing subsurface drip irrigation to center pivot irrigation. Unlike previous economic comparisons, this **analysis evaluates the net present value of production achieved in the future assuming an aquifer decline that is proportional to withdrawal.** The field days in particular, have been exceptionally valuable in providing proof of concept to Oklahoma Panhandle producers. Economic analysis determined that adopting subsurface drip irrigation on a typical 160 acre irrigated field would **double the lifespan of available water from 15 years to 30 years and generate an additional \$54,254 in farm income over that time** as compared to center pivot irrigation. This would **translate to a \$98 million dollar increase in farm income in the region** for that same time period.

Foliar disease can devastate wheat yield and grain quality, costing Oklahoma wheat farmers and the associated wheat milling and baking industries millions of dollars annually. The 2015 harvest was marked by a stripe rust epidemic that resulted in severe reduction of wheat yield and test weight which affected grain price and marketability. **Yield data from research trials showed that stripe rust and leaf rust reduced wheat grain yield by as much as 87% (68 bu/ac) and 32% (20 bu/ac),** respectively, in susceptible lines, and that timely application of a foliar fungicide prevented much of this yield loss. Producers were educated regarding fungicide timing and label restrictions regarding season-long application limits for foliar fungicides. As a result, **many wheat acres in Oklahoma were treated with a foliar fungicide.** Growers choosing not to apply a foliar fungicide to susceptible varieties were generally disappointed with variety performance. We worked with several of these producers during the summer of 2015 to identify wheat varieties that were resistant to foliar disease recommended shifting acres to varieties with genetic resistance.

3 Plant Biological Technologies

The nursery industry is the 5th largest agricultural industry in Oklahoma and is responsible for approximately \$400 million in annual sales. Canna lily is becoming one of the most popular landscape plants among nursery growers in Oklahoma, Arkansas, and Texas. Canna lily production is so lucrative that there are nurseries dedicated solely to canna lily production for national and international retailers. Within the last few years the **horticulture community worldwide has experienced an epidemic explosion of new diseases** in a multitude of their crops. Cannas have been no exception. **In the UK, Ian Cooke destroyed his National Collection because much of it was infected with a virus. In the USA, a virus (CaYMV) has swept rapidly through collections and nurseries across the country. The California Department of Agriculture has ordered the destruction of infected varieties to prevent further spread of the virus.** Until recently, science has been unable to reliably identify the cause of some of these diseases. **OSU researchers developed a multiplex RT-PCR test that detects three viruses infecting cannas and have implemented this test at a production nursery.** Overall, this research has two goals: 1) propagate virus free canna through tissue culture; 2) run diagnostics to identify and eliminate disease that are prevalent in canna fields in Oklahoma.

Both **bermudagrass and switchgrass** are widely grown and economically important for turf, forage, and/or bioenergy in Oklahoma and the southern United States. One major goal of the OSU programs is to breed cultivars improved in **resistance to major abiotic and biotic stresses.** In Oklahoma, drought stress occurs frequently due to high temperatures and very low precipitation in the summer. Development of new bermudagrass and switchgrass cultivars with improvement in resistance to one or more abiotic and biotic stresses will benefit farmers, growers, producers, and many consumers. The genetic improvement not only can protect functional traits related to practical performance (i.e., turf quality, biomass or forage

yield), but also reduces management inputs and decreases footprints of growing the grasses to the environment.

4 Commercial and Consumer Horticulture

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. 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 1,157 active Master Gardeners volunteered their time (82,520 hours), contributing over \$1,736,633 in service time donated.** In addition to the many hours donated, **approximately 1,640 pounds of produce was donated to local food pantries/kitchens, shelters,** and other organizations throughout Oklahoma by the Master Gardeners.

Grape Seed Value-Added Products from Oklahoma Winery Waste - Each year 250 to 300 tons of grape pomace must be disposed of each year by the Oklahoma winery industry. Disposal fees for this product are about \$40/ton - leaving a cost to the industry of \$10,000 to \$12,000 per year. Disposal costs are likely to double in the next 10 years. Winemakers are seeking ways to cut costs and improve profitability - use of the pomace by-product to produce new Oklahoma products could accomplish both eliminating disposal costs and providing an un-utilized income stream of the Oklahoma wine grape industry. OSU researchers have devised pomace handling technologies to separate seed from skins/pulp/stems, dry the seed, and process it into oil and grape seed flour. A system has been defined to process grape pomace into value added products of grape skins for cattle feed, grape seed oil for culinary uses and grape seed flour for baking and health foods/supplements. **Equipment costs** for a small scale processing system (designed to process 30 - 40 tons of pomace) were **about \$39,000. Income potential per ton of pomace ranged from \$1,000 to \$3000, with total income per year of \$30,000 to \$90,000, using a current un-utilized waste product.**

5 Ecosystems and Environmental Quality and Management including Weather and Climate

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, **2,774 people have completed the initial nine hours** of required training. **In 2015, 71 new producers completed the initial nine hours of training, and 426 completed an additional 2 hours of training.** New subject matter developed in 2015 included poultry mortality management, financial preparation for production down times, farm biosecurity for prevention of disease outbreaks, house management strategies to improve efficiency and reduce housing costs, litter application and research updates from fertility trials, new technologies for applicators and hands on demonstrations. Surveys have shown that **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.** OSU researchers provided information to plant breeders to better identify **plant traits that optimize mycorrhizal derived nutrient uptake and in doing so improve soil tilth, decrease fertilizer inputs, and increase soil C, all without a loss in production.** This allows us to inform resource managers of

ways to simultaneously maximize feedstock biomass production and soil quality, without additional resources.

Restoration of native mycorrhizal fungi is a fundamental consideration for successful establishment of native rangelands; when establishing restoration practices selection of native inoculum and local plants species is critical. Consequently, better management of mycorrhizal symbioses will improve our ability to generate highly productive ecosystems. OSU researchers are working with several Department of Defense resource managers to facilitate best management practices with restoration of native grasslands following removal of invasive grasses.

Weight and volume equations for loblolly pine in Oklahoma will help landowners and forestry organizations more **accurately assess the value of loblolly pine timber on their land.** Associated dry biomass equations can help more accurately assess carbon storage in Oklahoma forests, which is an important issue with regard to climate change. Prior to this OSU cooperative study with Rayonier Corporation, there had been no previous loblolly pine weight study in the state of Oklahoma, although loblolly pine is one of Oklahoma's most important timber producing species.

Ongoing work on growth modeling for **shortleaf pine forests** can be beneficial for those who manage these stands, including the USDA Forest Service, private nonindustrial landowners, and other landowners. Recently the 25-year remeasurement of a shortleaf pine growth study consisting of over 200 permanently established plots was initiated. These **data add to our knowledge of the long-term development of these stands.** Moreover, additional carbon sampling for soil and understory plants was added to the measurement protocol to help provide information concerning carbon stored in these forests.

Land management in the Southern Plains that includes energy development and loss of broad scale heterogeneity is largely incompatible with the needs of prairie grouse, specifically the **Lesser Prairie-Chicken in the mixed-grass and shortgrass prairie and Greater Prairie-Chicken in the tallgrass prairie.** This research has led directly to a change in rangeland management over 250,000 acres of the Flint Hills. Thus, approximately a **quarter of a million acres of former habitat has been restored for the benefit of Greater Prairie-Chicken and other tallgrass prairie species** in the Flint Hills.

In 2006, the U.S. **Environmental Protection Agency (EPA) lowered the limit on average PM_{2.5} emissions over a 24 hour period from 65 to 35 micrograms per cubic meter.** Some states have set the standard much lower. This comes from a growing concern that the smallest "dust" particles pose the biggest health threat because they are small enough to penetrate deeply into peoples' lungs. PM_{2.5} refers to particulate matter less than 2.5 microns in diameter--2.5 microns is about 1/30th of the thickness of a human hair. **OSU research has changed the permitting process for cotton gins in the state of Texas (roughly 35% of the active cotton gins in the U.S. are in Texas).** Approximately 89% of the cotton gin permits in the state of Texas use the new dataset. This research is now incorporated into the California Air Resources Board's Main Speciation Profiles document released in 2015 which directly impact the California cotton gins. This work will be used as the primary source for **the U.S. EPA's Compilation of Air Pollutant Emission Factors for stationary point and area sources (AP-42), Chapter 9.7 Cotton Ginning.** The work is being used in Australia and China in permitting and evaluating cotton gins. Fifteen **videos highlighting innovative manure handling and treatment technologies** were filmed, edited, and produced by the Oklahoma Cooperative Extension Service. Videos were uploaded onto the OSU Waste Management Channel on YouTube to maximize exposure of the technologies. In the six years since creation of the **YouTube channel, the videos have been downloaded more than 75,000 times** with a total viewing time of nearly 3,200 hours. Videos have been downloaded in all fifty states - plus Guam, Puerto Rico, the US Virgin Islands and American Samoa. In addition to the United States, the videos have been seen by viewers in 190 countries on all continents.

Roughly 40 % of houses in Oklahoma and many small businesses are not connected to a centralized sewer system. **Domestic wastewater is treated in these situations by Onsite Wastewater Treatment Systems (OWTS).** Every day, OWTS treat an estimated 215 million gallons of wastewater in Oklahoma. The environmental and possible water reuse impacts of OWTS wastewater in Oklahoma are tremendous. The Inaugural State-wide Onsite Wastewater Treatment Conferences was held in 2015. The conference was attended by **152 participants from all sectors of the OWTS industry.**

The Oklahoma Panhandle is major agricultural area for the production of wheat, grain sorghum, and barley

for the state. **Much of the crop production uses ground water irrigation from center pivot rigs pumping from the Ogallala aquifer.** The use of the Ogallala has far exceeded the aquifer's ability to naturally recharge for some time. As such, the water table levels have been dropping for the last 50-70 years. In some areas the water table has dropped over 150 feet. Well flow rates have also decreased. Pumping irrigation water is also a very expensive operation for Panhandle producers. The average cost per irrigation rig is approximately \$9,000 per year. Producers often own more than one irrigation rig as well. This project measures the energy efficiency of the plant (engine, motor) and the pump of the irrigation rig while a separate effort of the project measures the water application and distribution efficiency/effectiveness of the center pivot. **A Life Cycle Assessment (LCA) report is also done for each test site as well. This shows the relative environmental impacts due to wasted fuel (or electrical energy) due to inefficiencies.**

7 4-H Youth Development

The U.S. 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.)** Oklahoma 4-H Educators spent over 5,000 hours teaching, promoting and evaluating 4-H STEM projects. They held 157 demonstrations, 252 conferences, and almost 2,000 personal visits with 4-H volunteers, parents and youth. In addition to this they reported over 5,000 volunteer hours of working with youth STEM projects. Through their **STEM based educational programming they made over 30,500 contacts representing 75,000 contact hours teaching youth STEM concepts.** More than twenty-seven hundred (>2,700) youth participated in a 4-H Science event or activity. Four thousand five hundred and thirty (4,530) youth and volunteers participated in trainings related to science. This included **robotics, STEM Institute and GIS/GPS.**

8 Turfgrass Development and Management

Through the joint efforts of OSU selected licensing agents a total of 71 producers in the U.S. and one producer in Europe were producing one or more of the five OSU proprietary, **turf-type bermudagrasses with improved quality and cold-hardiness.** Growers of the products in the southern U.S. were able to sell to new target areas of installation in the northeastern U.S. where winter-kill had led to common bermudagrass stand loss. In addition, the newest OSU products **of Latitude 36 and Northbridge bermudagrass continued to slightly displace Tifway bermudagrass in several southern sportsfield venues.** Sod producers are able to make at least a **three to five cent per square foot profit on sale of improved/proprietary bermudagrasses over the variety-not-stated and public domain older varieties.** This allows some producers to escape the "commodity-like" market place of variety-not-stated common bermudagrass sod production. In 2014, OSU developed Latitude 36 bermudagrass was **installed on the infield of Kauffman Stadium, the field which hosted two of five games of the 2015 World Series for the champion Kansas City Royals.** High visibility installations of OSU turfgrass products helps to further promote these excellent new products, assisting with their adoption by the professional turfgrass industry.

9 Community Resource and Economic Development

The Western OK I-40 **Stronger Economies Together (SET)** team is comprised of 4 Oklahoma counties along the I-40 Corridor (Beckham, Custer, Washita, and Caddo) and has been in existence since 2012. The team completed their 9-module training and submitted their High-Quality Plan (HQP) for evaluation in late 2013. A revised version was accepted by the national program office in 2014, and continued work on the 5 regional goals led to national awards for both an outstanding HQP and for excellence in regional economic development work. Specific goals accomplished include: re-establishing the aerospace industry (the team developed a brochure and attended national UAV conferences); a "drying canola pilot project" for diversifying agriculture in the region that **demonstrated a \$72 / acre gain using peanut trailers to dry canola** that was harvested when it was still moist (translating to a potential \$3 million plus in additional income for the region); and attraction **of 2 daycare facilities and a commercial driver's license facility to the region** (associated with the goal of developing amenities that will support strong community lifestyles). In addition, a **grant to develop a wireless hotspot** lending program **at the Cordell library** was submitted in late 2015.

OSU Applications Engineers provide technical assistance that **helped Oklahoma manufacturers create or retain 250 jobs and increase sales over \$30.7 million in 2015**. 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 2015, the Applications Engineers client projects had the following impacts: **Sales increase \$30,797,500; Sales retained** that would have otherwise been lost **\$63,930,000; Cost savings \$6,029,789; Costs avoided \$5,575,084; 194 new jobs created** at \$75,511 per job for \$14,649,134; **56 jobs retained** at \$75,511 per job for \$4,228,616; Investment in new plant facilities and equipment in amount of \$11,787,215; for a **total impact of \$136,997,338**.

During 2015, the Oklahoma State University **e-commerce program** provided training to 115 small businesses on how to plan, effectively set up, and promote their websites. After the training, 91% of respondents planned on increasing their web efforts, and 92% indicated that they would be changing the way they marketed their website. Attendees used the workshops to set up their own websites (several good examples are: 1) The Country Framer, specializing in custom frames and hand-crafted art in Durant; 2) Lasley Family Farm, a peanut farm in Anadarko; and 3) several non-profits in Lawton that set up simple websites for their organizations. Other participants made successful changes to their own existing sites - for example, Wilkey Plumbing contacted us 2 months after our Durant workshop with news that the SEO techniques they incorporated into their **site increased their monthly website visits by 50%**. The Oklahoma Agritourism office took our SEO class as well and was pleasantly surprised by their increased reach with just a few minor keyword changes suggested during the workshop. 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 potentially increased the revenue of small businesses in Oklahoma by at minimum of \$3.4 million during 2015**.

10 Integrated Pest Management

In 2015, **sugarcane aphid** was found in 32 counties, infesting a minimum of 200,000 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 150,000-200,000 acres of grain sorghum in 2015. **Based on an extension demonstration coordinated by the IPM Crops Insect Pest Management Team, this Emergency registration saved Oklahoma sorghum growers ca. \$7.2-\$14.4 million in lost grain yield, depending on whether they sprayed once or twice for sugarcane aphid**.

Oklahoma ranchers and pasture managers can **achieve up to 95% control of musk thistle through an IPM program** that includes the use of biological control agents integrated with carefully timed mechanical and chemical controls. This program results in fewer herbicide applications to manage musk thistle. To date, this program collected and redistributed more than 944,000 musk thistle head weevils and 47,710 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 pounds per year**.

Oklahoma beef production represents 53% of the total cash receipts received by Oklahoma agricultural commodities. **Horn flies can impact daily weight gains, weaning weights and cause the animal to consume more forage without the gain advantage**. Two major beef sectors (stockers and cow/calf) rely on insecticides to control the horn fly. OSU's Animal Pest Management group within the IPM team conducted trainings and insecticide trials to determine which product effectiveness. These trainings and

demonstration trials show that **ear tags impregnated with insecticides are the most efficacious application method. Ear tags required fewer follow-up insecticide applications when compared to sprays and pour-on applications.** This results in lower labor costs due to reduced insecticide applications as well as improved environmental quality to pasture ecosystems. Additionally, **cattle tagged with insecticide impregnated ear tags gained 24.8 lbs. more** than those sprayed multiple times to reduce horn fly populations. If 20% of Oklahoma beef producers changed to this method of fly control, the Oklahoma beef market would realize \$35.16 million in additional income.

12 Farm and Agribusiness Systems Economics

Oklahoma Farm and Business Tax Institutes 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. Total 2015 attendance for the schools was **1,950 tax preparers**. 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. Participants filed more than 37,000 Federal farm tax returns and 255,000 Federal non-farm tax returns** as reported by the participants in the most recent program evaluations.

Beef production accounts for approximately one-third of Oklahoma's agricultural production. An interdisciplinary **Beef Cattle Manual** was updated in 2015. The manual now contains 45 chapters addressing various business, production, and natural resource topics. To become a Master Cattleman, a producer completes twenty eight hours of instruction from the Beef Cattle Manual and associated quizzes. Approximately 1,106 producers have enrolled in the **Master Cattleman program** since 2004 and 897 have completed the program, with 45 graduating in 2015. 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 11 years for a total impact of **\$3.1 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.

In 2015, **242 women** attended a **Statewide Conference for Women in Agriculture and Small Business** participating in 12-15 hours of education over the course of two days. 97% of participants from the statewide conference responded very positively to the information, education and/or workshops provided, citing the overall satisfaction of the conference as 'Good' or 'Excellent'. As a result of the programs, attendees said they would "be able to take a stronger role in their farm/ranch business" and will be able "to improve [their] operation". It was also noted that the programming will assist them in "starting and growing [their] business". On the program evaluation survey, participants were able to estimate the annual economic benefit to their operation from attending the two-day conference, with the **average benefit amount at \$1,450 per participant** and outlier amounts of \$30,000 and "immeasurable". The statewide conference has also encouraged the launch of several regional women in agriculture conference, around the state.

13 Integrated Bioenergy and Biobased Products Development

The societal interest in **production of biofuels** has increased due to the desire for less dependence on foreign oil, concerns over air pollution caused by the use of fossil fuels, and favorable government policies. Switchgrass, a plant native to Oklahoma, has been deemed one of the best options as a sustainable feedstock to support a biorefinery. The current breeding procedures to genetically enhance biomass yield of switchgrass are developed and deployed on the basis of the sexual behavior of preferred

outcrossing and conditional selfing in the species. Four inbred lines of northern lowland (NL) germplasm and four inbred lines of southern lowland (SL) germplasm were used in the production of experimental hybrids. The hybrid seeds were produced and used to establish a biomass yield trial. To identify genomic regions associated with reproductive development, two lowland populations, one consisting of 176 progenies from NL94 (♀) × SL93 (♂) and a first-generation self-fertilized population of 265 progenies from NL94, were field established in a randomized complete block design with three replications at two Oklahoma locations. **The establishment-year biomass yields of the best experimental hybrid cultivars were 20% more than that of the best commercial cultivars. Significant genetic variation for reproductive maturity was observed within the two populations.** Broad-sense heritabilities were 0.46 to 0.77 and 0.28 to 0.74 for the hybrid and selfed populations, respectively. The markers linked to the significant quantitative trait loci (QTL) could be used to accelerate the development of switchgrass germplasm with later flowering to increase biomass yield.

To **boost biomass productivity**, OSU research on leaf blade development underlies the **molecular mechanism that regulates biomass accumulation**. Leaves are the primary photosynthetic organs where solar energy and carbon dioxide are assimilated into chemical energy, which is the basis for the existence of all living systems and the core requirement for building plant biomass. The second aspect of our work involves **understanding the control of floral transition in sorghum and switchgrass**. Flowering time is critical to accumulation of biomass yield since delaying flowering time is associated with increased vegetative biomass yield in several studies. In fact, flowering time has been described as the major driver of biomass, accounting for 67% of the variation in biomass yield among switchgrass hybrids. OSU researchers have looked at the key regulators of flowering time in sorghum and switchgrass that are related to the universal florigen encoding gene FLOWERING LOCUS T (FT). Using **genetic transformation and biochemical techniques, we show that the sorghum FT genes mediate photoperiod response and flowering time while the switchgrass PvFT1 promotes extremely early flowering while plants are still in the tissue culture.**

MicroRNAs, a class of small non-coding RNAs are well known their gene regulatory roles by destroying or repressing translation of the mRNA targets. **Identification of conserved and novel miRNA families were performed following drought or heat stress and could be potential candidates for developing stress tolerance in bioenergy crop species. Twenty-nine conserved and 62 novel miRNA families were identified.** Notably, the abundances of several conserved and novel miRNAs were dramatically altered following drought or heat. Using at least one fold (log₂) change as cut off, we observed that 13 conserved miRNA families were differentially regulated by both stresses, and, five and four families were specifically regulated by drought and heat, respectively. Similarly, using a more stringent cut off of two fold (log₂) regulation, we found 5 and 16 novel miRNA families were upregulated but 6 and 7 families were downregulated under drought and heat, respectively. The stress-altered expression of a subset of miRNAs and their targets was confirmed using quantitative PCR. Overall, the switchgrass plants exposed to drought or heat revealed similarities as well as differences with respect to miRNA regulation, which could be important for enduring different stress conditions.

14 Childhood Obesity

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, dairy and whole grains consumption. In 2015, 95 programs were presented to 16,392 participants. Oklahoma youth attended programs through 30 different curricula. Oklahoma adults attended programs through 23 different curricula. Programs presented include: **OrganWise Guys** program focusing on Oklahoma youth in the areas of increasing servings of fruit and vegetables, skim milk, hand-washing before eating, and physical activity. **Growing Strong Bodies and Minds** aims to promote the development of healthful food preferences, physically active lifestyles and literacy skills in young children. The **Farm to You** 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. Three different surveys with a total of over 2,600 respondents showed: **200% increase in youth who plan to eat a serving of fruit 2 or more times each day; 135% increase in youth who plan to eat a serving of vegetables 3 or more times each day; 400% increase**

in youth who plan to eat a whole grain food 3 or more times each day; **90% decrease in youth who plan to eat snack foods (chips, cookies, candy, etc.) 1 or more times a day**; 26% increase in youth who plan to use safe food handling practices; 87% increase in adults who plan to eat a serving of vegetables 3 or more times each day; 56% increase in adults who plan to eat a whole grain food 3 or more times each day; 67% increase in adults who plan to eat or drink a serving of calcium-rich food 2 or 3 times each day; **76% decrease in adults who plan to by foods that are high in fat, sugar, or salt**; 40% decrease in adults who plan to eat snack foods (chips, cookies, candy, etc.) 1 or more times a day; and 77% increase in adults who plan to eat a serving of fruit 2 or more times each day.

15 Structure and Function of Macromolecules

Aedes aegypti is the mosquito that transmits Dengue, Zika and Chikungunya, among other viruses, representing a serious problem for public health worldwide. Traditionally, mosquito populations have been controlled by use of chemical insecticides to prevent mosquito-transmitted diseases. However, new mechanisms conferring insecticide resistance in mosquitoes threaten this approach. The lack of vaccines or drugs to prevent or cure mosquito-transmitted diseases underscores the need to develop alternative strategies to control mosquito population. OSU researchers are studying the mechanisms of storage and mobilization of fat stores in the vector mosquito, *Aedes aegypti*. **Knowledge of lipid metabolism in the *Aedes aegypti* vector mosquito can be applied to improve our understanding of several aspects of mosquito physiology, such as the regulation of oogenesis, mosquito fitness and survival.** These are relevant to aspects for the development of innovative strategies to control vector mosquito population. State of the art equipment is required to enhance the research **capabilities relating to protein structure/ function/ interactions, and to researchers abilities to carry out cutting edge research.** Such research will contribute to filling 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, and the productivity of agriculture state wide. OSU researchers raised funds for the purchase of a **state-of-the-art Thermo-Fisher Fusion Thribid Fusion LC-MS/MS electrospray mass spectrometer.** This will enable research scientists in the Division of Agriculture and other OSU colleges to analyze the most challenging low-abundance, high-complexity samples to identify more compounds faster, quantify more accurately and elucidate structures more thoroughly. This will allow researchers to carry out cutting edge experiments that will lead to discoveries that can be exploited for the improvement of plant and animal health, and agricultural production.

18 Food Safety - Hunger, Health, Safety

Safety issues related to homes and food handling are important to Oklahoma and the U.S. Total annual health-related costs of food borne illness in the United States, including medical expenses, lost productivity, and even death, totals \$15.6 billion. In 2015, **1,150 youth and adults participated in educational programs on safe food handling, home hazards and safety,** and low-impact exercise to improve balance and mobility. Surveys of participants showed - **54% increase in those planning to use safe food handling practices**; 6% increase in those planning to use safe food storage practices; 44% increase in those who plan to use safe food preservation practices; **69% increase in those who plan to manage safety hazards in or near their home**; **83% increase in those who plan to conduct a basic safety audit**; 50% increase in those who are confident in their ability to maintain or improve their balance and strength; 137% increase in those who know where to find appropriate assistive technology for their needs.

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 FY15, CNEP had a positive impact on the health and wellness of over **3,000 low-income Oklahoma families.** More than **94% of adult graduates demonstrate a positive change towards a healthy diet.** In addition, **41% of graduates less often ran out of food by the end of the month and 57% report an increase in their intake of fruit.** In addition, 59% of participants indicated

one or more positive changes in food safety practices. Nutrition education programs provided in-school reached 22,050 children and youth. And over **78% of the youth increased their knowledge or ability to choose healthy foods and 28% increased their frequency of fruit consumption.**

19 Global Food Security and Hunger - Families and Youth

Food security and hunger programs for families reaches a broad audience. Food insecurity is significant in Oklahoma with 62% percent of Oklahoma public school students are enrolled in the national free or reduced-price school lunch, 50% of all infants born in Oklahoma are enrolled in WIC, and 25% of Oklahomans currently receive Supplemental Nutrition Assistance Program (SNAP). The Regional Food Bank in Oklahoma provides 57.2 million meals a year, while the Community Food Bank of Eastern Oklahoma provides 17.9 million meals a year. Food insecurity is often related to family income and financial management. Nearly 16% of Oklahomans have an annual income below the federal poverty threshold and 12.9% of Oklahoma households live in extreme asset poverty. The state ranks 38th in average annual pay. Oklahoma ranks 38th in residents with low-wage jobs (30% of Oklahoma jobs).

Oklahoma Extension Service reached over 2,200 Oklahomans with educational programs relating to money management and reducing hunger. The following planned behavior changes were reported from these efforts. **106% increase in those who plan to use money saving meal planning or food shopping practices;** 89% increase in those who plan to grow, produce, hunt or fish for some of their own food; **102% increase in those to plan to regularly track income and spending;** **118% increase in those who plan to regularly make a written spending plan;** increase in confidence of ability to get a job; **67% in confidence of ability to keep a job;** 100% increase in preparation to balance family and job needs during major life changes; 50% increase in ability to positively respond to stress; 80% increase in preparation to manage finances during major life changes.

20, 29, 30, 31, 32, 34, 35 Goat Production Related Planned Programs

Goat Research at Langston University is conducted through the **E kika de la Garza `American Institute for Goat Research**. The scope of the small ruminant research being performed includes Angora, meat and dairy goats. Nutrition studies are primarily oriented toward determining the nutrient requirements of goats with special emphasis on the high-producing dairy goat. Research is being conducted with goat milk and the development of value-added products from milk. During 2015, research and extension personnel worked collaboratively to put on goat artificial insemination clinics. These clinics allow goat producers to use superior animals to improve the genetic composition of their goat breeding stocks. In 2015, two artificial insemination workshops were conducted. The workshops had 17 participants. In order to provide effective training, workshops are limited to a manageable number. Other goat research and extension efforts included enhanced dairy herd improvement, internal parasite control for small ruminants, web-based training and international collaborations. Records indicate that **over 2,500 goat producers have enrolled in the web- based online certification program and 343 goat producers have been certified via the site.** Research findings from the institute are incorporated into fact sheets which are distributed by our Extension Program. Data are often summarized in articles in the quarterly newsletter. In addition, **research results are published in** appropriate journals for goat research, including **The Journal of Animal Sciences, Small Ruminant Research, Journal of Dairy Science, Canadian Journal of Animal Science, Sheep and Goat Research Journal and Animal Feed Sciences and Technology.**

26, 27, 28, 33 Aquaculture Related Planned Programs

Aquaculture Research and Extension Programs provide technology needed by Oklahoma Aquaculturists, pond owners and others. Materials provided by these programs assist producers and enthusiasts in properly managing fish farms and ponds in a profitable and ecologically sustainable manner. Research is being conducted with **alternative aquaculture species to test the profitability of additional fish species** for Oklahoma producers. During 2015, research and extension personnel had face- to-face contact with fish producers during workshops, site visits, meetings, and at the University's Annual Aquaculture Field Day. Information was shared from our studies which show bigmouth buffalo as a potential alternative fish species for Oklahoma producers. Information from the **Aquaculture Water Gardens Program** was available for stakeholders interested in **developing and or managing ornamental ponds.** Information was presented at the annual meeting of the Kansas Aquaculture Association, the Langston University Aquaculture Field Day, and during group sessions. A book on

ornamental ponds drafted in 2008 was used to provide best management practices to assist stakeholders in the construction and maintenance of ornamental ponds. Research and extension work from the Aquaponics Project provided **information to fish producers to help them reduce the off-flavors in their catfish by controlling phytoplankton levels in their ponds.**

21, 22, 23, 24 4-H Youth Development and Family Consumer Sciences Planned Programs 4-H and Youth Development and Family & Consumer Sciences provide needed programs to youth and families in Oklahoma. Langston University's Cooperative Extension Program views the youth population of Oklahoma as one of the state's most important resources. A learning-by-doing approach is used to enable youth to develop the knowledge, attitudes, and skills they need to become competent, caring, and contributing citizens of our society. Today's young people are living in an exciting time; with an increasingly diverse society, new technologies, and expanding opportunities. Two challenges facing many of our youth are deficiencies in reading and deficiencies in mathematics. Helping youth develop and maintain high skill levels in these areas is being addressed by the Youth Development Unit at Langston University. The **Extended Education Program** includes a youth summer program offered to students in Pre-kindergarten through Fifth Grade (ages 5-11). In 2015, **sixty-nine youth participated in the program. After six weeks of training 100% demonstrated an improvement in reading comprehension and 100% showed improvement in understanding mathematical concepts and operations.** This summer program helps youth maintain math and reading skills over the summer months and positions them to achieve well when school starts in the fall. During 2015, the **Science, Engineering and Technology (SET) Program was used to supplement our Extended Education and Food and Nutrition Programs. SET activities reached over 300 youth and enhanced their knowledge of the agricultural, biological and related sciences.**

Total Actual Amount of professional FTEs/SYs for this State

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	240.0	20.0	83.0	25.0
Actual	251.5	21.0	81.5	22.0

II. Merit Review Process

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

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

2. Brief Explanation

The merit review process for Langston research programs included individuals from within the University, external reviewers, advisory groups and USDA/NIFA personnel. The merit review from extension programs included individuals from within the University, advisory groups and staff members.

Previous merit reviews conducted by the Advisory Council for Langston University goat programs provided input on ways to improve these programs. These suggestions included design more programs aimed at better internal parasite control, modification of cattle barb wire fencing with electric fencing for goats and invest in developing more studies on alternative dewormers. These merit review points were incorporated into our programs.

Previous merit reviews for Langston University aquaculture programs were conducted by an advisory group. Suggestions for improving the programs included engaging the Oklahoma Department of Wildlife Conservation regarding the sale of triploid grass carp; address angler organizations regarding the possibilities of transferring aquatic nuisance species; and suggestions on modifying project proposals and fact sheets. These merit review points were incorporated into programs.

The merit review of Langston University 4-H, Youth Development and Family & Consumer Sciences was conducted by an advisory group consisting of 4-H volunteer leaders, parents and concerned community members. Suggestions for improving our programs included tailoring 4-H activities for the needs of members based upon their financial resources and geographical location; suggestions on ways to improve the mathematics and reading curriculum of our extended education program; and suggested action plans to enhance our programs. These merit review points were incorporated into our programs during 2015.

All Oklahoma Experiment Station projects, whether supported by Hatch or McIntire-Stennis funds, are peer reviewed prior to submission. It should be noted that stakeholder input into the planning process, position priorities, and research areas to be pursued by the scientists could be considered as the initial step in the review process. This valuable input helps in the merit and relevancy of our projects; it is a continual practice during the decision process to fill new positions, and direct research efforts and approaches to high priority needs.

Each department in OAES is required to have three reviews for a project (selected by the appropriate Department Head), with one of those reviews being external to the department. In those cases, this will be from another department in the Division, from another College at OSU, or another state with expertise in the area. These reviews are approved at both the departmental and OAES Directorate levels before submission to NIFA. The principal investigator is required to respond to the comments provided by the reviewers before final approval is granted. Most departments utilize the attached checklist.

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/or state program leader. 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 groups
- Survey specifically with non-traditional individuals
- Survey of selected individuals from the general public
- Other (Professional Journals and meetings)

Brief explanation.

A broad array of actions was used to encourage stakeholder input for Oklahoma State University research and Extension programs. 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. OAES and OCES have been in discussions with the new Director of the OSU Center for Sovereign Nations in order to see how we can better serve Native Americans in Oklahoma. 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 2015, the Vice President for Agriculture and Natural Resources at OSU began the planning process to identify future priorities for the Division. A multi-round, consensus seeking approach, commonly known as the Delphi method, will be employed to gather input from stakeholders. The process collects data utilizing a series of questionnaires administered to a panel of experts. For the purposes of this study, the panel will be identified by DASNR administrators with a goal to include persons representing the diversity of the Division and its clientele.

For Langston University, Stakeholders were contacted directly and/or through print, radio, television or the web media; and invited to participate in meetings, workshops, demonstrations and field days. Meetings were arranged to fit the stakeholder's schedule. Stakeholders were openly encouraged to share their input and appreciation was expressed for their comments.

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)

Brief explanation.

Dialogue with individual stakeholders led to the identification of additional stakeholders for Langston University research and Extension programs. Stakeholders were also identified at field days, meetings, workshops, farm visits and through e-mail correspondence. When people contacted us to request information on published materials, they were identified as stakeholders and placed on our contact lists. New stakeholders were identified via these methods in 2015.

Every Oklahoma Cooperative Extension (OCES) County 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, and individuals each year. See section 2(b) of this state report to get a partial list of groups providing input.

During 2015, 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. Training; 4. Development of written materials; 5. Intercultural Exchange program. Five trainings were conducted to help OCES personnel improve intercultural competencies. The two new fact sheets "Learning about My Culture" and "Values, Stereotypes, Prejudice, and Discrimination" were distributed to educators and extension audiences and "Intercultural Competence online training for Extension Educators" continued to be used. An 11-day intercultural trip to Mexico for a group of educators and specialists was planned and completed December 2015.

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 ((Telephone surveys of stakeholders), peer reviews, grant proposal reviews)

Brief explanation.

Questions/evaluations completed by Langston University Research and Extension (LU) stakeholders during field days, workshops and other sessions are very important. Stakeholders take advantage of the opportunities to help us tailor LU programs and activities to fit their needs. We know that when it comes to research, extension and education, there is no such thing as "one size fits all." Surveys are completed on-line and/or via mail. Again, they serve as another vital link between us and the needs of our stakeholders. Person-to-person contact works well for stakeholders.

Some stakeholders are on the other side of the digital divide or simply will not respond to electronic or paper questionnaires or surveys. Therefore, person-to-person contact works well for those stakeholders.

Following are some examples of stakeholder groups providing input to Oklahoma State research and Extension programs (OAES, OCES) - 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 (two times per year)
- Great Plains Canola Association
- 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
- 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 Action Plans
- To Set Priorities
- Other (in Team planning and budget requests)

Brief explanation.

For Oklahoma State University, 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: Food Safety, poultry production and waste management, animal nutrition, climatic impacts on cropping systems, and oilseeds and cropping systems to strengthen identified high priority program areas. Langston University takes input received from our stakeholders very seriously. In the same way that a doctor asks the patient where he/she hurts, we want to know that we are poking and concentrating on the right areas. Stakeholder input has directed our efforts to such areas as anthelmintic research; modification of barbed wire with electric fencing for goat production; development of curriculum that's more user friendly; curriculum developed to address specific needs of children in nutrition, mathematics and reading; and deciding when to have certain field days and other events to accommodate our stakeholders' schedules.

Brief Explanation of what you learned from your Stakeholders

While mid to late 2015 brought much needed rains, they were too late to help the wheat crop. Downward trend in commodity prices continues to be a concern. Other areas of concern expressed by Oklahoma State University Extension and research PAC attendees included:
the state economy and economic development
Forage production and management
Herd health issues
Cattle nutrition

Veterinary feed directive
Wheat variety selection and marketing
Pest and weed management in crops
Herbicide resistance and drift and invasive species
Nitrogen management
Local food production
Health issues
Managing personal finances
Farm bill and government programs
Risk management and crop insurance
Local leadership development
Mental health and chronic illness
Water use and water conservation
Employment and job creation and skills
Youth alcoholism and teen pregnancy
Youth leadership development
Youth health and safety
Alternative crops
No-till cropping systems
Improved parenting
Science projects for youth
Cattle management
Gardening and consumer Horticulture
Use of cover crops and crop rotations
Tax laws
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.

Langston University learned about some of the needs of our stakeholders.

Examples

- (i) Youth participating in the extended program need ways to maintain and/or strengthen their mathematics and reading skills over the summer months.
- (ii) Fish producers need to diversify their production systems to increase their profits and control phytoplankton.
- (iii) Clientele need to enhance their knowledge and skills in purchasing healthy foods and preparing healthy meals.
- (iv) Meat goat producers need accurate performance measurements to project the productivity of their meat goat bucks.
- (v) There is a need for a dependable (non-chemical) method for internal parasite control in goats.
- (vi) Goat milk producers need to learn value-added techniques to help increase their profits.

We learned about some of the challenges faced by our stakeholders.

Examples

- (i) Internal parasite problems in goats
- (ii) Off-flavor taste of catfish from phytoplankton build-up in ponds
- (iii) Poor diets contributing to health problems
- (iv) Youth digressing over the summer months and losing skills learned during the previous school year in mathematics and reading

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
5784159	2040087	4104300	2402317

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	1508808	240993	3299346	95005
Actual Matching	1508808	289960	3299346	158160
Actual All Other	34734146	1169610	20071955	959773
Total Actual Expended	37751762	1700563	26670647	1212938

3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous				
Carryover	1508808	1480813	0	1598089

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
20	Enhanced Goat Production in the South - Central United States (Langston University)
21	4-H Clubs (Langston University)
22	Extended Education (Langston University)
23	Family and Consumer Sciences (Langston University)
24	Food and Nutrition (Langston University)
25	Biotechnology (Langston University)
26	Water Gardens (Aquaculture) (Langston University)
27	Alternative Species (Aquaculture) (Langston University)

28	Fishery Management (Aquaculture) (Langston University)
29	Sustainable Internal Parasite Control for Small Ruminants (Langston University)
30	Goat Internet Website (Langston University)
31	Development of New Dairy Goat Products (Langston University)
32	Demonstration Clinic: Artificial Insemination for Goats (Langston University)
33	Fish Marketing (Aquaculture) (Langston University)
34	Meat Buck Performance Test (Langston University)
35	Goat Dairy Herd Improvement (DHI) Laboratory (Langston University)

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	9%	0%	15%	0%
302	Nutrient Utilization in Animals	12%	0%	20%	0%
303	Genetic Improvement of Animals	9%	0%	10%	0%
304	Animal Genome	0%	0%	10%	0%
305	Animal Physiological Processes	7%	0%	10%	0%
306	Environmental Stress in Animals	10%	0%	10%	0%
307	Animal Management Systems	20%	0%	10%	0%
308	Improved Animal Products (Before Harvest)	11%	0%	5%	0%
311	Animal Diseases	12%	0%	5%	0%
315	Animal Welfare/Well-Being and Protection	10%	0%	5%	0%
	Total	100%	0%	100%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	20.0	0.0	15.0	0.0
Actual Paid	25.0	0.0	12.2	0.0
Actual Volunteer	1.6	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
140000	0	514959	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
140000	0	514959	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
3520000	0	3132812	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.

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	99201	1830000	3000	450000

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

Patent Applications Submitted

Year: 2015
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	7	37	44

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
2015	898

Output #2

Output Measure

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

Year	Actual
2015	726

Output #3

Output Measure

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

Year	Actual
2015	9

Output #4

Output Measure

- Number of web sites maintained

Year	Actual
2015	4

Output #5

Output Measure

- Number of decision making tools developed

Year	Actual
2015	3

Output #6

Output Measure

- Number of peer reviewed manuscripts published

Year	Actual
2015	37

Output #7

Output Measure

- Number of beef and pork quality assurance program participants

Year	Actual
2015	166

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 of growing cattle grazing wheat pasture
7	Increasing reproductive efficiency of cattle
8	Dietary manipulation effects on nutrient excretion and gaseous emission.
9	Analyzing microbial fluctuations as beef cattle adapt to a high-concentrated diet and as they succumb to acidosis.
10	Improved Food Safety in Meats

Outcome #1

1. Outcome Measures

Number of cattle enrolled in value enhancement programs

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	8891

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahoma Quality Beef Network (OQBN) represents a unique opportunity where members of the allied beef industry can work together to improve the quality of cattle to enhance value, profitability, health and well-being in all segments of Oklahoma's beef industry.

What has been done

OQBN was developed to educate and capitalize on best management practices for producers across the state of Oklahoma. Cattle that are managed according to research based recommendations of OCES are verified and marketed at livestock markets across the state of Oklahoma.

OQBN held 7 sales for verified cattle in Oklahoma throughout 2015, which proved to be a difficult fall for cattle producers. 8,891 calves were enrolled representing 160 producers which is an increase of 27% in total cattle enrolled from 2014 and an increase of 34% of producers. Producers involved participated in a VAC-45 program which documents calves that are vaccinated according to program guidelines, weaned a minimum of 45 days and verified through an independent 3rd party, allowing for healthier, better performing cattle increasing profitability and animal welfare for all segment of the beef industry.

Results

Final premiums have not been completely analyzed, but preliminary data shows \$11.18/100 lb increase in price over non-weaned cattle. The average price premium (on average for a 600 lb calf) is \$67.08/animal. The added weight gain over the 45 day preconditioning period on average is 90 lbs. That added gain cost producers \$10.80/calf with a value of gain at \$-0.12/lb for a gross increase in revenue of \$56.28/calf. The seasonal price increase was absent this fall that we traditionally see in the later part of the year. If the price of preconditioning is estimated at \$70.00/calf, a net loss to producers is \$13.72/calf. But in comparison to not participating in the

program a non-weaned lost \$128.16/calf, saving Oklahoma producers \$114.44/calf. With total enrollments of 8,891, OQBN contributed \$1,017,486 back to the Oklahoma Beef Industry.

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
2015	166

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

OQBN was developed to educate and capitalize on best management practices for producers across the state of Oklahoma. Cattle that are managed according to research based

recommendations are verified and marketed at livestock markets across the state of Oklahoma. In addition, in 2015 two training sessions were conducted to increase awareness of issues related to potential microbial pathogens found in cattle that are potentially transmitted to humans. These workshops primarily targeted individuals involved in managing agritourism activities.

Results

In 2015, 166 Oklahoma beef producers enrolled 8,891 calves in the OQBN program, a 34% increase in enrollment over 2014. In addition, 29 individuals received certificate training in identifying risk and management opportunities related to livestock microbial pathogens.

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
2015	278

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

Educational programs focusing on best on-farm management practices for calves that reduce incidences of bovine respiratory disease through reduction of stress, reduced pathogen exposure, quality nutrition, and appropriate vaccination. In addition, we have evaluated the effects of dietary copper (Cu), manganese (Mn), and zinc (Zn) supplementation on serum antibody titers and multiple immune response variables of calves following a bovine viral diarrhea virus (BVDV) and Mannheimia haemolytica (MH) immune challenge. Steers from a single ranch were processed, weaned, and randomly pairwise assigned to either mineral supplemented (MIN) or control (CON) experimental treatments. After 46 days on the experimental treatments, all calves were naturally exposed to a heifer persistently infected (PI) with BVDV type 1b for 4 days and then subsequently intratracheally challenged with MH.

Results

Supplementation of Cu, Mn, and Zn has the potential to impact serum antibody titers and multiple immune response variables in calves challenged with BVDV and MH. These results serve as evidence of an important role for trace minerals, especially Cu, in the normal immune function of calves. If the trace mineral status of calves is known prior to arrival at a feedlot or backgrounding facility, targeted trace mineral supplementation programs can be developed to improve the immune response of calves during a BRD challenge. 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
2015	280

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 ecosystem services to landowners and society. In a real way, grazing management affects all citizens of Oklahoma. Challenges such as climate variability and input price volatility increase the importance of good grazing management to improve long-term sustainability of Oklahoma grasslands and ranch families.

What has been done

Two in-service trainings were held for OCES county educators that focused on grazing and range management. Approximately 60 educators participated. A section on grazing management was conducted during the Winter Crop School hosted by OCES in Stillwater. Approximately 80 ranchers and crop consultants attended. A presentation on incorporating intensive cow management strategies to improve rangeland sustainability was given to a national audience at the McDonald Eng Foundation Symposium hosted by OSU in Oklahoma City. Approximately 200 ranchers from at least 20 states attended.

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
2015	165

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

While the world's population is expected to dramatically increase over the next four decades, the demand/need for animal protein will also dramatically increase. However, availability of grazing land will continue to decline. As a result of these factors, the cost of grazing land (both land ownership and rental rates) continues to escalate. Therefore, development of management systems to enhance animal protein production with less land area is critical to meeting future food security needs. Additionally, changing environmental conditions have the potential to impact cattle management and nutrition related to climate change.

What has been done

Research projects and extension educational programs have been developed to address this critical issue from a beef production perspective. A multiple-year beef production systems project is underway evaluating the incorporation of cropland to provide winter supplement in the form of high quality forage and summer grazing a cover crop on the same cropland. The primary forage base is native rangeland in both the traditional and the intensified system. Research and educational programs are underway to explore the opportunity to use excess feed yard capacity and inexpensive concentrate feed resources to expand/intensify cow/calf production in the region. A national conference was held to explore these possibilities and provide research program updates from 3 academic institutions working in this area. Research has been initiated to monitor long term core body temperatures of grazing and feedlot cattle. This data is being used to identify conditions that result in both critical heat and cold stress of cattle.

Results

After two years of research, results indicate that land area required can be reduced by about 35% to produce the same amount (or slightly more) weaned calf weight. In the semi-confinement work, preliminary results suggest that feed energy required to maintain beef cows is reduced by about

18% when compared to animals consuming free-choice forage diets. Approximately 165 producers and industry professionals from across the U.S. attended the national educational program.

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 of growing cattle grazing wheat pasture

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	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. Approximately 5.5 million stocker cattle that are grown on wheat pasture in the southern Great Plains each year. While not a true bloat-preventive compound, monensin does decrease the incidence and severity of bloat of wheat pasture cattle. The challenge is getting an efficacious dosage of monensin into the cattle.

What has been done

We have conducted studies relative to delivery of an efficacious dosage of monensin to wheat pasture stocker cattle via a free-choice mineral (1620 grams monensin/ton). Consumption of the mineral mixture has averaged about 70 grams or 121 grams of monensin/steer/day.

Results

This program increased daily gain of the cattle by about 0.45 lb, as compared with the negative control (wheat pasture and no supplement), and increased gross return per steer by \$35-\$55 depending on value of weight gain during the fall-winter wheat pasture grazing period. This supplementation program has huge potential to increase profitability of the approximately 5.5 million stocker cattle that are grown on wheat pasture in the southern Great Plains each year.

4. Associated Knowledge Areas

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

Outcome #7

1. Outcome Measures

Increasing reproductive efficiency of cattle

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Beef and dairy cows must produce a calf every 12 months to be maximally profitable. Producers must utilize available information to initiate reproductive function at puberty and after parturition. Biological mechanisms that control estrus and ovulation must be elucidated to facilitate development of management and techniques to enhance pregnancy rates. Fertility at insemination must be increased and interval from calving to ovulation must be reduced to enhance efficiency.

What has been done

The effects of nutrition on ovarian function and prenatal development have been determined. Molecular techniques have been utilized to determine factors (genes and proteins) that control growth and function of ovarian follicles. Discoveries have been used to develop management recommendations to increase reproductive efficiency. Cattle producers receive weekly updates on television (Cow Calf Corner) and on the web to enhance the use of current recommendations to increase profitability.

Results

Utilization of recommendations to increase reproductive efficiency of beef and dairy cows has increased pregnancy rates during the last 5 years. A 1% increase in US beef calf production has a value of more than \$200 million. A 30 day decrease in the number of days from calving to pregnancy in 10% of the US dairy cows has a value of more than \$100 million. These increases will make high quality animal protein available to more individuals and improve human health. Improved production efficiency will reduce resources needed to produce food, increase profitability for cattlemen, and enhance sustainability of the environment.

4. Associated Knowledge Areas

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

Outcome #8

1. Outcome Measures

Dietary manipulation effects on nutrient excretion and gaseous emission.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Nutrient excretion and gaseous emissions from livestock facilities are potential environmental threats that have received much media attention in recent years. For non-ruminants (swine and poultry), the issue is much more problematic due to the consolidation of these industries into smaller geographic areas. The nutrients of greatest concern are nitrogen and phosphorus. Nitrogen is a problem because it can leach to groundwater increasing nitrate levels which have severe human health consequences. Nitrogen is also implicated in air pollution due to a direct association with ammonia emission. Phosphorus, on the other hand, can affect surface water leading to eutrophication of lakes, ponds, and streams. These issues are hotly contested in the scientific community, media, and state legislatures today.

What has been done

The diet of an animal can be considered the first line of defense against excess nutrient excretion. Studies to date have examined the effects of the type of diet fed to swine on the quantity of nutrients excreted and gaseous emissions. Changes in dietary protein source, phosphorus source, enzyme additions, and growth- promoters have been evaluated for their potential to reduce the environmental footprint of swine facilities.

Results

Results, to date, suggest dietary manipulation can have profound effects on nutrient excretion and gaseous emissions from swine facilities. These reductions in nutrient excretion from diet manipulation alone combined with treatment of the waste and exhaust air stream have the potential to markedly reduce the potential environmental impact of swine facilities.

4. Associated Knowledge Areas

KA Code	Knowledge Area
302	Nutrient Utilization in Animals
305	Animal Physiological Processes

Outcome #9

1. Outcome Measures

Analyzing microbial fluctuations as beef cattle adapt to a high-concentrated diet and as they succumb to acidosis.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Microbes that reside within the gastrointestinal and reproductive tracts of animals play an integral role in health and well-being of animals. The organisms make nutrients that are generally not available to the animal become available and they help maintain reproductive tract health in other farm animals. However domestic animal-derived microbes have long being blames for increase in antibiotic resistance in natural environments as well. We have been interested in understanding the role these organisms play in health and disease status in animals and how they fluctuate in response to various environment and management stimuli.

What has been done

OSU researchers have analyzed microbial fluctuations as beef cattle adapts to a high-concentrated diet and as they succumb to acidosis. We have also analyzed the diversity and abundance of the fungal and viral biomes of cattle as well. We are analyzing the bacterial, fungal and viral biomes of fertile and infertile mares to understand the role the uterine microbiome plays in equine fertility. Finally we are analyzing soils that were treated with cattle and swine manure for an elongated period of time to ascertain the role animal intestinal microbiota play on increasing and maintaining antibiotic resistance in agricultural land.

Results

The information generated in these studies will increase our understanding of the role microbiome plays in health and well-being of farm animals. We will have a better understanding of the role animal agriculture plays in increase of antibiotic resistance. In addition, we will have the information necessary to manipulate the microbiome for the benefit of the producer and to minimize deleterious effect to the environment. Knowledge gained in these studies would enable us to manipulate the resident microflora of domestic animals for better production efficiency, better health and better environmental stewardship.

4. Associated Knowledge Areas

KA Code	Knowledge Area
302	Nutrient Utilization in Animals
305	Animal Physiological Processes

Outcome #10

1. Outcome Measures

Improved Food Safety in Meats

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	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.

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.

?Trained 7 undergraduate students, 8 master?s students, and 2 PhD students in fundamental and applied areas in Food Microbiology.

4. Associated Knowledge Areas

KA Code	Knowledge Area
302	Nutrient Utilization in Animals
305	Animal Physiological Processes

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

Eastern Oklahoma Beef Cattle Summit evaluations (62 respondents) indicated:: participants expected that the knowledge gained applied to their cattle herds would most typically be worth between \$6 to \$15 per head. With over 9,500 head represented by the respondents this would put a value on the conference of between \$57,000 and \$142,000.

All the participants felt they gained significant knowledge in Creep Grazing, 300 Day Grazing, Market Outlook, Cattle handling, sprayer calibration, and animal nutrition. And over 60% of the respondents felt they gained a great deal of knowledge.

Evaluation data below - table did not transfer well.

6th Annual Eastern Oklahoma Beef Cattle Summit Evaluation

April 10, 2015, McAlester, OK 62 Evaluations

Please answer the question below as honestly as possible. We will use these evaluations to help improve future summits.

1. Is this your first Eastern Oklahoma Beef Cattle Summit that you have attended? YES 30 NO - 28
No Answer 4

2. Please indicate the knowledge learned from the sessions you attended. Score each presentation from 1 to 10 with 1 being no knowledge gained, 5 being average knowledge gained and 10 being a great deal of knowledge gained. Circle the appropriate number.

Session No Answer Score

Creep Grazing Research Update - Brian Pugh 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62

300 Day Grazing - John Jennings 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62

Market Outlook - Derrell Peel 2 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62

Live Cattle Demo - Freking/Whitworth 21 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62

Sprayer Calibration Chris Rice 22 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62

Native vs Wheat Supplementation - Dave Lalman 25 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62

3. Please indicate the number that best describes your operation (Check those that apply).

Cattle inventory

No answer 3

None

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3
1100
43
101200
6
201500
3
5011,000
2
1,0015,000
2
Over 5,000
Hay Feeding time (days)
No answer 4
None
4
160
9
6175
9
7690
9
91120
18
121145
8
Over 145
1
Hay
No answer 3
Purchase Hay
21
Produce Hay
39
Produce Hay to Sell
9
Not applicable
2
Acres in Hay Production
No answer 4
None
12
1100
28
101200
10
201500
6
5011,000
2 1,0013,000 Over 3,000
Management Practice(s)

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No answer 7

Implant

17

Castrate

41

Creep Feed

26

Strip Graze Wheat

4

Calibrate Sprayer

27

Acres Sprayed per year

No answer 10

None

6

&le25%

7

26 to 50%

15

5175%

17

>75%

8

Market Strategy

No answer 7

Sell at Weaning

18

Precondition for 45 days

38

Retain through feedlot

2015 OSU Cow-Calf Boot Camp 46 participants responding -

- The overall value of this program is best determined by using the producer's own estimation of the average value (\$/head) gained from the workshop, the average number of cattle per participant and the total number of participants. By this estimation the value of the OSU Cow/Calf Camp was \$137,691.

- This was the first extension program for 71% of the participants.

- Pre-test and Post-test are summarized below resulting in a 34% increase in knowledge.

Pre-Test

Post-Test

Average % Correct

62.6%

83.9%

Minimum Score

40%

72%

Maximum Score

84%

2015 Oklahoma State University and Langston University Combined Research and Extension Annual Report of Accomplishments and Results

96%

Standard Deviation

12.3

5.8

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	18%	0%	5%	0%
133	Pollution Prevention and Mitigation	3%	0%	5%	0%
201	Plant Genome, Genetics, and Genetic Mechanisms	7%	0%	20%	0%
204	Plant Product Quality and Utility (Preharvest)	13%	0%	10%	0%
205	Plant Management Systems	30%	0%	20%	0%
211	Insects, Mites, and Other Arthropods Affecting Plants	6%	0%	10%	0%
212	Pathogens and Nematodes Affecting Plants	5%	0%	10%	0%
213	Weeds Affecting Plants	10%	0%	5%	0%
215	Biological Control of Pests Affecting Plants	3%	0%	5%	0%
216	Integrated Pest Management Systems	5%	0%	10%	0%
	Total	100%	0%	100%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	18.0	0.0	10.0	0.0
Actual Paid	20.0	0.0	11.2	0.0
Actual Volunteer	0.9	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
135000	0	471799	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
135000	0	471799	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
2990000	0	2870243	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

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?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	44016	2401094	3500	35000

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

Patent Applications Submitted

Year: 2015
 Actual: 1

Patents listed

A Plant Variety Protection document was filed for the hard red winter wheat variety Bentley.

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	21	15	36

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Field Demonstrations, field days, and conferences

Year	Actual
2015	157

Output #2

Output Measure

- Regionally adapted wheat cultivars

Year	Actual
2015	1

Output #3

Output Measure

- Educational materials developed

Year	Actual
2015	83

Output #4

Output Measure

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

Year	Actual
2015	18

Output #5

Output Measure

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

Year	Actual
2015	102

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	Increasing dollars through the wheat farm gate by improving resistant weed management
6	Fighting Hessian fly through genetic resistance
7	Extending aquifer life and increasing farm income through subsurface drip irrigation
8	Drought monitoring: a system for tracking plant available soil moisture based on the Oklahoma Mesonet
9	Reducing the impact of foliar disease for southern Great Plains wheat farmers

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
2015	1

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 2015. The hard red winter wheat experimental line OK09125 was released as "Bentley" by the Oklahoma Agricultural Experiment Station. The name Bentley is a tribute to W.D. Bentley, the first director of the Oklahoma Cooperative Extension Service. Bentley is best adapted for southwestern Oklahoma and provides superior yield performance in drought-stressed environments. In 2015, Bentley received the Millers Award from the Wheat Quality Council for outstanding milling and baking quality.

In addition, a hard white advanced experimental line OK10728W is being considered for release in 2016. 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.

Not Reporting on this Outcome Measure

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
2015	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 40 grower meetings with approximately 2,600 individuals in attendance in 2012. Two websites devoted nutrient management (nue.okstate.edu and npk.okstate.edu) were viewed approximately 19,500 times in 2012.

Results

In the fall of 2012 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 dollars. 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 (495\$) of the larger unit historically used. The new Hand Held has been selling well in Oklahoma and across the United States. The Hand Held has also meet great support internationally. 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 Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	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 and at the OSU Small Grains blog at www.osuwheat.com. These sites received 17,549 page views in 2015 and was reinforced with the @OSU_smallgrains Twitter feed which currently has over 1,750 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 17,537 page views in 2015 and visitors represented 112 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

Increasing dollars through the wheat farm gate by improving resistant weed management

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	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.

4. Associated Knowledge Areas

KA Code	Knowledge Area
213	Weeds Affecting Plants

Outcome #6

1. Outcome Measures

Fighting Hessian fly through genetic resistance

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Hessian fly is an insect pest of wheat that causes significant economic injury. Hessian fly overwinters on wheat residue, making it a particularly troublesome pest in no-till production systems where the previous crop's residue is left on the soil surface to prevent erosion and conserve moisture. Wheat farmers in more northern latitudes can avoid Hessian fly by planting after the first killing frost, but this is not an effective control in the southern Great Plains due to the unpredictability of first killing frost. Seed treatments offer partial protection against Hessian fly, but the most effective control measure has been genetic resistance. Current methods for screening for Hessian fly resistance are laborious and require growing plants in the presence of the pest to check for resistance. A more rapid, molecular-based technique would allow breeders to rapidly screen large quantities of germplasm, thus decreasing costs and increasing the number of potential resistant lines.

What has been done

The variety 'Duster' released by Oklahoma State University in 2007 possesses consistent and unique resistance to the GP biotype of Hessian fly, which is the most prevalent biotype in the region. We crossed Duster with the susceptible variety 'Billings' and created 282 doubled

haploid lines for genotyping using 2,358 genotype-by-sequencing markers. Our goal was to identify Quantitative Trait Loci (QTL) that mark the location of resistance genes. A QTL is like a spot on the genetic roadmap that identifies the location of a gene for a particular trait.

Results

We discovered a major QTL/gene responsible for a consistently high level of resistance against Hessian fly in the variety Duster. This QTL explained 88% of the total phenotypic variation (gene expression) and was mapped to the short arm of chromosome 1A. In a previous study, a major QTL on the short arm of chromosome 1A explained 66% of the total phenotypic variation for Hessian fly resistance in a similar population created by crossing the resistant cultivar '2174' with the susceptible line 'Jagger'. Comparative mapping of the common markers for the gene Hessian fly resistance in 'Duster' and the gene for Hessian fly resistance in '2174' showed that the two resistance genes are located in different regions of the same chromosome arm but not very close to each other, which would make incorporation of both genes into a single plant easier.

4. Associated Knowledge Areas

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

Outcome #7

1. Outcome Measures

Extending aquifer life and increasing farm income through subsurface drip irrigation

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Previous efforts have shown that subsurface drip irrigation increases irrigation water use efficiency by 20-40%. Despite this increased efficiency, there has been very limited adoption of subsurface drip irrigation in the Oklahoma Panhandle even though groundwater available for

irrigation is declining. Part of the reason for low adoption rates of subsurface drip irrigation systems is the lack of local demonstrations and locally generated data evaluating performance and economic return of subsurface drip irrigation systems as compared to center pivot systems that are currently used by most producers in the region.

What has been done

A comprehensive research and extension program centered on subsurface drip irrigation was initiated at the Oklahoma Panhandle Research and Extension Center in 2012. This effort has focused on evaluating corn, sorghum, and wheat production under differing irrigation capacities and planting configurations. Work from this project has been presented at three field days and five grower meetings. Current activities include economic analysis comparing subsurface drip irrigation to center pivot irrigation. Unlike previous economic comparisons, this analysis evaluates the net present value of production achieved in the future assuming an aquifer decline that is proportional to withdrawal.

Results

The field days in particular, have been exceptionally valuable in providing proof of concept to producers in the Oklahoma Panhandle and have generated a great deal of interest in how this technology could be adopted to increase long-term economic sustainability. Economic analysis determined utilizing subsurface drip irrigation on a typical 160 acre irrigated field would double the lifespan of available water from 15 years to 30 years and generate an additional \$54,254 in farm income over that time as compared to center pivot irrigation. This would translate to a \$98 million dollar increase in farm income in the region for that same time period.

4. Associated Knowledge Areas

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

Outcome #8

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
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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 three peer-reviewed journal articles, multiple scientific presentations and press releases, and four new funded research projects worth approximately \$350,000, 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. The plant available water maps have also been posted and discussed by hunters and wildlife managers on websites devoted to managing deer habitat.

4. Associated Knowledge Areas

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

Outcome #9

1. Outcome Measures

Reducing the impact of foliar disease for southern Great Plains wheat farmers

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Foliar disease can devastate wheat yield and end use quality, costing Oklahoma wheat farmers and the associated wheat milling and baking industries millions of dollars annually. Harvest year 2015 was marked by a stripe rust epidemic that resulted in severe reduction of wheat yield and test weight which affected grain price and marketability.

What has been done

Twelve extension articles related to wheat were distributed via listserv (650 recipients), Twitter (>1,000 followers) and extension blog during the spring of 2015. Blog posts related to wheat disease at www.osuwheat.com were viewed 1,815 times in the spring of 2015. Information from these blog posts was also utilized by various media outlets in the region.

Three small grains variety testing sites include by-variety yield and test weight comparisons with and without foliar fungicide application. This effort includes the planting, evaluation, and harvesting of over 1,000 individual research plots. Results are distributed via website, print publication, and popular press insert that reaches over 8,000 subscribers in the region. An additional foliar fungicide trial examined the effect of multiple foliar fungicides on a single variety susceptible to all foliar diseases. In this trial, leaf rust was the primary foliar disease. Results were distributed via print publication and plant disease management reports as well as in multiple presentations to producers, extension personnel, and the wheat industry.

Results

Yield data from research trials showed that stripe rust and leaf rust reduced wheat grain yield by as much as 87% (68 bu/ac) and 32% (20 bu/ac), respectively, in susceptible lines, and that timely application of a foliar fungicide prevented much of this yield loss. Producers were educated regarding fungicide timing and label restrictions regarding season-long application limits for foliar fungicides. As a result, many wheat acres in Oklahoma were treated with a foliar fungicide.

Growers choosing not to apply a foliar fungicide to susceptible varieties were generally disappointed with variety performance. We worked with several of these producers during the summer of 2015 to identify wheat varieties that were resistant to foliar disease recommended shifting acres to varieties with genetic resistance.

4. Associated Knowledge Areas

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

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

V(I). Planned Program (Evaluation Studies)

Evaluation Results

None

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
132	Weather and Climate	0%	0%	5%	0%
201	Plant Genome, Genetics, and Genetic Mechanisms	0%	0%	30%	0%
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%	0%	15%	0%
206	Basic Plant Biology	0%	0%	15%	0%
211	Insects, Mites, and Other Arthropods Affecting Plants	0%	0%	10%	0%
212	Pathogens and Nematodes Affecting Plants	0%	0%	25%	0%
	Total	0%	0%	100%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	11.0	0.0
Actual Paid	0.0	0.0	11.2	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	338510	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	338510	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	2059367	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

2015	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: 2015
 Actual: 2

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	0	36	36

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Grant proposals written and submitted

Year	Actual
2015	20

Output #2

Output Measure

- Peer-reviewed publications including journal articles

Year	Actual
2015	36

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Graduate students graduated
2	Auxin plant growth hormone in rhizosphere
3	Inorganic nitrogen impact on microbial communities
4	Identification and Characterization of drought and heat-responsive microRNA in Switchgrass
5	Control of floral transition in sorghum and switchgrass
6	Bermudagrass cultivars to resist abiotic stress
7	Genetic regulation of plant insect resistance

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
2015	6

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	Pathogens and Nematodes Affecting Plants

Outcome #2

1. Outcome Measures

Auxin plant growth hormone in rhizosphere

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Auxin is the most important plant growth hormone and almost all bacteria are known to produce auxin for some unknown reason and this may influence overall plant biomass production.

What has been done

Previous research in our lab indicated a negative correlation between auxin production and plant biomass. This year we completed a project evaluating whether auxin production by bacteria in the rhizosphere of wheat is correlated to overall plant biomass. This year we repeat the analysis in a different way isolating over 6000 bacteria and testing them for auxin production capacity in wheat plants of differing biomass.

Results

Our recent work has supported the negative correlation with biomass suggesting there is little relationship and possibly a negative relationship between auxin production by bacteria in the rhizosphere and wheat biomass. This suggests that auxin production by rhizobacteria by itself is likely not associated with wheat biomass productivity.

4. Associated Knowledge Areas

KA Code	Knowledge Area
206	Basic Plant Biology

Outcome #3

1. Outcome Measures

Inorganic nitrogen impact on microbial communities

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Inorganic nitrogen is used world-wide in cropping systems to sustain agricultural yields. The impact of inorganic nitrogen on microbial communities needs assessing. Previously, we developed a method to identify productivity associated microorganisms in wheat rhizospheres.

What has been done

We treated plants with and without organic and inorganic nitrogen in order to evaluate the effect of nitrogen treatment on the productivity associated communities that support wheat agricultural yield.

Results

We found that fertilization with inorganic fertilizer increased the total numbers of productivity associated rhizobacteria compared to organic fertilization. This suggested that numbers of productivity associated rhizobacteria are associated with plant growth. On the other hand the numbers of genera or types of rhizobacteria was dramatically lower when fertilizing with inorganic nitrogen compared to organic nitrogen. This factor suggested a decrease in overall functionality of the rhizobacteria community which may impact disease resistance to soil borne pathogens, decreased environmental resistance to stresses and a host of other factors under prolonged continuous inorganic nitrogen fertilization.

4. Associated Knowledge Areas

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

Outcome #4

1. Outcome Measures

Identification and Characterization of drought and heat-responsive microRNA in Switchgrass

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Current climate models predicting increasing drought frequencies and temperature will significantly affect switchgrass production in the future. Thus, generating switchgrass cultivars with improved drought and heat tolerance is an important goal for the breeding and biotechnology programs. The success of such strategies require substantial amount of molecular information in the form of markers, genes and other gene regulatory molecules such as miRNAs. MicroRNAs, a class of small noncoding RNAs are, well known for their gene regulatory roles by destroying or repressing translation of the mRNA targets.

What has been done

To identify drought- or heat-responsive miRNAs in switchgrass, we profiled small RNAs using deep sequencing approach from the 30 day-old switchgrass seedlings at 28°/20°C (day/night) exposed to heat stress. Drought stress was imposed by withholding irrigation for one week on 73-day-old (after sowing) plants grown at 28°/20°C (day/night).

Results

Sequence analysis enabled the identification of 29 conserved and 62 novel miRNA families. Notably, the abundances of several conserved and novel miRNAs were dramatically altered following drought or heat. Using at least one fold (log2) change as cut off, we observed that 13 conserved miRNA families were differentially regulated by both stresses, and, five and four families were specifically regulated by drought and heat, respectively. Similarly, using a more stringent cut off of two fold (log2) regulation, we found 5 and 16 novel miRNA families were upregulated but 6 and 7 families were downregulated under drought and heat, respectively. The stress-altered expression of a subset of miRNAs and their targets was confirmed using quantitative PCR. Overall, the switchgrass plants exposed to drought or heat revealed similarities as well as differences with respect to miRNA regulation, which could be important for enduring different stress conditions.

4. Associated Knowledge Areas

KA Code	Knowledge Area
132	Weather and Climate
201	Plant Genome, Genetics, and Genetic Mechanisms
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
206	Basic Plant Biology

Outcome #5

1. Outcome Measures

Control of floral transition in sorghum and switchgrass

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Sorghum is a typical short day (SD) plant and its use in grain or biomass production in temperate regions depends on its flowering time control, but the underlying molecular mechanism of floral transition in sorghum is poorly understood. Switchgrass (*Panicum virgatum* L.), a perennial warm season bunchgrass native to North America, has been a target in the U.S. as a renewable bioenergy crop because of its ability to produce moderate to high yields on marginal farmlands. Delaying flowering can increase vegetative biomass yield by allowing prolonged growth before switching to the reproductive phase.

What has been done

We characterized sorghum FLOWERING LOCUS T (SbFT) genes to establish a molecular roadmap for mechanistic understanding. Despite the identification of flowering time as a biomass trait in switchgrass, the molecular regulatory factors involved in controlling floral transition are poorly understood. Here we identified PvFT1, PvAPL1-3 and PvSL1, 2 as key flowering regulators required from floral transition initiation to development of floral organs.

Results

Three genes are expressed in the leaf at the floral transition initiation stage, expressed early in grain sorghum genotypes but late in sweet and forage sorghum genotypes, induced by SD treatment in photoperiod sensitive genotypes. Ectopic expression of PvFT1 in *Arabidopsis*, *Brachypodium* and switchgrass led to extremely early flowering, and activation of FT downstream target genes, confirming that it is a strong activator of flowering in switchgrass.

4. Associated Knowledge Areas

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

Outcome #6

1. Outcome Measures

Bermudagrass cultivars to resist abiotic stress

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Bermudagrass is widely grown and economically important for turf and forage in Oklahoma and the southern United States. One major goal of the OSU programs is to breed cultivars improved in resistance to major abiotic and biotic stresses. In Oklahoma, drought stress occurs frequently due to high temperatures and very low precipitation in the summer. Development of new bermudagrass and switchgrass cultivars with improvement in resistance to one or more abiotic and biotic stresses will benefit farmers, growers, producers, and many consumers.

What has been done

Two tetraploid ($2n=4x=36$), first-generation selfed (S1) populations, 228 progeny of ?Zebra? and 273 of A12359, were used in a segregation analysis with 21 and 12 simple sequence repeat (SSR) markers, respectively.

Results

The inheritance mode of tetraploid bermudagrass was complete or near complete disomic. It is evident that the two bermudagrass parents had an allotetraploid genome with two distinct subgenomes since 33 SSR PPs amplified 34 loci, each having two alleles. Severe transmission ratio distortions occurred in the Zebra S1 population while less so in the A12359 S1 progeny. The findings of disomic inheritance and segregation ratio distortion in common bermudagrass is significant in subsequent linkage map construction, quantitative trait locus mapping and marker assisted selection in the species.

4. Associated Knowledge Areas

KA Code	Knowledge Area
132	Weather and Climate

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

Outcome #7

1. Outcome Measures

Genetic regulation of plant insect resistance

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Hessian fly [Hf, *Mayetiola destructor* (Say)] is one of the most destructive pests of wheat in the U.S.A. and worldwide. Our recently released winter wheat cultivar ?Duster? possesses consistent and unique resistance to biotype GP, and Hf intensities at economically significant levels have not been reported in any field plot containing this cultivar.

What has been done

The 282 doubled haploid (DH) lines generated from a cross between Duster and ?Billings? that susceptible to Hf, were genotyped using 2,358 GBS (Genotyping-By-Sequencing) markers.

Results

A major QTL, explaining 88% of the total phenotypic variation, was mapped to the short arm of chromosome 1A. In a previous study, a major QTL on the short arm of chromosome 1A, explained 66% of the total phenotypic variation in Hf-resistance in the Jagger x 2174 recombinant inbred line population. Comparative mapping of the common markers for the gene for QHf.osu-1Ad in Duster and the gene for QHf.osu-1A2 in cultivar ?2174? showed that the two Hf resistance genes are located in different regions of the same chromosome arm 1AS, with 11.2 cM apart in genetic distance.

4. Associated Knowledge Areas

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

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

Decreased availability of research funding. Application to external granting agencies is continuing but the success rate for basic research is often very low.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Significant milestones include the publication of our work on transgenic cotton plants with modified expression of brassinosteroid receptor BR11 and our work on the chromatin-based regulation of seed maturation genes by HSI2. These publication signal our continuing efforts to develop a research program at the cutting edge of molecular genetics and biochemistry. Research work has received 1320 google scholar citations, which demonstrate the scientific impact of our work.

Key Items of Evaluation

Research work is being widely cited within the scientific community.

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	7%	0%	10%	0%
202	Plant Genetic Resources	10%	0%	10%	0%
204	Plant Product Quality and Utility (Preharvest)	14%	0%	15%	0%
205	Plant Management Systems	38%	0%	40%	0%
502	New and Improved Food Products	15%	0%	20%	0%
901	Program and Project Design, and Statistics	3%	0%	5%	0%
903	Communication, Education, and Information Delivery	13%	0%	0%	0%
	Total	100%	0%	100%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	12.0	0.0	2.0	0.0
Actual Paid	22.0	0.0	3.5	0.0
Actual Volunteer	21.9	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
130000	0	149829	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
130000	0	149829	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
2940000	0	911502	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. •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. •Develop cultural practices to reduce pecan alternate bearing and provide consistent nut quality. of research based information for clientele •Conduct "New Farmer" workshops and short courses for edible horticultural crops •Survey Oklahoma Consumers (Gardeners) at the county level 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 •Provide Education on Backyard Food Production •Assist in Youth at Risk - 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 2015 eighty-two consumer horticulture questions were responded to through the Ask-an-Expert feature of eXtension.

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	61500	14200000	5080	3057000

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

Patent Applications Submitted

Year: 2015

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	36	19	55

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- New Master Gardeners trained

Year	Actual
2015	206

Output #2

Output Measure

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

Year	Actual
2015	19

Output #3

Output Measure

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

Year	Actual
2015	63

Output #4

Output Measure

- Number of statewide "Oklahoma Gardening" shows produced

Year	Actual
2015	36

Output #5

Output Measure

- Number of Funded Grant Proposals

Year	Actual
2015	16

Output #6

Output Measure

- Number of potential fresh market growers of horticulture crops trained

Year	Actual
2015	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	Trialing tomato varieties with heat-set capabilities and using plasticulture to manage soil temperatures and moisture levels.
5	Companion planting for squash bug control in summer squash
6	Use of Optical Chlorophyll Sensors to Determine Nitrogen Status of Ornamentals
7	Grape Seed Value-Added Products from Oklahoma Winery Waste

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
2015	17

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. Examples of research includes studies on sustainable practices including soil improvement through the use of cover crops in vegetable production, reduced use of synthetic inputs, etc. 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 seventeen newly certified organic producers have been added to the ODAFF certified list.

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
2015	82520

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 horticulture 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 24 counties participating in the program as of January 2016. The following data was provided by 20 of the 24 counties. Approximately 206 new Master Gardeners were trained during the 2015 training season. Close to 1,157 active Master Gardeners volunteered their time, contributing approximately 82,520 volunteer hours resulting in over 2,474,119 educational interventions with Oklahomans and as many as 2,179+ educational and community programs and activities being conducted in their communities in 2015. This translates to over \$1,736,633.00 in service that was donated by volunteers (wage rate of \$21.45/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 2014 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 1,640 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
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

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

Trialing tomato varieties with heat-set capabilities and using plasticulture to manage soil temperatures and moisture levels.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahomans want local grown fresh produce and tomato is an important component of a crop mix for fresh market growers within the state. A major problem for tomato farmers is fruit set and the associated loss of yield and income when fruit set is poor, farmers continue to request help each year with this issue.

What has been done

During 2015 one tomato trial was completed and reported. The trial site was located in Blaine County in western Oklahoma. The on-farm trial included six cultivars for testing in a replicated trial. The site used drip irrigation and plastic mulch as a crop management system.

Results

The past three years of tomato trials have generated interest by farmers and by county extension educators. As a result, ongoing trials are planned for 2016 and we would anticipate continued trials in the coming years. Farmers have benefited directly through the trials by improving their tomato yields through increased summer production of field tomatoes. Results from the third year of this study were published in the Oklahoma State University ?Vegetable Trial Report MP-164? which is available at <http://www.hortla.okstate.edu/research-and-outreach/research/vegetable-trial-reports>.

4. Associated Knowledge Areas

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

Outcome #5

1. Outcome Measures

Companion planting for squash bug control in summer squash

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The economic value of the various cucurbit crops produced in the southern United States is very high. Government statistics of the value of these crops, however, are no longer available on a regional basis. In Oklahoma, this production was estimated to be worth over \$11.7 million in 2007. For cucurbits, the single most important insect pest is the squash bug, *Anasa tristis* DeGeer. Squash bug management typically involves multiple applications of chemical insecticides. There is considerable qualitative information regarding this insect, but more

quantitative data are needed. In particular, the scientific literature contains very little information about non-insecticidal approaches to squash bug management.

What has been done

The concept of companion planting as a potential pest management tool has received some attention recently as interest in sustainable and organic vegetable production has grown. Results have been mixed, and none of these studies has addressed squash bug management. A three-year study, partially funded by Southern SARE, provided information on the potential of companion plants as tools for pest management of squash bug in commercial production of summer squash. Companion planting with white yarrow had few effects.

Results

Companion planting with feverfew showed a tendency to reduce squash bug populations, but results often were not statistically significant. Early-season row covers neither reduced squash bug populations nor increased squash yields. We concluded that companion planting with white yarrow or feverfew had an inconsistent effect on squash bug populations on summer squash. Therefore, these strategies are not recommended to commercial producers.

Results from the both years of this two year study were published in the Oklahoma State University Vegetable Trial Report MP-164? which is available at <http://www.hortla.okstate.edu/research-and-outreach/research/vegetable-trial-reports>.

4. Associated Knowledge Areas

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

Outcome #6

1. Outcome Measures

Use of Optical Chlorophyll Sensors to Determine Nitrogen Status of Ornamentals

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Potted plant production is a billion dollar market in the plant industry. Growers are looking for ways to increase production quality while decreasing cost and environmental impact. The use of nondestructive, optical sensors has been investigated on twelve different greenhouse crops to improve nitrogen use efficiency, increase plant quality, develop a sampling protocol, and reduce costs associated with other sampling methods.

What has been done

Over the last three years, 2 graduate students have been trained to determine nutrient status using optical sensors. A fact sheet was developed to inform growers and has been viewed over 1,700 times, which has led to an increase in awareness of alternative nondestructive methods to evaluate crop nitrogen status. In all but one crop, the atLEAF chlorophyll sensor performed as well as the SPAD chlorophyll meter, which is considered the standard but costs 10 times as much as the atLEAF sensor.

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems

Outcome #7

1. Outcome Measures

Grape Seed Value-Added Products from Oklahoma Winery Waste

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Each year 250 to 300 tons of grape pomace must be disposed of each year by the Oklahoma winery industry. Disposal fees for this product are about \$40/ton - leaving a cost to the industry of

\$10,000 to \$12,000 per year. Disposal costs are likely to double in the next 10 years. Winemakers are seeking ways to cut costs and improve profitability - use of the pomace by-product to produce new Oklahoma products could accomplish both eliminating disposal costs and providing an un-utilized income stream of the Oklahoma wine grape industry.

What has been done

Over the last two years two graduate students have devised pomace handling technologies to separate seed from skins/pulp/stems, dry the seed and process it into oil and grape seed flour. A system has been defined to process grape pomace into value added products of grape skins for cattle feed, grape seed oil for culinary uses and grape seed flour for baking and health foods/supplements.

Results

Equipment costs for a small scale processing system (designed to process 30 - 40 tons of pomace) were about \$39,000. Income potential per ton of pomace ranged from \$1,000 to \$3,000, with total income per year of \$30,000 to \$90,000, using a current un-utilized waste product.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
502	New and Improved Food Products

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

V(I). Planned Program (Evaluation Studies)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

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%	0%	10%	0%
111	Conservation and Efficient Use of Water	17%	0%	10%	0%
112	Watershed Protection and Management	13%	0%	10%	0%
121	Management of Range Resources	6%	0%	15%	0%
123	Management and Sustainability of Forest Resources	3%	0%	10%	0%
132	Weather and Climate	10%	0%	5%	0%
133	Pollution Prevention and Mitigation	5%	0%	5%	0%
134	Outdoor Recreation	4%	0%	5%	0%
135	Aquatic and Terrestrial Wildlife	5%	0%	0%	0%
136	Conservation of Biological Diversity	5%	0%	5%	0%
141	Air Resource Protection and Management	8%	0%	5%	0%
205	Plant Management Systems	8%	0%	5%	0%
403	Waste Disposal, Recycling, and Reuse	5%	0%	5%	0%
605	Natural Resource and Environmental Economics	6%	0%	10%	0%
	Total	100%	0%	100%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	10.0	0.0	14.0	0.0
Actual Paid	15.0	0.0	15.7	0.0
Actual Volunteer	0.9	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
100000	0	663903	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
100000	0	663903	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
2000000	0	4038933	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Submit grant proposals and conduct research that addresses priorities

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.

Conduct Poultry Waste Management Education

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

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 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

3. How was eXtension used?

Prescribed Fire Community of Practice is maintained through Oklahoma Cooperative Extension Service.

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	11490	137476	4500	20000

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

Patent Applications Submitted

Year: 2015

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	8	10	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Grant proposals written and submitted

Year	Actual
2015	52

Output #2

Output Measure

- Manuscripts submitted for consideration of peer-reviewed publication

Year	Actual
2015	78

Output #3

Output Measure

- Extension conferences, workshops and training sessions

Year	Actual
2015	37

Output #4

Output Measure

- Research and Extension reports, fact sheets, and other media presentations

Year	Actual
2015	76

Output #5

Output Measure

- Number of weather-based agricultural decision support tools

Year	Actual
2015	2

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	Stream Stewardship
11	Prairie grouse management in the Southern Plains
12	An unbiased estimator for plantation row sampling

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
2015	497

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, 2,774 people have completed the initial nine hours of required training. In 2015, 71 new producers completed the initial nine hours of training, and 426 completed an additional 2 hours of training. New subject matter developed in 2015 included poultry mortality management, financial preparation for production down times, farm biosecurity for prevention of disease outbreaks, house management strategies to improve efficiency and reduce housing costs, litter application and research updates from fertility trials, new technologies for applicators and hands on demonstrations.

Results

Note: Survey evaluations are conducted every other year as this is a long-term continuing program. The following results are for 2014. 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

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	1152

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 #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
2015	472

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
2015	9500

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
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	15000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Biological invasion by non-native plants is a major cause of native ecosystem loss, reducing agricultural production, lowering water quality and quantity, altering wildlife habitat, and decreasing potential for rural economic development. This is particularly true for native rangelands in Oklahoma, where non-native invasive grasses are persistent problems for land managers.

What has been done

we have completed multiple field and greenhouse experiments that show alterations of arbuscular mycorrhizal fungi (AMF) are a major mechanism in native plant growth suppression following non-native invasion, and restoration of native AMF may be a fundamental consideration for successful establishment of native grasses. We provided solid evidence that co-adapted plants and AM fungi develop over time such that the fitness of both plants and fungi is maximized under local soil conditions.

Results

We have shown that restoration of native mycorrhizal fungi is a fundamental consideration for successful establishment of native rangelands; when establishing restoration practices selection of native inoculum and local plants species is critical. Consequently, better management of mycorrhizal symbioses will improve our ability to generate highly productive ecosystems. Furthermore, there are serious consequences to management decisions that result in the loss of native AMF from rangeland ecosystems.

4. Associated Knowledge Areas

KA Code	Knowledge Area
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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
134	Outdoor Recreation
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
2015	15000

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

We have partnered with colleagues from around the country to initiate a prescribed fire Community of Practice (CoP) in eXtension. This CoP serves as a clearing house of knowledge for prescribed fire and highlights the leadership that OSU-NREM provides in the fire ecology discipline. Much of the content on the CoP is from research generated at OSU. The site also provides a mechanism to advertise workshops and field days that OSU and our collaborators carry out.

Results

The CoP was launched in 2013 and currently involves 67 professional members from across the country. A faculty member at OSU serves as content editor for this CoP that provides a clearinghouse of science based information related to prescribed fire, thus far resulting in 70 articles and 58 FAQs.

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
134	Outdoor Recreation
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
2015	955403

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.

What has been done

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.

Results

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. The use of iPhone and Android Apps has increased rapidly with over 3,500,000 sessions in 2015.

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
134	Outdoor Recreation
205	Plant Management Systems

Outcome #10

1. Outcome Measures

Stream Stewardship

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Stream channels are highly vulnerable to erosion, and ignorance regarding stream management often underlies degradation across the state. Stream degradation causes serious ecological, esthetic and economic damage in the form of land loss, increased flooding, loss of fish habitat, and increased sedimentation. The costs of restoring impaired streams to proper functioning condition ranges from a bare minimum of \$100 per linear foot to as high as \$2,200 per linear foot. Viewed in these terms, prevention of stream degradation is extremely cost-effective.

What has been done

Stream hydrology trailers are highly engaging educational tools in which flowing water cuts through a bed of plastic grit to model stream processes. A wide variety of audiences have received live-action instruction in stream system function and necessary stewardship practices. Participants observe the negative impacts of removing riparian vegetation, modifying stream channels and the danger of building in floodplains, lending an understanding of causes and effects through compressed time observation. Youth and adult audiences learn about streams from Extension educators at outdoor conservation classrooms, schools, landowner meetings, and other venues.

Results

We delivered programming to approximately 56,900 Oklahomans in 2015. Increasingly Oklahomans are learning how streams work and what steps are needed to maintain good stream health. When faced with a stream management decision, the odds are increasing that they will recall the need to tread gently lest they set in motion a chain of destructive changes they will regret. If only one tenth of one percent of the audience reached implements proper stewardship practices on 1000 linear feet of stream per person, then the potential cost savings resulting from avoiding the expense of stream restoration would be 5.7 million dollars. In addition to our own work, six trailers were produced for use by the Texas AgriLife Extension Program and one trailer was produced for the Oklahoma Conservation Commission.

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
132	Weather and Climate

Outcome #11

1. Outcome Measures

Prairie grouse management in the Southern Plains

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Land management in the Southern Plains that includes energy development and loss of broad scale heterogeneity is largely incompatible with the needs of prairie grouse, specifically the Lesser Prairie-Chicken in the mixed-grass and shortgrass prairie and Greater Prairie-Chicken in the tallgrass prairie. Additional research on suitable rangeland condition and specific attributes of life history is needed to inform management strategies to reverse population declines of these species. It is particularly important to find and implement conservation management on private lands that can obviate the protection of these species under the Federal Endangered Species Act.

What has been done

We continue to develop research programs for prairie-chickens in the Southern Great Plains. Currently we have 2 PhD students and one MS student on this project with current grants and donations exceeding \$400,000. With initial funding from USDA-AFRI in the amount of \$491,703 we have secured private donations exceeding \$250,000 and state funding in the amount of \$40,000 to support research and outreach in the Flint Hills of Oklahoma and Kansas.

Results

This research has led directly to a change in rangeland management over 250,000 acres of the Flint Hills. Thus, approximately a quarter of a million acres of former habitat has been restored for the benefit of Greater Prairie-Chicken and other tallgrass prairie species in the Flint Hills.

4. Associated Knowledge Areas

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

Outcome #12

1. Outcome Measures

An unbiased estimator for plantation row sampling

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Plantation row sampling promises to be an efficient new method for sampling southern pine plantations in Oklahoma and other southern states. There are thousands of acres of southern pine plantations in southeastern Oklahoma.

What has been done

The method used remote sensing to estimate plantation row lengths. Field samples on the rows are then used to estimate forest attributes such as weight and numbers of trees. Several new estimators were tested using computer simulation.

Results

A new design-unbiased estimator can be applied to sampling forest plantation rows to efficiently conduct forest inventories. A design-unbiased estimator for k-nearest neighbor sampling provides a way to inventory forest and other plant communities by sampling the k nearest plants to a random sample point. Until recently k nearest neighbor estimators could not guarantee unbiasedness for all spatial arrangements of plants. A recent breakthrough from another university developed a way to sample the k nearest neighbors on a line that is unbiased for any plant spatial arrangement. An alternate estimator builds on this work and provides a method of field sampling that is rapid and unbiased.

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources

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

V(I). Planned Program (Evaluation Studies)

Evaluation Results

None

Key Items of Evaluation

None

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	10%	0%	5%	0%
401	Structures, Facilities, and General Purpose Farm Supplies	11%	0%	5%	0%
403	Waste Disposal, Recycling, and Reuse	5%	0%	5%	0%
501	New and Improved Food Processing Technologies	15%	0%	10%	0%
502	New and Improved Food Products	9%	0%	10%	0%
503	Quality Maintenance in Storing and Marketing Food Products	9%	0%	10%	0%
701	Nutrient Composition of Food	5%	0%	10%	0%
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	3%	0%	10%	0%
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	11%	0%	25%	0%
723	Hazards to Human Health and Safety	22%	0%	10%	0%
	Total	100%	0%	100%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	2.0	0.0	5.0	0.0
Actual Paid	5.5	0.0	4.2	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
50000	0	180257	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
50000	0	180257	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
760000	0	1096613	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?

Provided information for the FReSH group on farm safety and referred producers and elevator managers to safety information online.

The Food Safety and Small Meat Processors Resource Areas were monitored for information regarding issues of concern and general questions from industry representatives and the public.

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	1177	2100	0	0

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

Patent Applications Submitted

Year: 2015

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	14	23	37

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of conferences and other extension outreach presentations

Year	Actual
2015	86

Output #2

Output Measure

- External funding obtained

Year	Actual
2015	1371206

Output #3

Output Measure

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

Year	Actual
2015	101

Output #4

Output Measure

- Technical assistance projects completed

Year	Actual
2015	128

Output #5

Output Measure

- Manuscripts submitted for publication in peer-reviewed journals

Year	Actual
2015	35

Output #6

Output Measure

- Extension publications completed

Year	Actual
2015	94

Output #7

Output Measure

- Number of air quality monitors tested

Year	Actual
2015	0

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 HACCP 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

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
2015	6

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Insect resistance is increasing and fumigant efficacy is decreasing in Oklahoma. Closed loop fumigation systems are key to effectively delivering sufficient concentrations of phosphine fumigant to kill all life stages of insects.

What has been done

Presentations on closed loop fumigation systems were made at workshops in Oklahoma.

Results

Six grain facilities installed closed loop fumigation systems in storage bins.

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
2015	45

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
2015	435

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
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
2015	92

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

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
2015	19

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
2015	103

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
401	Structures, Facilities, and General Purpose Farm Supplies
403	Waste Disposal, Recycling, and Reuse
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

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	4

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahoma is a major grain producing state. Yet, Oklahoma has few fire departments that are trained in grain bin rescue procedures.

What has been done

Training through workshops and publications have been delivered to over 200 firefighters in 2015.

Results

Four response teams were trained and now have sufficient training and organization to respond to a grain bin entrapment incident.

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

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	50

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
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
2015	12

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

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

Weather changes, government policies and economic downturn have made grain storage and safety a very difficult training environment.

Declines in formula funding have driven us to rely more on extramural funding, limiting our ability to conduct applied research and technical assistance projects without recouping costs.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Extension and outreach programs were evaluated primarily based on before and after

assessments of attendee knowledge using questionnaires. The number of people receiving training and the publications generated shows impact within Oklahoma.

Key Items of Evaluation

Number of people receiving training, number of presentations given, and the number of publications generated. Attendees were evaluated 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. Evaluation scores uniformly showed significant knowledge gains by attendees.

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%	100%	0%
	Total	100%	0%	100%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	59.0	0.0	0.0	0.0
Actual Paid	82.0	0.0	0.2	0.0
Actual Volunteer	51.2	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
275808	0	8463	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
275808	0	8463	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
9547146	0	51484	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Volunteer Development & Management - Recruited, oriented and trained adult volunteers to serve as club and project club leaders and to to serve as leaders on local, district and state committees to assist

with planning and coordinating activities and events.

Developed four initiative teams made up of state and county 4-H staff and appropriate partners to design and deliver curriculum and in-service training in each of the four initiatives.

Utilized 4-H curriculum, including printed materials, events, contests and or web-based content to support the four initiatives.

Designed and implemented events in each of the four initiative areas which may include, but not be limited to the following:

Leadership and Citizenship: 4-H Volunteer & Parent Conference, District Volunteer Conferences, District Youth In Action Conferences, Leadership Team Retreats, State and District 4-H Officers, Ambassador Training, 4-H Citizenship Washington Focus and Operation Military Kids events.

Agricultural and Natural Science: Big Three Field Days, State Fairs, Spring Livestock Shows and Oklahoma Youth Expo, Judging Events and Camps, District and State 4-H Horse Shows, Land, Range and Pasture Judging, Companion Animal Events, Shooting Sports, Wildlife Habitat Evaluation, Insect Zoo, Junior Master Gardeners and Forestry Camp.

Science and Technology: STEM Institute, TechXcite, Digital Media, Robotics and GIS/GPS programs.

Healthy Living: Food Show Down, Overcoming Obstacles, Healthy Living Grants, ATV Safety.

Some events like State 4-H Roundup and both state fairs contribute to a wide range of priorities.

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?

- 511 volunteers and educators completed the 4-H Youth Development Working with Minors Training.
- Twenty-nine volunteers participated in one or more of the six on-line volunteer continuing education units released in 2015.
- Thirty-five staff and volunteers participated in one or more of the OK 4-H Risk Management lessons. Planning for Potential Incidents and Accidents (21) and Event Crisis Management (14)
- Companion Animal Communities of Practice, eXtension developed a companion animal video and photo contest for 4-H youth

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	12000	600000	446100	5798931

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

Patent Applications Submitted

Year: 2015
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	59	0	59

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of in-service training sessions for Extension educators

Year	Actual
2015	37

Output #2

Output Measure

- Number of educational trainings offered for volunteers, teen leaders and ambassadors

Year	Actual
2015	432

Output #3

Output Measure

- Number of educational events and contests conducted

Year	Actual
2015	715

Output #4

Output Measure

- Number of partnerships and collaborative efforts engaged in to accomplish 4-H Goals

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

2015

17

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Adult volunteers will maintain or improve the skills necessary to provide appropriate leadership for 4-H club, camp, after-school and special interest programs.
2	Teen volunteers, officers and ambassadors will learn the leadership skills to become contributing partners with adult volunteers and Extension educators in the design and delivery of 4-H programs.
3	4-H youth will practice "contribution and caring" through citizenship and community service activities.
4	Youth will utilize agricultural and natural science programs to: improve the profitability of agricultural resources; enhance the sustainability of natural resources and improve their understanding of career and leisure activities related to these programs.
5	Youth will increase their ability to use STEM technologies and their awareness of career opportunities in science and technology.
6	Youth will develop an understanding of the relationship between diet/nutrition/exercise and physical, mental and emotional health and will demonstrate an increase in healthy lifestyle choices.

Outcome #1

1. Outcome Measures

Adult volunteers will maintain or improve the skills necessary to provide appropriate leadership for 4-H club, camp, after-school and special interest programs.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	6720

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.

Over 80% of homes with children own pets. Through proper training, leaders can utilize the dogs that 4-H members own as a means for teaching life skill development. As a 4-H dog club member, youth learn responsibility, science, empathy, competition, citizenship and leadership.

Programs that intentionally plan for positive youth development have been shown to make students four times more likely to make contributions to their communities, two times more likely to make healthy choices, and two times more likely to engage in STEM activities outside of school.

What has been done

Oklahoma 4-H has improved efforts with the counties to insure adult volunteers are in place for all chartered clubs. With the 4HOnline Data Management System it is going to be much easier to monitor a clubs ratio of certified volunteers to enrollment.

Provide ongoing training to State 4-H Ambassador Advisors to develop a growth mind-set, practice self-reflection and goal setting skills while working with State 4-H Ambassadors. The goal of training is to help youth succeed and thrive in leadership positions.

4-H Curriculum Workshops held at State 4-H Parent/Volunteer conference and District Volunteer conferences. Participants were instructed on the importance of utilizing 4-H curriculum with members to enhance their project learning experience.

Multiple workshops presented around the state to update volunteers on the new projects and expanded Design & Construction project (formerly Fabric and Fashions)

Train the trainer workshops were conducted in Northwest and Central Oklahoma. Leaders were taught how to utilize a dog program to promote positive youth development. They learned how to provide youth hands-on experiences in training, responsible dog care, community service, and leadership.

Both emerging and current recreational professionals were taught how to incorporate the essential elements of youth development into their recreational programming. They were provided resources to use in training their own staff and volunteers.

Trainings for OCES educators, Master Gardeners, childcare workers and 4H/FCS adult volunteers were given in Craig county, Washington county, in Stillwater at an in-service for FCS educators, the Myriad Botanical Gardens, the National Children's and Youth Gardening Symposium. Six gardening lessons were presented to youth and adults at the OSU Family Resource Center. Six "Oklahoma Gardening" segments featured gardening activities appropriate to complete with youth. The "Children's Gardens in Which to Learn and Grow" fact sheet was updated. The Facebook page, "Oklahoma School Garden Network" advertised lesson plans, grants, and ideas for gardening with youth throughout the year.

Results

It is difficult to divide out 4-H volunteers from other episodic volunteers reported through school enrichment. We have used the total adult volunteers to figure adult to youth ratios - 5,755 adult volunteers/21,635 4-H members resulting in a 1:4 ratio of adults to youth.

State 4-H Ambassador Advisors structure committee work and Ambassador responsibilities to include goal setting, planning, self-reflection and growth of leadership skills

4-H volunteers utilize 4-H curriculum and learning products designed to provide the highest quality positive youth development experience. 4-H curriculum materials are filled with fun, engaging experiences that cultivate abilities youth need for everyday living as they progressively gain subject matter knowledge.

Multiple workshops presented around the state to update volunteers on the new projects and expanded Design & Construction project (formerly Fabric and Fashions)

Leaders have been more successful in conducting dog programs in their own counties. New clubs have been established in at least 4 counties and 4-H dog events have been held in at least 7 of the counties that participated in the workshops.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #2

1. Outcome Measures

Teen volunteers, officers and ambassadors will learn the leadership skills to become contributing partners with adult volunteers and Extension educators in the design and delivery of 4-H programs.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	965

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Research indicates youth involved with caring and qualified adults will be prepared for successful lives as contributing citizens. Oklahoma State 4-H Ambassadors have expanded opportunities to serve and promote the Oklahoma State University 4-H Youth Development Program.

Through leadership development, youth have the opportunity to develop life skills which will help them become contributing members of society. 4-H Camps are a rich and exciting venue for young people to learn life skill development. The success and safety of our camps is highly dependent on the quality of camp counselors and the training that they receive. In order to ensure that all Oklahoma 4-H camp counselors receive a consistent and quality training that provides 4-H members the best camp experience possible, it is imperative that counselors receive quality training.

What has been done

511 volunteers and staff completed 4-H Working with Minors (WWM) training on-line. With the shutdown of ACCESS 4-H we have no means to pull data as to how many volunteers received training at the county level. With the migration to 4HOnline we will be able to track how many volunteers received New Volunteer Orientation, WWM, Title IX, and other continuing education opportunities at the county level.

Over the course of 2015 State 4-H Ambassadors (25 teens) participated in a 4-H Ambassador Retreat, Leadership Team Retreat, Fall and Spring training sessions. Trainings included information on telling the 4-H story, working with donors and the importance of making the 4-H program visible across the state of Oklahoma.

The 4-H State Council Team have received formal instruction in leadership development at Leadership Team Retreat, State Council Orientation, and at their quarterly meetings. Additionally,

they have been provided an on-going experiential leadership program in which as a group they plan, develop, and implement, service projects, instructional outreach, and events statewide. The ASAP teen leader group conducted four meetings to plan and implement a statewide 4-H Pet Fun Day program. This provided them a hands-on project to teach them leadership skills.

A camp counselor training was conducted prior to a quad county camp. Counselors were taught the importance of incorporating positive youth development elements into the camping experience; safety and risk management; and behavioral management and camp guidelines. Nine of the counties conducted camp evaluations in the areas of perceived competence, teamwork, and affinity for nature.

Results

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. According to PARS 98,200 volunteer hours were reported.

At this time we are unable to accurately report the number of volunteer receiving training to be certified volunteers with the closing of ACCESS 4-H. Parameters have been built into 4HOnline to track each individuals training. At this time the only thing not built into the system is the subject matter being taught at the county level.

State 4-H Ambassadors conducted events reaching over 5,000 people. Activities included corresponding with current donors, working exhibits and telling the 4-H story, advocating for 4-H youth and telling the impact that 4-H has on youth to state legislators and potential funders.

State Council set a goal and raised \$15,000 for the Children's Hospital, conducted workshops in over 40 counties, helped plan and implement State 4-H Roundup, provided leadership at 4-H Day at the Capitol, and successfully planned and conducted; four state council meetings, four executive council Meeting, and 20 different committee meetings. As a result they learned valuable leadership skills in communication, responsibility, citizenship, and knowledge in conducting orderly business meetings.

The ASAP group conducted the 2015 Pet Fun Day at the Tulsa Fairgrounds. Over 50 people were in attendance with 10 species of animals represented. Activities led by the ASAP members included dog training, rabbit showmanship, dog knowledge contests, oral presentations of animals and a display contest. As a result, ASAP members learned valuable life skills including communication and responsibility as well as provided a beneficial experience for 4-H families.

20 counselors learned and demonstrated knowledge in the intentional incorporation of the essential elements of positive youth development, risk management, and leadership. Of the campers responding, 85% indicated an increase in perceived competence, 84% said they increased in teamwork, and 84% indicated an increase in affinity for nature.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #3

1. Outcome Measures

4-H youth will practice "contribution and caring" through citizenship and community service activities.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	30588

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, and are necessary for positive youth development. All eight elements are present in a healthy 4-H club.

Community service teaches compassion and understanding. Caring and compassion are two of the traits identified as vital components to positive youth development.

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.

Through the State Council leadership not only was \$15,000 raised for Children's Hospital, 2 meals were served to families, crafts were made with patients at Christmas, and families that have been served by the hospital were invited to speak at both state and county 4-H events. Additionally, over 4,000 pounds of pop-tabs were collected to help fund the Ronald McDonald House in Oklahoma City. Counties were encouraged to take their tabs to the facility and many toured the facility and provided meals to the families.

Results

781 demonstrations/conferences were conducted on Club Management.

With the migration to 4HOnline Data Management systems we will have increased accountability in the charter renewal process, increasing our ability as a program to insure and manage safe and healthy clubs. It may be 2017 before we begin to actually report numbers.

Life skill development including empathy, citizenship, and leadership occurred due to a yearlong effort to promote the positive benefits that the Children's Hospital and Ronald McDonald House Charities provides to Oklahoma families.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #4

1. Outcome Measures

Youth will utilize agricultural and natural science programs to: improve the profitability of agricultural resources; enhance the sustainability of natural resources and improve their understanding of career and leisure activities related to these programs.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	52719

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.

Childhood obesity is prevalent in Oklahoma and has been partially attributed to decreased times spent outdoors. Backcountry programs not only teach fitness and nutrition but also provide children the skills and confidence to incorporate outdoor recreation into their lifestyles.

What has been done

Adults worked with youth to help them prepare for their outdoor adventure. As a result, 6 youth and adults participated in a 3 day camping weekend in state and then took an 11 day trip to Colorado where they packed in to experience a remote backcountry experience.

Eight (8) Shooting Sports certification workshops were hosted where 105 adult volunteers received certification as a shooting sports instructor.

Camp TURF is a two-week residential summer academy for Oklahoma youth entering grades 9 and 10, specifically focused on exploring careers in horticulture science. Camp TURF provides active learning in water conservation, solid waste management, plant science, ag communications, landscape architecture, greenhouse management, etc. In 2015, 24 youth from around the state participated in Camp TURF.

Plants and Bugs Camp provided youth with a one-week day camp experience focused on horticulture and insects. Field trips, science lessons, and hands-on activities gave 12 youth in 2015 a look into careers and activities in horticulture and entomology.

Two sessions of Grandparent University in 2015 gave 60 grandparent-grandchild pairs two days of hands-on instruction in flowers and horticulture, at the botanic garden and in the teaching greenhouses at OSU.

JMG is a gardening curriculum that introduces youth to horticulture and environmental science through hands-on activities.

Two sessions of Mason jar terrarium-making were offered at the 2015 4H RoundUp.

One thousand three hundred eighteen (1,318) youth and volunteers participated in educational trainings related to Agriculture and Natural Science project areas.

Nineteen thousand six hundred eighty-six (19,686) participated in agriculture literacy and Ag in the Classroom activities and trainings.

More than twenty two thousand (>22,000) youth participated in a 4-H event or activity related to agriculture and natural science.

Results

One youth from a previous Camp TURF went to college majoring in applied plant science; one youth from a previous Camp TURF declared that in fall 2016 she is enrolling in landscape architecture at OSU.

One thousand three hundred and fifty-five (1,355) youth participated in state sponsored shooting sports events.

Sixty-six youth experienced 2-, 5-, or 13-days of intensive horticulture training.

Twenty-four youth had a 90-minute greenhouse tour and terrarium-making session.

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

- ?84% knew food comes from the farm to the dinner plate.
- ?73% indicated a better understanding of how to take good care of their pets and/or livestock by feeding them and meeting their other needs.
- ?86% were setting goals but have not thought much about trying to reach a goal.
- ?77% 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

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #5

1. Outcome Measures

Youth will increase their ability to use STEM technologies and their awareness of career opportunities in science and technology.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	30485

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The U.S. 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

The Oklahoma 4-H program has taken this statistic to heart and is addressing the issue through training teens, educators and adults in STEM curriculum.

In 2015:

Five in-depth STEM trainings were held for 4-H CES Educators
Two workshops for 4-H volunteers
Two in-depth STEM trainings for teams of youth and adults. Part of this activity included the purchase and distribution of 90 National Youth Science Day kits which were used to train volunteers and adults in the engineering design process and experimental design. Each kit was designed for minimum of eight youth. Over 720 youth were introduced to science skills and careers through this single activity.

Results

Oklahoma 4-H Educators spent over 5,000 hours teaching, promoting and evaluating 4-H STEM projects. They held 157 demonstrations, 252 conferences, and almost 2,000 personal visits with 4-H volunteers, parents and youth. In addition to this they reported over 5,000 volunteer hours of working with youth STEM projects. Through their STEM based educational programming they made over 30,500 contacts representing 75,000 contact hours teaching youth STEM concepts. More than twenty-seven hundred (>2,700) youth participated in a 4-H Science event or activity. Four thousand five hundred and thirty (4,530) youth and volunteers participated in trainings related to science. This included robotics, STEM Institute and GIS/GPS.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #6

1. Outcome Measures

Youth will develop an understanding of the relationship between diet/nutrition/exercise and physical, mental and emotional health and will demonstrate an increase in healthy lifestyle choices.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	19328

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The 2014 State of the State's Health Report (Oklahoma) reveals ongoing challenges as well as signs of promise for improved health status. However, areas of continued challenges include: Oklahoma has the third highest rate of death due to heart disease in the nation

Oklahoma has the fourth highest rate of death due to stroke in the nation
Oklahoma has the fourth highest rate of death due to diabetes in the nation contributing to our high mortality rates are behavioral risk factors that disproportionately overburden Oklahomans and negatively affect our children's future health, academic achievement and our economy.
Oklahoma has the next to the lowest rate of fruit consumption in the nation
Oklahoma has the 44th lowest rate of vegetable consumption in the nation
Oklahoma is the 44th least physically active state in the nation
Oklahoma has the sixth highest rate of obesity in the nation
Without question, there is much work to do to improve the health of our state. However, there are reasons for hope and celebration.

What has been done

The goal of Oklahoma 4-H Healthy Living is to improve the health and fitness levels of Oklahoma children and families through food and nutrition education and physical fitness programming. Teens across the state were trained to serve as teachers and to assist with the implementation of various physical fitness and nutrition programs as we worked together to reach well over 5,000 underserved children. The "teens as teachers" trainings focused on education and activities to engage youth in developing a positive understanding of health, so they make healthier food and nutrition choices and incorporate daily exercise that leads to healthier lives.

Over nine thousand (>9,000) youth participated in a 4-H event or activity related to Healthy Living.

Results

A \$65,000 Youth Voice/Youth Choice Walmart Healthy Living grant was awarded through National 4-H Council.

To achieve our goals 22 healthy living mini-grants were awarded to county sites around the state and four Extension districts where healthy living projects were implemented in both urban and extremely rural parts of the state.

Additionally, five state wide programming efforts were implemented to help achieve our goals

- 1) Yoga for Kids (2 State-wide educator trainings)
- 2) Get Fit 4 Life (OK 4-H curriculum supported and district kits stocked) curriculum supports 10 lessons on food/beverage choices and each lesson contains a physical activity and take home component for families
- 3) Team of Oklahoma youth attended the National 4-H Healthy Living Summit and have provided activities and education since returning home
- 4) 4-H HERO (Health Educators Reaching Others). Development of county-based healthy living ambassadors (4-H HERO) and partnership with Oklahoma State University, America's Healthiest Campus? as part of OSU Wellness Strategy.
- 5) Change Agents program were conducted in 6 sites around the state. When the "Riding It Forward" campaign rolled through our state we thought this was a great opportunity to utilize Joe O's star power and message, but to also educate communities on the 4th H?Health.

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

Beginning in 2015, Oklahoma 4-H began using the National 4-H Common Measures instruments to identify a common core of youth outcomes and indicators which can be used to improve programs. Common Measures is the first-ever effort by the national 4-H system to provide evaluation instruments for use across 4-H programs.

During 2015 4-H educators across the state administered and collected 958 survey instruments.

These instruments were collected at club meetings, educational events, and other 4-H functions. All participants are in at least 4th grade, are enrolled in 4-H.

Below is a chart which includes the outcomes measured and the indicator questions included in the Common Measures instrument used in Oklahoma.

Outcome Indicators

Make positive **CHOICES**

- Youth will demonstrate responsibility, critical thinking and problem solving skills through informed decision making
- Youth will demonstrate flexibility and adaptability through decision making
- Youth will set goals and determine steps to reach them

Effectively **COMMUNICATE**

- Youth will demonstrate the ability to communicate through multiple methods and media

Build **CONNECTIONS**

- Youth will develop positive and sustained relationships

CONTRIBUTE to the health, growth and well-being of self, family, community, nation and the world.

- The cumulative effect of 4- H participation through the development of skills and competencies in making choices, forming connections, effectively communicating, and applying content results in citizens who contribute to their community and world.

Key Items of Evaluation

As this is the first year Common Measures have been used in Oklahoma to, the results below will be used to establish a baseline of information. This information will be compared to future surveys results to assist with future 4-H planning.

Q1: In this 4-H program or project....

Indicator

Outcome

Mean

I use information to make decisions

Choices

2.2

I take responsibility for my actions

Choices

1.59

I set goals for myself

Choices

1.74

I listen well to others

Communication

1.78

I am respectful of others

Communication

1.47

I have the confidence to speak in front of groups

Communication

2.28

I can work things out when others don't agree with me

Communication

2.24

I work well with other youth

Connection

1.7

Scale: 1-Always, 2-Usually, 3-Sometime, 4-Never

Q2: As a result of my experience in this 4-H program or project ...

Indicator

Outcome

Mean

I am comfortable making my own decisions

Choices

1.6

I don't let my friends talk me into doing something I don't want to do

Choices

1.78

I can explain my decisions to others

Choices

1.84

I have a plan for reaching my goals

Choices

1.58

I know how to deal with stress in positive ways

Choices

2.05

I can change my plan when I need to

Choices

1.73

Scale: 1-Strongly Agree, 2-Agree, 3-Disagree, 4-Strongly Disagree

Q3: As a result of my experience in this 4-H program or project ...

Indicator

Outcome

Mean

I am comfortable sharing my thoughts and feelings with others

Communication

2.1

I can use technology to help me express my ideas

Communication

1.82

I know who I can go to if I need help with a problem

Communication

1.44

I can work successfully with adults

Connection

1.54

I have friends who care about me

Connection

1.31

I am connected to adults who are not my parents

Connection

1.55

Scale: 1-Strongly Agree, 2-Agree, 3-Disagree, 4-Strongly Disagree

Q4: As a result of my experience in this 4-H program or project ...

Indicator

Outcome

Mean

I am someone who wants to help others.

Contribution

1.44

I like to work with others to solve problems

Contribution

1.7

I have talents I can offer to others

Contribution

1.72

I learned things that helped me make a difference in my community

Contribution

1.55

I helped with a project that made a difference in my community

Contribution

1.81

Scale: 1-Strongly Agree, 2-Agree, 3-Disagree, 4-Strongly Disagree

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	19%	0%	10%	0%
201	Plant Genome, Genetics, and Genetic Mechanisms	0%	0%	5%	0%
202	Plant Genetic Resources	8%	0%	10%	0%
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	8%	0%	10%	0%
204	Plant Product Quality and Utility (Preharvest)	8%	0%	5%	0%
205	Plant Management Systems	25%	0%	15%	0%
206	Basic Plant Biology	0%	0%	5%	0%
211	Insects, Mites, and Other Arthropods Affecting Plants	11%	0%	10%	0%
212	Pathogens and Nematodes Affecting Plants	11%	0%	10%	0%
216	Integrated Pest Management Systems	10%	0%	20%	0%
	Total	100%	0%	100%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	1.5	0.0	2.0	0.0
Actual Paid	5.0	0.0	2.5	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	104092	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
40000	0	104092	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
680000	0	633255	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 by our program. Research will identify the elite performing species and varieties from both our program and from industry. 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. 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 CSSA, and ASHS. Funding agency audiences: USGA, GCSAA, USDA, 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/lawncare 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

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	5589	25619	400	0

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

Patent Applications Submitted

Year: 2015
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	3	11	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
2015	0

Output #2

Output Measure

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

Year	Actual
2015	93

Output #3

Output Measure

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

Year	Actual
2015	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
2015	77

Output #5

Output Measure

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

Year	Actual
2015	28

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
2015	1571

Output #7

Output Measure

- Number of email news releases and fact sheets generated

Year	Actual
2015	49

Output #8

Output Measure

- Number of consultation phone calls and emails completed

Year	Actual
2015	5735

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Percentage of professionally managed properties using improved turfgrasses
2	Percentage of professional fine turf managers continuing adoption of improved BMPs and IPM practices when surveyed following educational events.
3	Percentage of ODOT roadside vegetation managers continuing adoption of improved BMPs and IPM practices
4	Number of licensed or sublicensed sod producers and seed producers producing OSU developed turfgrasses. Both new and retained production licenses each year.
5	Number of Oklahoma sod producers producing improved turfgrasses suggested for use by OSU Turfgrass Extension Program.

Outcome #1

1. Outcome Measures

Percentage of professionally managed properties using improved turfgrasses

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Percentage of professional fine turf managers continuing adoption of improved BMPs and IPM practices when surveyed following educational events.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	95

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 2015, approximately 240 turfgrass industry professionals attended the annual Oklahoma Turfgrass Conference and Trade Show. An estimated 1571 attended 33 turf and turf pest management presentations offered by various Turfgrass team members around the state. Over 5,735 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 and following consultation calls to assess adoption of improved turf management practices.

Results

Recent surveys following yearly education sessions to professional Turfgrass managers have revealed that 95% of attendees are employing techniques that are Best Management Practices (which includes IPM 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 #3

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
2015	98

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 29 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 their evolution in 2015.

Results

The OSU RVM team annually trains approximately 700 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 prescribed by OSU. These improved management techniques were taught in 2015 through four initial pesticide applicator certification schools (80 attendees), three annual herbicide sprayer calibration workshops (60 attendees) and 15 annual continuing education workshops (700 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 #4

1. Outcome Measures

Number of licensed or sublicensed sod producers and seed producers producing OSU developed turfgrasses. Both new and retained production licenses each year.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	72

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 acceptable.

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) and retain existing licensees of OSU bermudagrass products in 2015. Team members assisted in answering questions of existing and 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 agents a total of 71 producers in the US and one producer in Europe were producing 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. In addition, the newest OSU products of Latitude 36 and Northbridge bermudagrass continued to slightly displace Tifway bermudagrass in several southern sportsfield venues. Sod producers are able to make at least a three to five cent per square foot profit on sale of improved/proprietary bermudagrasses over the variety-not-stated and public domain older varieties. This allows some producers to escape the "commodity-like" market place of variety-not-stated common bermudagrass sod production. In 2014, our Latitude 36 bermudagrass was installed on the infield of Kauffman Stadium, the field which hosted two of five games of the 2015 World Series for the champion Kansas City Royals. High visibility installations of OSU turfgrass products helps to further promote these excellent new products, assisting with their adoption by the professional turfgrass industry. Replacement of winter-susceptible type bermudagrass will be a multi-year, on-going, national process.

4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
202	Plant Genetic Resources
204	Plant Product Quality and Utility (Preharvest)

Outcome #5

1. Outcome Measures

Number of Oklahoma sod producers producing improved turfgrasses suggested for use by OSU Turfgrass Extension Program.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	16

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 were considered standards by the purchasing lawn and landscape industry. Turfgrass cultivar development programs both within and outside of Oklahoma have generated a number of cultivars with superior performance that are 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 continued in 2015 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 17,700 one on one consultations (average of >700 per year) have been conducted over 25 years to these customer groups to discuss new turfgrass options available for licensing and production or purchase and installation/use.

Results

U-3 and Tifway bermudagrasses as well as Meyer zoysiagrass still make up the greatest majority of square footage of sales to the construction market in Oklahoma. However, approximately 39% (16 of 41 total producers) of the sod production industry in Oklahoma has diversified production to include Astro hybrid bermudagrass, El Toro zoysiagrass and various new tall fescue/Kentucky bluegrass blends as well as two cultivars of buffalograss. Additionally, 7% of the total producers (3 of 41) producers have diversified to include new proprietary bermudagrasses Riviera, Patriot, Latitude 36 and Northbridge. These grasses 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. In some cases sales of modern, improved turfgrasses becomes limited due to the presence of a ?no sole source bid? restriction. 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
201	Plant Genome, Genetics, and Genetic Mechanisms

202	Plant Genetic Resources
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

During 2015 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 continued in drought or were inundated by excess rain. California turfgrass installation markets were somewhat suppressed due to chronic drought and either real or anticipated new regulations concerning turfgrass usage in the landscape. Due to suitable growing conditions, an ODOT-funded roadside vegetation management tour of right of way demonstration sites that was postponed in 2014 due to drought was conducted in 2015. With respect to the implementation of BMPs, the lingering drought in western 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. An annual survey of Oklahoma Sod Producers that is normally conducted was postponed due to loss of a turfgrass extension/research staff position.

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.

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%	0%	100%	0%
	Total	100%	0%	100%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	9.0	0.0	1.0	0.0
Actual Paid	13.0	0.0	1.1	0.0
Actual Volunteer	3.6	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
80000	0	46647	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
80000	0	46647	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
1840000	0	283781	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Strategic planning training and strategic planning for communities, 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 entrepreneurship 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?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	25340	2014000	400	60000

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

Patent Applications Submitted

Year: 2015

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	4	8	12

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of community services plans completed

Year	Actual
2015	2

Output #2

Output Measure

- Number of education modules (written curricula) completed

Year	Actual
2015	2

Output #3

Output Measure

- Number of county officer training courses conducted

Year	Actual
2015	59

Output #4

Output Measure

- Number of manufacturing firms receiving applications engineering assistance

Year	Actual
2015	33

Output #5

Output Measure

- Number of county officials completing an educational certificate of achievement

Year	Actual
2015	90

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	Small Businesses Receiving eCommerce Training

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
2015	1878

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

PRIDE: Retain existing customers and provide quality customer experiences by businesses, government agencies and non-profit organizations

E-commerce: Assist small businesses to maintain and increase their market presence using the Internet

Business 4 Breakfast: Provide technical assistance and networking opportunities for entrepreneurs

Solid Materials Mgt: Develop professionally local and tribal government employees in the area of solid materials management

What has been done

PRIDE: Customer service training known as PRIDE

e-Commerce: Workshops on web site development, search engine optimization and using online store fronts

Cleveland County Business 4 Breakfast: hosted quarterly meetings

Solid Materials Mgt: Organized trainings and conferences, and delivered presentations on solid materials management

Results

PRIDE: Front-line employees have a clearer understanding of expectations from customers and their employers; equipped with best practices to deliver a better customer service experience

e-Commerce: 91% of participants indicated that they would increase web efforts, and 92% of participants changed the way they marketed their websites. More specifically, a plumber saw a 50% increase website traffic just 2 months after a workshop after implementing techniques learned

Business 4 Breakfast:

Solid Materials Management: 1,400 individuals were trained at 4 trainings, 3 conferences, and 5 presentations; an informal network of professionals and state agency officials has been created to facilitate communication across organizations and levels of geography; 2 schools were recognized for their educational efforts on recycling

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 Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	150

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Of the over 5,000 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 2015, the Applications Engineers client projects had the following impacts:

Sales increase \$30,797,500
Sales retained that would have otherwise been lost \$63,930,000
Cost savings \$6,029,789
Costs avoided \$5,575,084
194 new jobs created at \$75,511 per job \$14,649,134
56 jobs retained at \$75,511 per job \$4,228,616
Investment in new plant facilities and equipment \$11,787,215
Total impact \$136,997,338

4. Associated Knowledge Areas

KA Code	Knowledge Area
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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
2015	34

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Communities lack resources to create a culture of wellness and encourage healthy behaviors

What has been done

The Healthy Lexington Partnership has been created to get the city and public schools in Lexington certified as healthy places through the Oklahoma Tobacco Settlement Fund.

Results

4 schools and the City of Lexington has been certified

\$20,000 in grants have been secured to fund various wellness projects in the community (e.g., construction of a wellness trail)

The Wellness Weekend event has organized and held; it featured a fun run, health screenings, cooking demonstrations, and promotion of healthy activities and businesses which support wellness

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
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	21

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Small municipalities lack the capacity to proactively identify viable business opportunities

What has been done

The retail trade analysis program provides an analysis of sales tax collections and identifies retail sectors for which leakages (i.e., sales going outside of the community) exist; such sectors are opportunities for new retail businesses in the community.

Results

Communities have used this analysis to identify and recruit new businesses, which create jobs, generate sales tax revenue for the municipality, county and state governments, and enhance quality of life, to come to their communities. Because of the data contained in this report, El Reno was able to attract a new restaurant, while Mustang was able to recruit 4 restaurants, a sporting goods store and a small department store.

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
2015	8

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Smaller and rural communities lack the capacity to plan for their future

What has been done

Strategic planning facilitation has been provided to specific communities and multi-county regions through the Stronger Economies Together (SET) program

Results

The City of Norman has had their downtown revitalization plan updated, while their Fair Board produced their first ever strategic planning document.

Additionally, SET regions have realized grant funding for projects specific to their action plans (for example, a grant proposal is under review for a hotspot lending program through the Elk City Library), increased value-added agriculture opportunities through equipment modification and value-chain analysis efforts, and 3 daycare facilities have been opened.

The Western OK I-40 SET team is comprised of 4 Oklahoma counties along the I-40 Corridor (Beckham, Custer, Washita, and Caddo) and has been in existence since 2012. The team completed their 9-module training and submitted their High-Quality Plan (HQP) for evaluation in late 2013. A revised version was accepted by the national program office in 2014, and continued work on the 5 regional goals led to national awards for both an outstanding HQP and for excellence in regional economic development work. Specific goals accomplished include: re-establishing the aerospace industry (the team developed a brochure and attended national UAV conferences); a "drying canola pilot project" for diversifying agriculture in the region that demonstrated a \$72 / acre gain using peanut trailers to dry canola that was harvested when it was still moist (translating to a potential \$3 million plus in additional income for the region); and attraction of 2 daycare facilities and a commercial driver's license facility to the region

(associated with the goal of developing amenities that will support strong community lifestyles). In addition, a grant to develop a wireless hotspot lending program at the Cordell library was submitted in late 2015.

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
2015	23

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Farmers, ranchers and rural residents feel threatened by the urbanization of Oklahoma and the subsequent shift in legislative power to the urban parts of the state. Additionally, the existing leadership in Agriculture is aging and there is a need to identify and cultivate new leadership.

What has been done

The Oklahoma Agriculture Leadership Program (OALP) is a year-long leadership development program that educates individuals about new facets of agriculture, the political process and government agencies, and encourages networking and collaboration across the state.

OALP graduates have a greater understanding of people and processes. They also have a greater understanding of various systems of economics and government, both locally and nationally, and are able to solve problems and explore opportunities for Oklahoma agriculture and rural communities. During 2015, 23 participants spent 26 days learning about leadership and empowering their leadership skills. 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, especially after visiting with legislators in Washington, D.C.

Results

One class member, Coleen Thornton, has completely changed the way that she operates her specialized farm operation because of what he has learned in this class and has been able to apply for grants that she could not have in the past.

Two current members of Class XVII have new positions since being in the OALP. Dr. Josh Payne is the new State Poultry Specialist in the Department of Animal Science at OSU and Kirby Smith is a Field Representative for Congressman Frank Lucas.

Members of Class XVII live in 21 different communities throughout the state and make an impact in their agricultural activities by being more knowledgeable about agricultural issues and can communicate these issues to members of their local community. The service projects which we conduct at every seminar have caused some class members to become more involved in service activities in other groups to which they belong in their local communities.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #7

1. Outcome Measures

Small Businesses Receiving eCommerce Training

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

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 2015, the Oklahoma State University e-commerce program provided training to 115 small businesses on how to plan, effectively set up, and promote their websites, which can help address these issues. Of the 2015 participants, ratings for all relevant e-commerce workshops

were quite high. We offered 7 workshops geared to those business owners without websites, and this "Websites 101" class was attended by 80 different people. This included two workshops specifically focused on technology center students (typically either high school students or recent graduates) that had expressed an interest in web design. This was a new target audience for our workshops, and we were impressed by participation and response from this demographic. 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 (SEO) proved to be quite popular. Response to each of these different workshops has continued to be extremely positive.

Results

After the training, 91% of respondents planned on increasing their web efforts, and 92% 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 (several good examples are: 1) The Country Framer, specializing in custom frames and hand-crafted art in Durant; 2) Lasley Family Farm, a peanut farm in Anadarko; and 3) several non-profits in Lawton that set up simple websites for their organizations. Other participants made successful changes to their own existing sites - for example, Wilkey Plumbing contacted us 2 months after our Durant workshop with news that the SEO techniques they incorporated into their site increased their monthly website visits by 50%. The Oklahoma Agritourism office took our SEO class as well and was pleasantly surprised by their increased reach with just a few minor keyword changes suggested during the workshop. 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 potentially increased the revenue of small businesses in Oklahoma by a minimum of \$3.4 million during 2015.

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

Natural Disasters: One Solid Materials Management training was interrupted by a storm, which caused a number of participants to leave and act as first responders to victims of flash flooding.
Appropriations Changes: Both the County Training Program and OALP have suffered from cuts in legislative appropriations for their programming.

Competing Public Priorities: Additionally, OALP has seen a shift in donations - some donors have decreased and/or stopped donating due to drought, declining farm income and low oil and gas prices. These decreased donations have been offset by identifying additional donors.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Post-program evaluations of the County Training Program show that 90% of participants rated programs as being Good or Excellent across 10-12 attributes. e-Commerce also uses post-program evaluations to validate training content; 91% of participants planned to increase their web efforts, and 92% intended to change the way they market their websites. One website saw a 50% increase in web traffic due to website changes implemented because of the owner's participation in one of these eCommerce workshops. Additionally, business owners reported increased sales from better marketing their websites of 20 to 200%.

The Application Engineers program created or retained 33 jobs and added \$25.8 million to clients' bottom-lines during 2015.

Key Items of Evaluation

Training material content is the focus of post-program evaluations in the County Training Program, e-Commerce workshops and Oklahoma Agriculture Leadership Program. The eCommerce workshops follow up with participants several months after each workshop with a survey about behavioral changes of the participants: Have they launched a website or made changes to their website? What were the resulting outcomes in terms of traffic and sales?

The Application Engineering program evaluation uses estimated values of services and client benefits to arrive at their estimates of economic contribution.

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	6%	0%	10%	0%
202	Plant Genetic Resources	5%	0%	5%	0%
205	Plant Management Systems	9%	0%	10%	0%
211	Insects, Mites, and Other Arthropods Affecting Plants	16%	0%	20%	0%
212	Pathogens and Nematodes Affecting Plants	10%	0%	20%	0%
213	Weeds Affecting Plants	17%	0%	5%	0%
215	Biological Control of Pests Affecting Plants	11%	0%	5%	0%
216	Integrated Pest Management Systems	20%	0%	20%	0%
601	Economics of Agricultural Production and Farm Management	4%	0%	5%	0%
901	Program and Project Design, and Statistics	2%	0%	0%	0%
	Total	100%	0%	100%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	4.0	0.0	5.0	0.0
Actual Paid	6.0	0.0	3.2	0.0
Actual Volunteer	0.6	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
43000	0	134981	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
43000	0	134981	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
729000	0	821173	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?

Food Safety Community of Practice (COP): David Hillock, J. Hasse, R. Grantham, C. Keck,
 Grapes COP: Dr. Eric Rebek
 Red Imported Fire Ant COP: Dr. R. Grantham, Dr. Eric Rebek, Dr. J. Talley
 Urban Integrated Pest Management COP: C. Keck, R. Grantham, C. Luper, Dr. T. Royer, K. Shelton,

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	3191	80983	0	0

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

Patent Applications Submitted

Year: 2015
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	29	4	32

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Stakeholder assessment

Year	Actual
2015	1

Output #2

Output Measure

- Pesticide applicator education schools and workshops

Year	Actual
2015	15

Output #3

Output Measure

- County-based variety field tours of row-crops and small grains for Oklahoma growers

Year	Actual
2015	15

Output #4

Output Measure

- Extension publications will be created or revised

Year	Actual
2015	29

Output #5

Output Measure

- News releases on the subject of IPM horticulture crops, livestock, agronomic crops and urban systems (Public Housing).

Year	Actual
2015	46

Output #6

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
2015	0

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	Increase in percent of growers with knowledge and adoption of iWheat program for winter wheat.
4	Home gardeners will gain knowledge about IPM practices for their home gardens.
5	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.
6	Participants will understand connections between pest management of bed bugs, the near environment, housing, health, and well-being resulting in an increase in the number of Oklahoman?s practicing bed bug risk reduction.
7	Stakeholders will increase awareness of invasive species in Oklahoma (such as saltcedar, brown marmorated stink bug, emerald ash borer, etc) and how they might be managed.
8	Sugarcane Aphid Management
9	Managing Hessian fly through acreage planted to resistant wheat varieties
10	Management of Horn Flies in Cattle

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
2015	350000

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 125,000 acres in 2014-15. Oklahoma canola producers harvested 3.4 million bushels of sorghum worth ca. \$10.2 million. However, insect pests (aphids and caterpillars) regularly infest winter canola throughout winter and spring causing economic damage.

What has been done

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. Dr. John Damicone's lab is currently screening germplasm for resistance to this disease. 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. Dr. Damicone has 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 \$3.75 million in potential cost savings in the 2014-15 canola crop.

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	Pathogens 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
2015	6370

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

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	Pathogens 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

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
2015	10

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #4

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
2015	258

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Despite the recent down-turn in the economy, gardening remains the number one hobby of Americans including citizens of the State of Oklahoma. Consequently, over 500 nurseries, greenhouse and or garden center operations remain viable businesses throughout the state (stat from Oklahoma Nursery and Floral License Directory, ODAFF). Given the sheer number of green industry professionals not to mention allied groups such as landscape architects, urban foresters, arborists, etc., it seems reasonable to assist these groups in order that they remain ranked in the top ten states for gross sales of products and services (Oklahoma has been ranked no. 10 (ten) in the nation on occasion for its gross sales).

What has been done

A program to introduce and assist growers with using a ?banker plant? system of biological controls was developed. Currently, a graduate student is working with three grower cooperators to evaluate its potential. Work is continuing that will evaluate effectiveness of the system and growers? attitudes towards biological control.

Results

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	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants

- 215 Biological Control of Pests Affecting Plants
- 216 Integrated Pest Management Systems

Outcome #5

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.

Not Reporting on this Outcome Measure

Outcome #6

1. Outcome Measures

Participants will understand connections between pest management of bed bugs, the near environment, housing, health, and well-being resulting in an increase in the number of Oklahoman?s practicing bed bug risk reduction.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Bed bugs are significant pest, can build up in large numbers before they are noticed, and are difficult to eliminate from the home environment. There are significant barriers to successful eradication. Barriers include: stigma associated with bed bug infestation, social and mobile nature of humans today, and high cost of most effective treatments.

What has been done

Bed bugs risk reduction is being taught through healthy homes programming, that is, a holistic approach to consumer health, welfare, and safety in the home environment.

Results

Twenty-one people attended a bed bug management program geared for in-service to extension educators in 4H and FCS. A new healthy homes app will provide consumers education needed to reduce risk. IPM is featured as part of the app.

4. Associated Knowledge Areas

KA Code	Knowledge Area
216	Integrated Pest Management Systems

Outcome #7

1. Outcome Measures

Stakeholders will increase awareness of invasive species in Oklahoma (such as saltcedar, brown marmorated stink bug, emerald ash borer, etc) and how they might be managed.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	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 researchers, 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 2015 for landowners and NRCS employees. Extension educators, landowners and NRCS personnel collected approximately 10,000 musk thistle head weevils and 1,000 musk thistle rosette weevils in Alfalfa and Grant counties in spring of 2015 for redistribution.

Results

To date, this program collected and redistributed more than 944,000 musk thistle head weevils and 47,710 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
211	Insects, Mites, and Other Arthropods Affecting Plants
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems

Outcome #8

1. Outcome Measures

Sugarcane Aphid Management

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Sorghum was grown on 310,000-400,000 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, the Sorghum checkoff program funded 5 research/extension demonstrations to evaluate chemical and varietal control options and the impact of the aphid on production. One news release, 5 field day presentations and one television program (Sunup; viewership 20,000) were provided through

OSU to assist growers in identifying sugarcane aphid, with suggestions for determining the need for control.

Results

In 2015, sugarcane aphid was found in 32 counties, infesting a minimum of 200,000 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 150,000-200,000 acres of grain sorghum in 2015. Based on an extension demonstration coordinated by the IPM Crops Insect Pest Management Team, this Emergency registration saved Oklahoma sorghum growers ca. \$7.2-\$14.4 million in lost grain yield, depending on whether they sprayed once or twice for sugarcane aphid.

4. Associated Knowledge Areas

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

Outcome #9

1. Outcome Measures

Managing Hessian fly through acreage planted to resistant wheat varieties

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	1200000

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 appears 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, is 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 suggests that host plant resistance coupled with cultural controls should 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. Currently, Hessian fly has been reported to be infesting winter wheat in western Oklahoma. A minimum of 5%, or 70,000 acres were planted in areas where Hessian fly was documented (from 2009-2011) to be a serious problem. Producers that planted these varieties will recoup an estimated \$1.4 million in yield savings.

4. Associated Knowledge Areas

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

Outcome #10

1. Outcome Measures

Management of Horn Flies in Cattle

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahoma beef production represents 53% of the total cash receipts received by Oklahoma agricultural commodities. A major pest that impacts both health and production of beef animals is the horn fly. This pest can impact daily weight gains, weaning weights and cause the animal to consume more forage without the gain advantage when this pest is present.

What has been done

Two major beef sectors (stockers and cow/calf) rely on insecticides to control the horn fly and the Animal Pest Management group within the IPM team has conducted trainings as well as efficacy trials to determine which products are more effective. Through these trainings and trials, we monitor horn fly populations in relation to certain insecticide application methods. The trainings and demonstration trials utilize all aspects of the Oklahoma Cooperative Extension Service which include County Educators, Area Extension Livestock Specialist, and State Extension Specialists.

Results

Through our trainings and demonstration trials we were able to show the most efficacious application method for horn fly control are ear tags impregnated with insecticides. When compared to other application methods ear tags required fewer follow-up insecticide applications when compared to sprays and pour-on applications. This results in lower labor costs due to reduced insecticide applications as well as improved environmental quality to pasture ecosystems. Another advantage was the cattle tagged with insecticide impregnated ear tags gained 24.8 lbs more than those sprayed multiple times to reduce horn fly populations. These results were presented to beef producers at 15 different beef extension meetings and out of 400 attendees at these meetings 20% stated they would change their insecticide application practices to control horn flies. If 20% of Oklahoma beef producers changed to this method of fly control, the Oklahoma beef market would realize \$35.16 million in additional income (24.8 lb X \$1.61 per pound = \$7.73 per animal X 4.55 million beef animals in Oklahoma X 0.2 adoption rate).

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

V(I). Planned Program (Evaluation Studies)

Evaluation Results

The number of people receiving training and the publications generated shows impact within Oklahoma.

Key Items of Evaluation

Number of people receiving training, number of presentations given, and the number of publications generated.

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	5%	0%	5%	0%
212	Pathogens and Nematodes Affecting Plants	0%	0%	50%	0%
213	Weeds Affecting Plants	10%	0%	0%	0%
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	10%	0%	35%	0%
903	Communication, Education, and Information Delivery	75%	0%	10%	0%
	Total	100%	0%	100%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	0.7	0.0	3.0	0.0
Actual Paid	0.5	0.0	3.5	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	148098	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	148098	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
75000	0	900973	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. Increase visibility and impact of NIMFFAB through education and outreach (an interactive website, student internships, field exercises, hosting meetings).
6. 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

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	992	332	25	0

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

Patent Applications Submitted

Year: 2015

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	1	17	18

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
2015	66

Output #2

Output Measure

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

Year	Actual
2015	93

Output #3

Output Measure

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

and food safety.

Year	Actual
2015	18

Output #4

Output Measure

- Number of grants/contracts awarded in those areas.

Year	Actual
2015	12

Output #5

Output Measure

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

Year	Actual
2015	21

Output #6

Output Measure

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

Year	Actual
2015	35

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

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
2015	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
212	Pathogens 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
2015	7

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
212	Pathogens and Nematodes Affecting Plants
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
2015	3

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	Pathogens 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
2015	35

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
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211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

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

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

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	25%	0%	60%	0%
602	Business Management, Finance, and Taxation	28%	0%	10%	0%
603	Market Economics	30%	0%	10%	0%
607	Consumer Economics	7%	0%	10%	0%
610	Domestic Policy Analysis	10%	0%	10%	0%
	Total	100%	0%	100%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	7.0	0.0	4.0	0.0
Actual Paid	8.0	0.0	1.4	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
65000	0	57124	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
65000	0	57124	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
1420000	0	347518	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; agricultural lenders; policy makers; agency leadership

3. How was eXtension used?

The cooperatives community of practice on eXtension was used extensively to develop and deliver information to cooperative managers, board of director members and producer members. During 2015, 10 articles in a new blog "Farmer Cooperative Commentary" were published 17 section of educational content were publications on eXtension

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	38253	558000	3000	20000

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

Patent Applications Submitted

Year: 2015

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	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
2015	45

Output #2

Output Measure

- Number of software decision analysis aids developed

Year	Actual
2015	6

Output #3

Output Measure

- Number of manuscripts submitted to refereed journals

Year	Actual
2015	43

Output #4

Output Measure

- Number of farm income tax management schools conducted

Year	Actual
2015	11

Output #5

Output Measure

- Number of participatory experiential learning workshops conducted

Year	Actual
2015	3

Output #6

Output Measure

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

Year	Actual
2015	55

Output #7

Output Measure

- Number of Extension educational meetings and workshops conducted

Year	Actual
2015	402

Output #8

Output Measure

- Number of website posts and other electronic media deliveries
Not reporting on this Output for this Annual Report

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of 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
6	Number of stakeholder downloads of information from websites and other electronic media
7	Farm Business Management for Women and Minorities
8	Improved Grain Grading

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 Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	1950

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 46 years. It has grown from a one-day seminar to its present form of two days per location for the fall Oklahoma Farm and Business Tax Institutes and the summer Tax Clinic. This year was the third for our one day Special Topics Course. 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 2015 attendance for the schools was approximately 1,950 tax preparers. 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 37,000 Federal farm tax returns and 255,000 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
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	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 fifteen 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 lead cooperatives with \$270 million of assets that market almost \$500 million of commodities for their farmer members while also providing \$120 million of crop inputs. The OCCD training builds increases their understanding of financial management, business strategy and legal issues. This contributes to the financial success of these farmer-owned organizations helping them to distribute over \$12 million of profits back to their members while maintaining almost 1,500 jobs in rural communities. A recent study determined the total economic impact of Oklahoma cooperatives at \$2.3 billion. The OCCD program has contributed to success of these firms, impacting the 39,000 producers who are members of Oklahoma cooperatives by enhancing the boards' 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
2015	71

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Beef production accounts for approximately one-third of Oklahoma's agricultural production in most years. Moreover, nearly seventy percent of the state's 80,000+ farms have some cattle and over fifty percent of the land area in Oklahoma is pasture or rangeland. Most of the cattle operations are small in size, with three-quarters of the beef cow inventory in herds of fifty head or fewer. Costs of production are highly variable but smaller cattle operations often have higher cost of production and are less likely to incorporate best management practices.

What has been done

An interdisciplinary Beef Cattle Manual was first published in spring 2004, then updated and reprinted in fall 2005, fall 2008 and fall 2015. The manual now contains 45 chapters addressing various business, production, and natural resource topics. An interdisciplinary team effort has resulted in a variety of educational products and programs, including the Beef Cattle Manual, benchmarking of cow/calf and stocker producer practices, Master Cattleman programs delivered at the local level, periodic in-service training for Extension educators, biennial Master Cattleman Summits, journal articles and Extension publications, including a quarterly newsletter for graduates. To become a Master Cattleman, a producer completes twenty eight hours of instruction from the Beef Cattle Manual and associated quizzes. The program has enjoyed wide adoption in the state and continues to be a popular staple in educational programming. Approximately 1,106 students have enrolled in the Master Cattleman program since 2004 and 897 have completed the program, with 45 graduating in 2015.

Results

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 11 years for a total impact of \$3.1 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
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	650

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Agricultural producers and agribusiness need information on a wide variety of financial decisions - including crop and livestock enterprise budgeting, crop insurance alternatives, construction costs, machinery sharing, agribusiness market share and other topics.

What has been done

Farm and agribusiness team members continue to develop and update decision aids which assist producers and agribusiness managers with these financial and management decisions.

Results

Over 650 decision aids were downloaded with many more distributed through email and through supporting industry organizations. These include decision aids on cooperative market share, machinery sharing arrangements, crop enterprise budgets, grain bin and pole barn construction costs, cooperative profit distribution alternatives, crop insurance program alternatives, wind energy leasing alternatives and other topics. These decision aids assisted producers and agribusiness managers in operating more efficiently.

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
2015	90

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Understanding and managing risk is a critical management area for Oklahoma's agricultural producers and agribusiness managers.

What has been done

The packer-feeder simulation program was created to help beef industry participants understand the market risk in the beef supply chain. The Oklahoma Banking simulator was developed to assist lenders in understanding the composite risks of a loan portfolio. 70 lenders participated in workshops using the banking simulator and over 20 producers worked with the packer-feeder game.

Results

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

Outcome #6

1. Outcome Measures

Number of stakeholder downloads of information from websites and other electronic media

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	77000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

On-line decision aids and webinar recordings are an important vehicle to distribute research based information to farm producers and agribusiness industry participants.

What has been done

Numerous farm management decision aides have been made available for on-line use for producers in Oklahoma and around the nation. These include the OSU-Kansas State Farm Bill Tool, Oklahoma Land Values, Enterprise Budgets, livestock economics and more.

Results

The farm commodity programs authorized by the 2014 farm bill were the most complicated commodity programs to date. With signup deadlines in 2015, dozens of meetings and workshops were held around the state and region. The OSU-KSU Farm Bill Decision Tool was developed to assist producers with evaluating the complex decisions associated with commodity programs. The program incorporated data from all states, counties, parishes, and buroughs in the US with base acres. The tool was used over 37,000 times nationwide. The estimated revenue protected with the tool is \$13.9 billion. Breakdown of other website activity is as follows.

Google Analytics*

	Sessions	Users	Pageviews	Bounce rate
OK Land Values	9,642	8,550	28,019	58.21
Quicken	7,376	6,475	12,101	71.85
Budgets	7,934	6,311	14,025	64.92
Master Cattleman	7,356	5,861	14,794	66.18
Livestock Econ	5,026	4,416	6,206	80.04
Farmbook	4,933	4,660	5,571	86.50
Women in Ag	7,885	7,070	10,529	87.63

Farm Finance	3,792,662,149	89.03
Annie's Project	4,391,125,214	85.77
Farm Transition	3,880,515,408	82.58
IFMAPS	3,920,714,338	87.42
Total	66,135,835,911,354	

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
607	Consumer Economics
610	Domestic Policy Analysis

Outcome #7

1. Outcome Measures

Farm Business Management for Women and Minorities

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	283

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Women and minority farmers are often at a disadvantage due to being underserved by government and educational programs. The OSU programs in conjunction with USDA's risk management cooperative agreement programs emphasize specialty crops and underserved commodities and have four target audiences for risk management education: women in agriculture; beef and forage producers; specialty crops producers and those impacted by crop insurance and Farm Bill changes.

What has been done

Educational programs targeting women producers in Oklahoma include a statewide women in agriculture and small business conference and the Annie's Project workshop series. In 2015, the statewide conference experienced record attendance with 242 participants, up from 175 the previous year and offered approximately 12-15 hours of education over the course of two days. Five Annie's Project workshop series were led in Oklahoma in 2015. The six week program provides 18 hours of instruction and is dedicated to strengthening women's roles in the modern farm enterprise. Annie's Project aims to foster problem solving, record keeping, and decision making skills. Two in-service workshops and one webinar training, for county educators, were held in 2014 and 2015.

Results

Statewide Conference for Women in Agriculture and Small Business

97% of participants from the statewide conference responded very positively to the information, education and/or workshops provided, citing the overall satisfaction of the conference as 'Good' or 'Excellent'. As a result of the programs, attendees said they would "be able to take a stronger role in their farm/ranch business" and will be able "to improve [their] operation". It was also noted that the programming will assist them in "starting and growing [their] business". On the program evaluation survey, participants were able to estimate the annual economic benefit to their operation from attending the two-day conference, with the average amount at \$1,450 and outlier amounts of \$30,000 and "immeasurable". The statewide conference has also encouraged the launch of several regional women in agriculture conference, around the state.

Annie's Project Workshop Series

The Annie's Project workshop series had 41 participants who completed the course in 2015. Courses were held in five counties: Grant, Logan, Kay, Okfuskee, and Osage. In program evaluation surveys, participants said the course helped them to "understand legal documents, financing the farm production and livestock reporting". It was also stated that they now "know how to calculate input costs so that the production can be maximized for best profit" and are generally "more knowledgeable about the financial side of the operation". A total of 19 Annie's Project courses have been taught in Oklahoma since 2007 with 194 participants.

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 #8

1. Outcome Measures

Improved Grain Grading

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	225

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

An OSU research team sampled over 3600 trucks delivering grain during harvest. The OSU research indicated that grain elevator personnel underestimated dockage, foreign material and over estimated the test weight in loads of grain delivered at harvest. The ten percent of producers delivering the highest quality grain were under compensated by \$.05/bushel while the 10% of producers delivering the lowest quality loads were over compensated by \$.22/bushel. This price distortion which totaled more than \$13 million/year reduced the incentive for producers to deliver cleaner, better grain. Inaccuracies in grading hinder communication and increase procurement risk all through the grain supply chain.

What has been done

OSU personnel designed a new hands-on grain grading school. Grain grading school participants received classroom instruction on grain grading principles and federal grain standards. They also grade a series of grain samples and compare their results with official grain inspection service grades on the same samples.

Results

As a result of the workshops, grain grading accuracy improved, reducing risks for both producers and grain handling firms. The grain pricing system became more efficient, increasing the premiums for producers delivering high quality grain. Over 225 agribusiness personnel attended one of the eight grain grading schools offering in 2015.

4. Associated Knowledge Areas

KA Code	Knowledge Area
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

V(I). Planned Program (Evaluation Studies)

Evaluation Results

The following are analytics run on a part of the farm business management websites available.

Google Analytics*

Sessions

Users

Pageviews

Bounce rate

OK Land Values

9,642

8,550

28,019

58.21

Quicken

7,376

6,475

12,101

71.85

Budgets

7,934

6,311

14,025

64.92

Master Cattleman

7,356

5,861

14,794

66.18

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Livestock Economics

5,026

4,416

6,206

80.04

Farmbook

4,933

4,660

5,571

86.50

Women in Ag

7,885

7,070

10,529

87.63

Farm Finance

3,792

3,662

4,149

89.03

Annie's Project

4,391

4,125

5,214

85.77

Farm Transitions

3,880

3,515

5,408

82.58

IFMAPS

3,920

3,714

4,338

87.42

Total

66,135

58,359

110,354

Key Items of Evaluation

This did not include the 37,000 visits on the OSU-Kansas State Farm Bill Tool which was downloaded over 37,000 between late 2014 and 2015. Independent estimates show this helped producers protect \$39 million of farm production.

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%	0%	100%	0%
	Total	100%	0%	100%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	2.0	0.0	4.0	0.0
Actual Paid	0.5	0.0	4.2	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
30000	0	178564	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
30000	0	178564	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
165000	0	1086316	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Developing partnerships with universities, industry, and federal laboratories.
- Developing project proposals
- Preparing and presenting technical papers
- Submitting papers for journal articles
- Developing licenses and patents
- Taking new and/or improved products to pre-commercialization
- Developing educational materials
- Disseminate research findings through meetings and workshops

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

2015	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: 2015

Actual: 6

Patents listed

Atiyeh, H. K., J. R. Phillips and R. L. Huhnke. Fermentation Control for Optimization of Syngas Utilization. International Patent Application No. PCT/US2015/60720, Filed: 11/13/2015.

Kumar, A.*, Zixu Yang, and A. Apblett. Synergistic co-pyrolysis of biomass and methane for hydrocarbon fuels and chemicals production. US provisional patent serial number: 62/168,166. Filed on May 29, 2015.

Kumar, A.*, K. Qian, D. D. Bellmer, H. Zhang, and K. N. Patil. International Patent Application No. PCT/US2015/032984. System and method of producing a char supported Nickel catalyst for sue in syngas production. Filed ? May 28, 2015.

Tadege, M. and K.S. Mysore. 2015. Methods and Compositions for Altering Plant Biomass. United States Patent No. 9,074,216.

Atiyeh, H. K., J. R. Phillips and R. L. Huhnke. System and Method for Feedback Control of Gas Supply for Ethanol Production Via Syngas Fermentation Using pH as a Key Control Indicator. U.S. Provisional Patent Application, Filed: 03/25/2015.

Atiyeh, H. K., J. R. Phillips and R. L. Huhnke. Fermentation Control for Optimization of Syngas Utilization. U.S. Provisional Patent Application, Filed: 11/13/2015.

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	1	48	49

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Technical papers and presentations

Year	Actual
2015	55

Output #2

Output Measure

- New processes or products developed

Year	Actual
2015	8

Output #3

Output Measure

- Technology demonstrations conducted

Year	Actual
2015	3

Output #4

Output Measure

- Educational Publications

Year	Actual
2015	1

Output #5

Output Measure

- Extension programs developed

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Year	Actual
2015	2

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
2015	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. However, perennial grasses and annual forages in this state have shown to be viable renewable biomass feedstocks. 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

What has been done

Switchgrass is a naturally allogamous species. Four inbred lines of northern lowland (NL) germplasm and four inbred lines of southern lowland (SL) germplasm were used in the production of experimental hybrids. The hybrid seeds were produced and used to establish a biomass yield trial. To identify genomic regions associated with reproductive development, two lowland populations, one consisting of 176 progenies from NL94 (9792;) × SL93 (9794;) and a first-generation self-fertilized population of 265 progenies from NL94, were field established in a randomized complete block design with three replications at two Oklahoma locations. Phenotypic data of reproductive maturity in the populations were collected in two years.

Results

The experimental hybrid cultivars along with three commercial standard cultivars, Alamo, Cimarron and Kanlow were field established using a randomized complete block design with four replications. The establishment-year biomass yields of the best experimental hybrid cultivars were 20% more than that of the best commercial cultivars. This trial will be continued for three more years. Significant genetic variation for reproductive maturity was observed within the two populations. Broad-sense heritabilities were 0.46 to 0.77 and 0.28 to 0.74 for the hybrid and selfed populations, respectively.

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

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Fundamental knowledge of engineering or science gained in developing biobased products

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

MicroRNAs, a class of small non-coding RNAs are well known their gene regulatory roles by destroying or repressing translation of the mRNA targets. We are conducting research that might identify critical miRNAs that might be important for adaptation to abiotic stresses such as drought and heat.

What has been done

Identification of conserved and novel miRNA families were performed following drought or heat. We continue to characterize several miRNAs that appear to be important for adaptation to abiotic (drought and heat) stresses in switchgrass and sorghum. These miRNAs could be potential candidates for developing stress tolerance in these bioenergy crop species.

Results

Twenty-nine conserved and 62 novel miRNA families were identified. Notably, the abundances of several conserved and novel miRNAs were dramatically altered following drought or heat. Using at least one fold (log2) change as cut off, we observed that 13 conserved miRNA families were differentially regulated by both stresses, and, five and four families were specifically regulated by drought and heat, respectively. Similarly, using a more stringent cut off of two fold (log2) regulation, we found 5 and 16 novel miRNA families were upregulated but 6 and 7 families were downregulated under drought and heat, respectively. The stress-altered expression of a subset of miRNAs and their targets was confirmed using quantitative PCR. Overall, the switchgrass plants exposed to drought or heat revealed similarities as well as differences with respect to miRNA regulation, which could be important for enduring different stress conditions.

4. Associated Knowledge Areas

KA Code	Knowledge Area
511	New and Improved Non-Food Products and Processes

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
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

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

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, production of bioplastics through microbial cultivation and biochemical conversion of biomass to biofuels. Cellulosic feedstocks being converted are switchgrass, sorghum and Eastern redcedar.

Results

There are opportunities to apply the hybrid conversion technology in different regions of the country to meet our increasing energy needs. Upon its full development, this hybrid technology can provide 35% more ethanol from the same amount of biomass as compared to the biochemical conversion technology. The tools developed in the hybrid conversion and biochemical conversion technologies can be applicable with additional research for production of biobased products such as biopolymers, succinic acid, butanediol and other fine chemicals.

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

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	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.

What has been done

Continued the development of a direct monitoring and control of CO/H₂ in bioreactors. The selection and overall design of the real-time CO sensor and real-time CO/H₂ monitoring system were finalized. Ranges for gas measurements and data acquisition module to perform tests of the developed system were established. One invention disclosure is filed with OSU-TDC, who indicated university interest to retain this invention.

Results

There are opportunities to apply the hybrid conversion technology in different regions of the country to meet our increasing energy needs. Upon its full development, this hybrid technology can provide 35% more ethanol from the same amount of biomass as compared to the biochemical conversion technology. If biofuel producers adopt this hybrid technology to produce 25% of the mandated 16 billion GPY renewable transportation fuels such as ethanol (i.e., 4 billion GPY), my research suggests a projected annual savings of over \$650 million due to the use of 13.1 million tons less biomass with the hybrid technology.

4. Associated Knowledge Areas

KA Code	Knowledge Area
511	New and Improved Non-Food Products and 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

Low funding levels.
Accounting issues within departments and division due to the implementation of a new accounting system.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

None

Key Items of Evaluation

Identified several potential miRNAs that could play important roles under abiotic stress conditions such as drought and heat both in switchgrass and sorghum.

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	12%	0%	0%	0%
703	Nutrition Education and Behavior	40%	0%	0%	0%
724	Healthy Lifestyle	18%	0%	0%	0%
802	Human Development and Family Well-Being	19%	0%	0%	0%
806	Youth Development	11%	0%	0%	0%
	Total	100%	0%	0%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	35.0	0.0	0.0	0.0
Actual Paid	13.0	0.0	0.0	0.0
Actual Volunteer	6.8	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
110000	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
110000	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
2380000	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?

eXtension is provided as an educator resource.

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	191524	1800000	75000	1600000

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

Patent Applications Submitted

Year: 2015
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	4	14	18

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of OSU Facts published

Year	Actual
2015	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
2015	77

Output #3

Output Measure

- Number of in-service training sessions

Year	Actual
2015	16

Output #4

Output Measure

- Number of certification training sessions

Year	Actual
2015	5

Output #5

Output Measure

- Number of other training sessions, workshops, etc. conducted

Year	Actual
2015	0

Output #6

Output Measure

- Number of presentations at Extension organized meetings

Year	Actual
2015	4

Output #7

Output Measure

- Number of presentations at other meetings and events (professional meetings, invitations to speak to community groups, etc.)

Year	Actual
2015	18

Output #8

Output Measure

- Number of workshops, conferences, etc. organized

Year	Actual
2015	8

Output #9

Output Measure

- Number of posters or displays

Year	Actual
2015	1

Output #10

Output Measure

- Number of other demonstrations, displays, exhibits, and models

Year	Actual
2015	3

Output #11

Output Measure

- Number of newsletters

Year	Actual
2015	4

Output #12

Output Measure

- Number of website hits

Year	Actual
2015	37062

Output #13

Output Measure

- Number of radio and television presentations

Year	Actual
2015	32

Output #14

Output Measure

- Number of newspaper, and magazine articles written

Year	Actual
2015	12

Output #15

Output Measure

- Average number of phone calls and/or email requests responded to on a weekly basis

Year	Actual
2015	44

Output #16

Output Measure

- Number of websites

Year	Actual
2015	6

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 low-fat dairy and other calcium-rich 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
15	Percentage decrease in child problematic behaviors
16	Percentage decrease in disengaged or hostile parenting

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
2015	75

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. Half of all the state's adults reported eating no fruit and 48% 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 2015, 95 programs were presented to 16,392 participants. Oklahoma youth attended programs through 30 different curricula. Oklahoma adults attended programs through 23 different curricula. Surveys of participants showed a 200% increase in youth who plan to eat a serving of fruit 2 or more times each day; 77% increase in adults who plan to eat a serving of fruit 2 or more times each day; 27% improvement of OrganWise Guys participants in responses to eat fruit. Programs presented include:

OrganWise Guys program. Based on 2,050 pre-post tests, improvements were reported among participating Oklahoma youth in the areas of increasing servings of fruit and vegetables, skim milk, hand-washing before eating, and physical activity. Youth also reported increased consumption of healthy snacks, 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. 609 youth across the state participated in this program. In addition to increasing their knowledge of healthy foods, the students are trying new foods.

The Farm to You exhibit was experienced by over 9,548 students in 19 counties in Oklahoma. It has also been featured at summer camps, county fairs and community events. This brings the seven year total to over 100,000 elementary school students in 74 counties. 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
2015	85

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. Half of all the state's adults reported eating no fruit and 48% 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 2015, 95 programs were presented to 16,392 participants. Oklahoma youth attended programs through 30 different curricula. Oklahoma adults attended programs through 23 different curricula. Surveys of participants showed 135% increase in youth who plan to eat a serving of vegetables 3 or more times each day and 87% increase in adults who plan to eat a serving of vegetables 3 or more times each day. Programs presented include:

OrganWise Guys program. Based on 2,050 pre-post tests, improvements were reported among participating Oklahoma youth in the areas of increasing servings of fruit and vegetables, skim milk, hand-washing before eating, and physical activity. Youth also reported increased consumption of healthy snacks, 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. 609 youth across the state participated in this program. In addition to increasing their knowledge of healthy foods, the students are trying new foods.

The Farm to You exhibit was experienced by over 9,548 students in 19 counties in Oklahoma. It has also been featured at summer camps, county fairs and community events. This brings the seven year total to over 100,000 elementary school students in 74 counties. 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
2015	100

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. Half of all the state's adults reported eating no fruit and 48% 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 2015, 95 programs were presented to 16,392 participants. Oklahoma youth attended programs through 30 different curricula. Oklahoma adults attended programs through 23 different curricula. Surveys of participants show 400% increase in youth who plan to eat a whole grain food 3 or more times each day and 56% increase in adults who plan to eat a whole grain food 3 or more times each day. Programs presented include:

?OrganWise Guys program. Based on 2,050 pre-post tests, improvements were reported among participating Oklahoma youth in the areas of increasing servings of fruit and vegetables, skim milk, hand-washing before eating, and physical activity. Youth also reported increased consumption of healthy snacks, 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. 609 youth across the state participated in this program. In addition to increasing their knowledge of healthy foods, the students are trying new foods.

?The Farm to You exhibit was experienced by over 9,548 students in 19 counties in Oklahoma. It has also been featured at summer camps, county fairs and community events. This brings the seven year total to over 100,000 elementary school students in 74 counties. 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 low-fat dairy and other calcium-rich foods

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	68

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. Half of all the state's adults reported eating no fruit and 48% 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 2015, 95 programs were presented to 16,392 participants. Oklahoma youth attended programs through 30 different curricula. Oklahoma adults attended programs through 23 different curricula. Surveys of program participants showed 115% increase in youth who plan to eat or drink a serving of calcium-rich food 2 or 3 times each day; 67% increase in adults who plan to eat or drink a serving of calcium-rich food 2 or 3 times each day; and 29% improvement in OrganWise Guys participants in responses to ask someone to buy low-fat milk. Programs presented include:

?OrganWise Guys program. Based on 2,050 pre-post tests, improvements were reported among participating Oklahoma youth in the areas of increasing servings of fruit and vegetables, skim milk, hand-washing before eating, and physical activity. Youth also reported increased consumption of healthy snacks, 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. 609 youth across the state participated in this program. In addition to increasing their knowledge of healthy foods, the students are trying new foods.

?The Farm to You exhibit was experienced by over 9,548 students in 19 counties in Oklahoma. It has also been featured at summer camps, county fairs and community events. This brings the seven year total to over 100,000 elementary school students in 74 counties. 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
2015	70

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. Half of all the state's adults reported eating no fruit and 48% 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 2015, 95 programs were presented to 16,392 participants. Oklahoma youth attended programs through 30 different curricula. Oklahoma adults attended programs through 23 different curricula. Survey of participants showed 65% decrease in youth who plan to buy foods that are high in fat, sugar, or salt; 76% decrease in adults who plan to buy foods that are high in fat, sugar, or salt; 90% decrease in youth who plan to eat snack foods (chips, cookies, candy, etc.) 1 or more times a day; 40% decrease in adults who plan to eat snack foods (chips, cookies, candy, etc.) 1 or more times a day; and 30% improvement in OrganWise Guys participants in responses to select healthy snacks.

Programs presented include:

?OrganWise Guys program. Based on 2,050 pre-post tests, improvements were reported among participating Oklahoma youth in the areas of increasing servings of fruit and vegetables, skim milk, hand-washing before eating, and physical activity. Youth also reported increased consumption of healthy snacks, which can play a role in reducing overweight and risk of related chronic diseases.

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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
2015	39

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

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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 2015, 95 programs were presented to 16,392 participants. Oklahoma youth attended programs through 30 different curricula. Oklahoma adults attended programs through 23 different curricula. Surveys of participants show a 39% decrease in adults who plan to drink 1 or more sugar-sweetened drinks each day. Programs presented include:

?OrganWise Guys program. Based on 2,050 pre-post tests, improvements were reported among participating Oklahoma youth in the areas of increasing servings of fruit and vegetables, skim milk, hand-washing before eating, and physical activity. Youth also reported increased consumption of healthy snacks, which can play a role in reducing overweight and risk of related chronic diseases.

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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
2015	35

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. Half of all the state's adults reported eating no fruit and 48% 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 2015, 95 programs were presented to 16,392 participants. Oklahoma youth attended programs through 30 different curricula. Oklahoma adults attended programs through 23 different curricula. Surveys of participants show 50% increase in youth who plan to be physically active at least 60 minutes throughout the day; 37% increase in adults who plan to be physically active at least 60 minutes throughout the day; and 24% improvement in OrganWise Guys participants in responses to do physical activities. Programs presented include:

?OrganWise Guys program. Based on 2,050 pre-post tests, improvements were reported among participating Oklahoma youth in the areas of increasing servings of fruit and vegetables, skim milk, hand-washing before eating, and physical activity. Youth also reported increased

consumption of healthy snacks, 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. 609 youth across the state participated in this program. In addition to increasing their knowledge of healthy foods, the students are trying new foods.

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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
2015	22

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. Half of all the state's adults reported eating no fruit and 48% 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 2015, 95 programs were presented to 16,392 participants. Oklahoma youth attended programs through 30 different curricula. Oklahoma adults attended programs through 23 different curricula. Surveys of participants showed 26% increase in youth who plan to use safe food handling practices; 5% increase in adults who plan to use safe food handling practices; and 48% improvement in OrganWise Guys participants in responses to identify when to wash their hands before eating.

Programs presented include:

• OrganWise Guys program. Based on 2,050 pre-post tests, improvements were reported among participating Oklahoma youth in the areas of increasing servings of fruit and vegetables, skim milk, hand-washing before eating, and physical activity. Youth also reported increased consumption of healthy snacks, 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. 609 youth across the state participated in this program. In addition to increasing their knowledge of healthy foods, the students are trying new foods.

• The Farm to You exhibit was experienced by over 9,548 students in 19 counties in Oklahoma. It has also been featured at summer camps, county fairs and community events. This brings the seven year total to over 100,000 elementary school students in 74 counties. 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
2015	15

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 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.

While all teens are vulnerable during adolescence, obese teens 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, 4,003 youth statewide dropped out of high school; 16,357 arrests were made for violent crimes where the victim was a child or adolescent between 10-17 years, and 488 adolescents between 10-17 years were arrested for perpetrating violent crimes. In terms of other risky behaviors, Oklahoma youth rank fourth in the nation (26.8%) in reports of current use of tobacco, in being sexually active (36.2%), and are tied for fourth place in texting or emailing while driving (50.7%).

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 2015, 437 parenting and youth resilience programs were presented to 2,914 participants through 13 different curricula. Surveys of participants show 5% increase in belief that children need encouragement as much as they need discipline

6% increase in belief that parents should monitor their children's activities; 28% increase in disagreement with the belief that sometimes yelling at children is the only way to get them to do what you want; and 18% increase in disagreement with the belief that parents should control their children; Programs presented include:

77 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 329 Oklahoma youth.

Oklahoma Cooperative Extension conducted the award-winning Co-Parenting for Resilience classes in 60 counties to over 2,798 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
2015	20

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 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.

While all teens are vulnerable during adolescence, obese teens 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, 4,003 youth statewide dropped out of high school; 16,357 arrests were made for violent crimes where the victim was a child or adolescent between 10-17 years, and 488 adolescents between 10-17 years were arrested for perpetrating violent crimes. In terms of other risky behaviors, Oklahoma youth rank fourth in the nation (26.8%) in reports of current use of tobacco, in being sexually active (36.2%), and are tied for fourth place in texting or emailing while driving (50.7%).

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 2015, 437 parenting and youth resilience programs were presented to 2,914 participants through 13 different curricula. Surveys of participants show 44% increase in child's sharing readily with other children, for example toys, treats, pencils; and 5% increase in child having at least one good friend. Programs presented include:

?77 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 329 Oklahoma youth.
?Oklahoma Cooperative Extension conducted the award-winning Co-Parenting for Resilience classes in 60 counties to over 2,798 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
2015	45

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 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. While all teens are vulnerable during adolescence, obese teens 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, 4,003 youth statewide dropped out of high school; 16,357 arrests were made for violent crimes where the victim was a child or adolescent between 10-17 years, and 488 adolescents between 10-17 years were arrested for perpetrating violent crimes. In terms of other risky behaviors, Oklahoma youth rank fourth in the nation (26.8%) in reports of current use of tobacco, in being sexually active (36.2%), and are tied for fourth place in texting or emailing while driving (50.7%).

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 2015, 437 parenting and youth resilience programs were presented to 2,914 participants through 13 different curricula. Surveys of participants show 57% increase in feeling sure of self as a mother/father; 33% increase in knowing they are doing a good job as a mother/father; and 45%% increase in persistence in trying to solve problems between their child and themselves. Programs presented include:

?77 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 329 Oklahoma youth.

?Oklahoma Cooperative Extension conducted the award-winning Co-Parenting for Resilience classes in 60 counties to over 2,798 parents.

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
2015	30

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 2015, 437 parenting and youth resilience programs were presented to 2,914 participants through 13 different curricula. Surveys of participants show 33% increase in child being considerate of other people's feelings and 28% increase in child having a good attention span, seeing work through to the end. Programs presented include:

?77 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 329 Oklahoma youth.
?Oklahoma Cooperative Extension conducted the award-winning Co-Parenting for Resilience classes in 60 counties to over 2,798 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

Outcome #15

1. Outcome Measures

Percentage decrease in child problematic behaviors

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	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
802	Human Development and Family Well-Being
806	Youth Development

Outcome #16

1. Outcome Measures

Percentage decrease in disengaged or hostile parenting

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

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Issue team evaluation items for the above outcomes include:

71 youth respondents to health issue team evaluations reported the following planned behavior changes after participating in the program:

- 200% increase in youth who plan to eat a serving of fruit 2 or more times each day
- 135% increase in youth who plan to eat a serving of vegetables 3 or more times each day
- 400% increase in youth who plan to eat a whole grain food 3 or more times each day
- 115% increase in youth who plan to eat or drink a serving of calcium-rich food 2 or 3 times each day
- 65% decrease in youth who plan to buy foods that are high in fat, sugar, or salt
- 90% decrease in youth who plan to eat snack foods (chips, cookies, candy, etc.) 1 or more times a day
- 50% increase in youth who plan to be physically active at least 60 minutes throughout the day
- 26% increase in youth who plan to use safe food handling practices

561 adult respondents to health issue team evaluations reported the following planned behavior changes after participating in the program:

- 5% increase in adults who plan to use safe food handling practices
- 87% increase in adults who plan to eat a serving of vegetables 3 or more times each day
- 56% increase in adults who plan to eat a whole grain food 3 or more times each day
- 67% increase in adults who plan to eat or drink a serving of calcium-rich food 2 or 3 times each day
- 76% decrease in adults who plan to buy foods that are high in fat, sugar, or salt
- 40% decrease in adults who plan to eat snack foods (chips, cookies, candy, etc.) 1 or more times a day
- 39% decrease in adults who plan to drink 1 or more sugar-sweetened drinks each day
- 37% increase in adults who plan to be physically active at least 60 minutes throughout
- 77% increase in adults who plan to eat a serving of fruit 2 or more times each day

34 adult respondents to family resilience issue team evaluations reported the following changes after participating in the programs:

- 5% increase in belief that children need encouragement as much as they need discipline
- 6% increase in belief that parents should monitor their children's activities
- 28% increase in disagreement with the belief that sometimes yelling at children is the only way to get them to do what you want
- 18% increase in disagreement with the belief that parents should control their children
- 44% increase in child's sharing readily with other children, for example toys, treats, pencils
- 5% increase in child having at least one good friend
- 57% increase in feeling sure of self as a mother/father
- 33% increase in knowing they are doing a good job as a mother/father

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- 45% increase in persistence in trying to solve problems between their child and themselves
- 33% increase in child being considerate of other people's feelings
- 28% increase in child having a good attention span, seeing work through to the end

Based on 2,050 pre-post tests for the OrganWise Guys program, the following improvements were reported among participating Oklahoma youth:

- 48% improved in their responses to identify when to wash their hands before eating
- 29% improved in their responses to eat vegetables
- 27% improved in their responses to eat fruits
- 30% improved in their responses to select healthy snacks
- 29% improved in their responses to ask someone to buy low-fat milk
- 24% improved in their responses to do physical activities

Key Items of Evaluation

In 2015, 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%	0%	5%	0%
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%	0%	5%	0%
206	Basic Plant Biology	0%	0%	20%	0%
211	Insects, Mites, and Other Arthropods Affecting Plants	0%	0%	5%	0%
212	Pathogens and Nematodes Affecting Plants	0%	0%	5%	0%
304	Animal Genome	0%	0%	5%	0%
305	Animal Physiological Processes	0%	0%	45%	0%
311	Animal Diseases	0%	0%	5%	0%
312	External Parasites and Pests of Animals	0%	0%	5%	0%
	Total	0%	0%	100%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	9.0	0.0
Actual Paid	0.0	0.0	7.1	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	302120	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	302120	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	1837985	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

2015	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: 2015
 Actual: 1

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	0	31	31

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
2015	36

Output #2

Output Measure

- Filing patents for protection of intellectual property and negotiation of licensing agreements for technology transfer.

Year	Actual
2015	1

Output #3

Output Measure

- Training of students and post-docs.

Year	Actual
2015	28

Output #4

Output Measure

- Research discoveries, procedural and technological advances, and solicitation of support for research efforts.

Year	Actual
2015	19

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 design to train individuals in aspects of structural biology.

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
2015	31

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Antibiotic resistance is of great importance to agriculture and public health.

What has been done

Dr. Wilson in collaboration with Dr. Hartson have demonstrated that antibiotic resistant E. coli persister cells suppress translation by selectively disassembling and degrading their protein synthesis apparatus.

Results

Their findings explain the basis for suppression protein synthesis in persisters and suggest how persisters survive exposure to multiple antibiotics. This work is likely to have a major impact on curtailing antibiotic resistant bacteria in hospitals and farms across Oklahoma, as well as nationwide.

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
2015	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
2015	9

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Society has the need for basic research to 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.

What has been done

Team members have placed nine graduate students and postdoctoral associates who they have mentored into appropriate profession level positions.

Results

Team members have trained and mentored scientists who will now continue to make fundamental scientific discoveries that will enhance our understanding of molecular mechanisms involved in the regulation of macromolecular interactions, and determination of macromolecular structures, and the relationships of macromolecular structure to function that can be exploited for the improvement of plant and animal health, and agricultural production.

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
2015	5

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Aedes aegypti is the mosquito that transmits Dengue, Zika and Chikungunya, among other viruses, representing a serious problem for public health worldwide. Traditionally, mosquito populations have been controlled by use of chemical insecticides to prevent mosquito-transmitted diseases. However, new mechanisms conferring insecticide resistance in mosquitoes threaten this approach. The lack of vaccines or drugs to prevent or cure mosquito-transmitted diseases underscores the need to develop alternative strategies to control mosquito population. A detailed understanding of mosquito biology is a prerequisite for the development of new vector control strategies.

What has been done

We have received funding to study the mechanisms of storage and mobilization of fat stores in the vector mosquito, *Aedes aegypti*. The importance of energy reserves for reproduction is obvious in adult female mosquitoes, as low levels of nutrients are stored by these females, who need a blood meal to acquire additional nutrients to complete their reproductive cycle.

Results

Knowledge on lipid metabolism in the *Aedes aegypti* vector mosquito can be applied to improve our understanding of several aspects of mosquito physiology, such as the regulation of oogenesis, mosquito fitness and survival. These are relevant to aspects for the development of innovative strategies to control vector mosquito population.

4. Associated Knowledge Areas

KA Code	Knowledge Area
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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
2015	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

State of the art equipment is required to enhance the research capabilities relating to protein structure/ function/ interactions on the OSU campus, and to researchers abilities to carry out cutting edge research. Such research will contribute to filling 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, and the productivity of agriculture state wide.

What has been done

We raised funds for the purchase of a state-of-the-art Thermo-Fisher Fusion Thribrid Fusion LC-MS/MS electrospray mass spectrometer.

Results

The Orbitrap Fusion Tribrid Mass Spectrometer will enable research scientists in the Division of Agriculture and other OSU colleges to analyze the most challenging low-abundance, high-complexity samples to identify more compounds faster, quantify more accurately and elucidate structures more thoroughly. This will allow researchers to carry out cutting edge experiments that will lead to discoveries that can be exploited for the improvement of plant and animal health, and agricultural production.

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
2015	16

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Scientists in the division of Agricultural Sciences and Natural Resources carry out research that is vital to improving plant and animal health, and agricultural production in the state of Oklahoma. The importance of this work is recognized nationally and internationally by invitations to faculty to present their work at meetings and symposiums.

What has been done

The importance of Dr. Wilson's work on how a bacterial pathogen survives exposure to multiple antibiotics by shutting down the activity of their ribosomes was recognized by an invitation to give a talk entitled, "Bacterial persisters survive antibiotics by remodeling their ribosomes", as a Young Investigator at the 115th General Meeting of the American Society for Microbiology held in New Orleans.

Results

Dr. Wilson's research is advancing the scientific community's understanding of the mechanisms of antibiotic resistance that is of importance to agriculture and public health. Dr. Wilson's invitation to present his laboratory's research results at a national meeting acknowledges the

important contributions that are being made by researchers in the Division of Agricultural Sciences and Natural Resources at OSU to the scientific community at large, and the national prominence of its faculty.

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 design to train individuals in aspects of structural biology.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	140

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Society has the need for scientists who are trained in state of the art technologies, that will lead to research discoveries that will enhance our understanding of molecular mechanisms involved in the regulation of physiological processes in plant and animal systems can be made. These discoveries in turn will help to improve the public health and the economy of the state of Oklahoma.

What has been done

We have trained graduate students, postdoctoral associates and faculty in state-of-the-art techniques that are used in mass spectrometry and bioinformatics.

Results

Researchers at Oklahoma State University have been trained to use cutting edge technology to enhance agricultural research in the state. This training will augment the abilities of scientist to

carry out research that will advance our understanding of molecular mechanisms of physiological processes that can be exploited for the improvement of plant and animal health, and agricultural production.

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

V(I). Planned Program (Evaluation Studies)

Evaluation Results

1. We will evaluate percentage increases in number of manuscripts published as stated in Outcome #1. 119%
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-0
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. 129%
4. We will evaluate percentage increases in numbers of new extramural grants funded as stated in Outcome #4. 50%
5. We will evaluate percentage increases in numbers of instrumentation proposals funded and new instruments obtained as stated in Outcome #5. 1 (2015) vs 0 (2014)
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. 123%
7. We will evaluate the percentage increases in workshop attendance as stated in Outcome #7. 72%

Key Items of Evaluation

Shrinking appropriations and increased competition for research funding is now impacting the ability of TIP team members to obtain grant funds compared with 2014. While team members have increased the numbers of grants they have submitted, their success rate has fallen. However, team members have increased their productivity as measured by the number of manuscripts published. In particular, 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 due to state budgetary cuts. The impact of this situation on the current evaluations compared to 2014 has been minimal, with the exception of the number of grants being funded, reflecting the external factors discussed above.

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	50%	0%	0%	0%
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures	50%	0%	0%	0%
	Total	100%	0%	0%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	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	0.1	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
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
340000	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

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	571	300	300	200

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

Patent Applications Submitted

Year: 2015
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	2	1	3

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of OSU Facts published

Year	Actual
2015	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
2015	5

Output #3

Output Measure

- Number of in-service training sessions

Year	Actual
2015	18

Output #4

Output Measure

- Number of certification Training sessions

Year	Actual
2015	0

Output #5

Output Measure

- Number of other training sessions, workshops, etc. conducted

Year	Actual
2015	6

Output #6

Output Measure

- Number of presentations at Extension organized meetings

Year	Actual
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2015 0

Output #7

Output Measure

- Number of presentations at other meetings and events (professional meetings, invitations to speak to community groups, etc.)

Year	Actual
2015	2

Output #8

Output Measure

- Number of workshops, conferences, etc. organized

Year	Actual
2015	0

Output #9

Output Measure

- Number of posters or displays

Year	Actual
2015	0

Output #10

Output Measure

- Number of other demonstrations, displays, exhibits, and models

Year	Actual
2015	0

Output #11

Output Measure

- Number of newsletters

Year	Actual
2015	0

Output #12

Output Measure

- Number of radio and television presentations

Year	Actual
2015	0

Output #13

Output Measure

- Number of newspaper, and magazine articles written

Year	Actual
2015	3

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 increase in maintenance, conservation, and protection of natural resources (air, land, water)
4	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
2015	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 typical family spends about \$1,900 annually on utility bills. 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. About half of Oklahomans' utility bills are spent on heating and cooling; a large portion of that energy is wasted. Recently, 23% of Oklahomans were potentially exposed to water exceeding a violation limit.

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.

In 2015 82 individuals attended educational programs which taught them how to repurpose and upcycle items such as books, china and glassware, and textiles.

Results

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 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
2015	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 typical family spends about \$1,900 annually on utility bills. 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. About half of Oklahomans' utility bills are spent on heating and cooling; a large portion of that energy is wasted. Recently, 23% of Oklahomans were potentially exposed to water exceeding a violation limit.

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.

In 2015 307 individuals attended programming on water conservation practices and soil erosion.

Results

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 #4

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

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.

This program will be merged with another Planned Program in the future.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

This program will be merged with another Planned Program in the future.

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%	0%	0%
111	Conservation and Efficient Use of Water	6%	0%	0%	0%
121	Management of Range Resources	13%	0%	0%	0%
133	Pollution Prevention and Mitigation	13%	0%	0%	0%
134	Outdoor Recreation	18%	0%	0%	0%
141	Air Resource Protection and Management	5%	0%	0%	0%
723	Hazards to Human Health and Safety	25%	0%	0%	0%
805	Community Institutions, Health, and Social Services	15%	0%	0%	0%
	Total	100%	0%	0%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	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	0.4	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
60000	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
60000	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
640000	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

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	1842	0	600	0

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

Patent Applications Submitted

Year: 2015

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	1	1	2

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of OSU Fact s published

Year	Actual
2015	9

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
2015	3

Output #3

Output Measure

- Number of in-service training sessions

Year	Actual
2015	12

Output #4

Output Measure

- Number of certification training sessions

Year	Actual
2015	0

Output #5

Output Measure

- Number of other training sessions, workshops, etc. conducted

Year	Actual
2015	10

Output #6

Output Measure

- Number of presentations at Extension organized meetings

Year	Actual
2015	13

Output #7

Output Measure

- Number of presentations at other meetings and events (professional meetings, invitations to speak to community groups, etc.)

Year	Actual
2015	3

Output #8

Output Measure

- Number of workshops, conferences, etc. organized

Year	Actual
2015	1

Output #9

Output Measure

- Number of posters or displays

Year	Actual
2015	0

Output #10

Output Measure

- Number of other demonstrations, displays, exhibits, and models

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

2015 0

Output #11

Output Measure

- Number of newsletters

Year	Actual
2015	0

Output #12

Output Measure

- Number of radio and television presentations

Year	Actual
2015	1

Output #13

Output Measure

- Number of newspaper, and magazine articles written

Year	Actual
2015	22

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 increase in maintenance, conservation, and protection of natural resources (air, land, water)
4	Percentage increase in preparation for emergencies
5	Percentage increase in communities that establish or continue collection points/times for recycling/reuse of consumer and agriculture goods
6	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 Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahoma has the 6th highest rate of obesity in the nation. Only 51% of Oklahoma census tracts have a healthy food retailer. Total annual health-related costs of food borne illness in the United States, including associated outpatient and inpatient medical expenses and lost income, totals more than \$15.6 billion.

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. Across the state 259 Oklahomans learned how to preserve food.

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
805	Community Institutions, Health, and Social Services

Outcome #2

1. Outcome Measures

Percentage increase in composting, donation of goods for others to use, repurpose, and recycle

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Percentage increase in maintenance, conservation, and protection of natural resources (air, land, water)

Not Reporting on this Outcome Measure

Outcome #4

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
2015	20

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. In Oklahoma, falls, fires/burns, and poisonings account for the majority of unintentional home injury deaths among all age groups.

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. A total of 595 individuals were reached through emergency preparedness programs such as EDEN Grab and Go Emergency Preparedness and Build an Emergency Preparedness Kit on a Budget. A total of 1,063 youth attended Progressive Ag Safety Day across Oklahoma and learned how to keep safe at home, at play, and during severe weather.

Results

In 2015, 386 Oklahomans pledged to create emergency kits and 155 fulfilled this pledge.

4. Associated Knowledge Areas

KA Code	Knowledge Area
723	Hazards to Human Health and Safety
805	Community Institutions, Health, and Social Services

Outcome #5

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 #6

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, coupled with vacancies in some counties, has reduced activity in some planned programs.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

14 adult respondents to safety issue team evaluations reported the following planned behavior changes after participating in the program:

- 20% increase in those who plan to prepare a home evacuation plan

Key Items of Evaluation

In 2015, 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
703	Nutrition Education and Behavior	30%	0%	0%	0%
723	Hazards to Human Health and Safety	40%	0%	0%	0%
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures	5%	0%	0%	0%
805	Community Institutions, Health, and Social Services	25%	0%	0%	0%
	Total	100%	0%	0%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	19.0	0.0	0.0	0.0
Actual Paid	12.0	0.0	0.0	0.0
Actual Volunteer	3.2	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
100000	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
100000	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
1928000	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, restaurant 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

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	49810	2500000	7009	290000

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

Patent Applications Submitted

Year: 2015
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	1	1	2

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of OSU Facts published

Year	Actual
2015	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
2015	7

Output #3

Output Measure

- Number of in-service training sessions

Year	Actual
2015	5

Output #4

Output Measure

- Number of certification Training sessions

Year	Actual
2015	0

Output #5

Output Measure

- Number of other training sessions, workshops, etc. conducted

Year	Actual
2015	5

Output #6

Output Measure

- Number of presentations at Extension organized meetings

Year	Actual
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2015 0

Output #7

Output Measure

- Number of presentations at other meetings and events (professional meetings, invitations to speak to community groups, etc.)

Year	Actual
2015	1

Output #8

Output Measure

- Number of workshops, conferences, etc. organized

Year	Actual
2015	0

Output #9

Output Measure

- Number of posters or displays

Year	Actual
2015	0

Output #10

Output Measure

- Number of other demonstrations, displays, exhibits, and models

Year	Actual
2015	0

Output #11

Output Measure

- Number of newsletters

Year	Actual
2015	1

Output #12

Output Measure

- Number of radio and television presentations

Year	Actual
2015	15

Output #13

Output Measure

- Number of newspaper, and magazine articles written

Year	Actual
2015	4

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 Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	35

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. Half of all adults reported eating no fruit and 1 in 4 adults eat no vegetables on a daily basis. Forty-eight percent of Oklahoma youth reported they did not eat at least one piece of fruit each day. Oklahoma ranks 44th for vegetable consumption nationally; 44% 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 \$15.6 billion.

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 2015, 521 youth and adult participants across Oklahomans learned safe food handling and food preparation practices through programs such as Food Safety Basics, Home Food Preservation, and Put It Up! Food Preservation for Youth. Of the participants surveyed - 30% increase in adults planning to cook meals at home and 81% increase in youth planning to cook food at home.

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
2015	52

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. Half of all adults reported eating no fruit and 1 in 4 adults eat no vegetables on a daily basis. Forty-eight percent of Oklahoma youth reported they did not eat at least one piece of fruit each day. Oklahoma ranks 44th for vegetable consumption nationally; 44% 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 \$15.6 billion.

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 2015, 521 youth and adult participants across Oklahomans learned safe food handling and food preparation practices through programs such as Food Safety Basics, Home Food Preservation, and Put It Up! Food Preservation for Youth. Of participants surveyed - 46% increase in adults planning to use simple recipes to cook foods and 84% increase in youth planning to use simple recipes to cook food.

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
2015	40

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Total annual health-related costs of food borne illness in the United States, including medical expenses, lost productivity, and even death, totals \$15.6 billion.

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 2015, 521 youth and adult participants across Oklahomans learned safe food handling and food preparation practices through programs such as Food Safety Basics, Home Food Preservation, and Put It Up! Food Preservation for Youth. Of those participants responding to the survey - 54% increase in adults planning to use safe food handling practices; - 6% increase in adults planning to use safe food storage practices; - 26% increase in youth planning to use safe food handling practices; and 38% increase in youth planning to use safe food storage practices.

4. Associated Knowledge Areas

KA Code	Knowledge Area
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703 Nutrition Education and Behavior
723 Hazards to Human Health and Safety

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
2015	18

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. Half of all adults reported eating no fruit and 1 in 4 adults eat no vegetables on a daily basis. Forty-eight percent of Oklahoma youth reported they did not eat at least one piece of fruit each day. Oklahoma ranks 44th for vegetable consumption nationally; 44% 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 \$15.6 billion.

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 2015, 521 youth and adult participants across Oklahomans learned safe food handling and food preparation practices through programs such as Food Safety Basics, Home Food Preservation, and Put It Up! Food Preservation for Youth. Of the participants completing the survey - 13% increase in adults planning on using safe and effective food preservation practices and 44% increase in youth planning on using safe food preservation practices.

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
2015	83

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 2015, 491 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?. Survey showed an 83% increase in those who plan to conduct a basic home safety audit.

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
2015	40

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 2015, 491 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?.

In 2015, 144 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.

Surveys of participants show - 69% increase in those who plan to manage safety hazards in or near their home; 30% increase in those who have confidence in their ability to be safe; 12% increase in those who are able to move without the risk of injury despite their current health condition; 37% increase in those who are able to perform common activities of daily living with minimal difficulty; and 50% increase in those who are confident in their ability to maintain or improve their balance and strength.

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
2015	137

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 2015, 491 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?. The participants completing the survey showed - 137% increase in those who know where to find appropriate assistive technology for their needs

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, Health, and Social Services

Outcome #8

1. Outcome Measures

Percentage increase in use of available assistance by persons with injury/disability

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 Programmatic Challenges

Brief Explanation

Statewide issue team format has changed educator focus and, coupled with vacancies in some counties, has reduced activity in some planned programs.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Issue team evaluation items for the above outcomes include:

135 adult respondents to hunger issue team evaluations and 561 adult respondents to health issue team evaluations reported the following planned behavior changes after participating in the program:

- 30% increase in those planning to cook meals at home
- 46% increase in those planning to use simple recipes to cook food
- 54% increase in those planning to use safe food handling practices
- 6% increase in those planning to use safe food storage practices

- 13% increase in using planning to use safe and effective food preservation practices

131 youth respondents to hunger issue team evaluations and 71 youth respondents to health issue team evaluations reported the following planned behavior changes after participating in the program:

- 81% increase in those who plan to cook food at home
- 84% increase in those who plan to use simple recipes to cook food
- 26% increase in those who plan to use safe food handling practices
- 38% increase in those who plan to use safe food storage practices
- 44% increase in those who plan to use safe food preservation practices

76 adult respondents to safety issue team evaluations reported the following planned behavior changes after participating in the program:

- 69% increase in those who plan to manage safety hazards in or near their home
- 83% increase in those who plan to conduct a basic safety audit
- 30% increase in those who have confidence in their ability to be safe
- 12% increase in those who are able to move without the risk of injury in spite of their current health condition
 - 37% increase in those who are able to perform common activities of daily living with minimal difficulty
 - 50% increase in those who are confident in their ability to maintain or improve their balance and strength
 - 137% increase in those who know where to find appropriate assistive technology for their needs

Key Items of Evaluation

In 2015, 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%	0%	0%
607	Consumer Economics	20%	0%	0%	0%
703	Nutrition Education and Behavior	20%	0%	0%	0%
704	Nutrition and Hunger in the Population	10%	0%	0%	0%
724	Healthy Lifestyle	10%	0%	0%	0%
801	Individual and Family Resource Management	8%	0%	0%	0%
802	Human Development and Family Well-Being	7%	0%	0%	0%
805	Community Institutions, Health, and Social Services	10%	0%	0%	0%
806	Youth Development	10%	0%	0%	0%
	Total	100%	0%	0%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	33.0	0.0	0.0	0.0
Actual Paid	17.0	0.0	0.0	0.0
Actual Volunteer	8.7	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
110000	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
110000	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
2780000	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

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	91007	4400000	10000	250000

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

Patent Applications Submitted

Year: 2015
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	0	2	2

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of OSU Fact s published

Year	Actual
2015	10

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
2015	13

Output #3

Output Measure

- Number of in-service training sessions

Year	Actual
2015	14

Output #4

Output Measure

- Number of certification training sessions

Year	Actual
2015	2

Output #5

Output Measure

- Number of other training sessions, workshops, etc. conducted

Year	Actual
2015	13

Output #6

Output Measure

- Number of presentations at Extension organized meetings

Year	Actual
2015	7

Output #7

Output Measure

- Number of presentations at other meetings and events (professional meetings, invitations to speak to community groups, etc.)

Year	Actual
2015	7

Output #8

Output Measure

- Number of workshops, conferences, etc. organized

Year	Actual
2015	2

Output #9

Output Measure

- Number of posters or displays

Year	Actual
2015	1

Output #10

Output Measure

- Number of other demonstrations, displays, exhibits, and models

Year	Actual
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2015 0

Output #11

Output Measure

- Number of newsletters

Year	Actual
2015	8

Output #12

Output Measure

- Number of radio and television presentations

Year	Actual
2015	18

Output #13

Output Measure

- Number of newspaper, and magazine articles written

Year	Actual
2015	0

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 partnership of agencies and organizations interested in reducing hunger
14	Percentage increase in action to develop and sustain assets that support employment and economic opportunities
15	Percentage increase in child competent behaviors
16	Percentage decrease in child problematic behaviors

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
2015	106

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

According to a recent USDA report, for the three year period of 2012-2014, Oklahoma ranked higher than the national average for food insecurity. Seventeen percent of Oklahomans are classified as food insecure; with one in four children, and one in six adults struggling with hunger daily. Sixty-two percent of Oklahoma public school students are enrolled in the national free or reduced-price school lunch, 50% of all infants born in Oklahoma are enrolled in WIC, and 25% of Oklahomans currently receive Supplemental Nutrition Assistance Program (SNAP). The Regional Food Bank in Oklahoma provides 57.2 million meals a year, while the Community Food Bank of Eastern Oklahoma provides 17.9 million meals a year.

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 2015, 838 Oklahomans participated in educational programs including Eat Right When Money is Tight and MyPlate for My Family that focused on reducing hunger. Of the participants taking the survey - 106% increase in adults who plan to use money saving meal planning or food shopping practices.

4. Associated Knowledge Areas

KA Code	Knowledge Area
607	Consumer Economics
704	Nutrition and Hunger in the Population

Outcome #2

1. Outcome Measures

Percentage increase in food money management practices

Not Reporting on this Outcome Measure

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 Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	89

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

According to a recent USDA report, for the three year period of 2012-2014, Oklahoma ranked higher than the national average for food insecurity. Seventeen percent of Oklahomans are classified as food insecure; with one in four children, and one in six adults struggling with hunger daily. Sixty-two percent of Oklahoma public school students are enrolled in the national free or reduced-price school lunch, 50% of all infants born in Oklahoma are enrolled in WIC, and 25% of Oklahomans currently receive Supplemental Nutrition Assistance Program (SNAP). The Regional Food Bank in Oklahoma provides 57.2 million meals a year, while the Community Food Bank of Eastern Oklahoma provides 17.9 million meals a year.

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 2015, 838 Oklahomans participated in educational programs including Eat Right When Money is Tight and MyPlate for My Family that focused on reducing hunger. Participants responding to the survey indicated - 89% increase in adults who plan to grow, produce, hunt or fish for some of their own food.

4. Associated Knowledge Areas

KA Code	Knowledge Area
607	Consumer Economics
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
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
2015	45

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahoma has some of the nation's highest populations of unbanked (10.9%, ranked 43rd nationally) and underbanked households (22.2%, ranked 37th nationally), families without savings accounts, and consumers with subprime credit. Oklahoma ranks 47th nationally on an index ranking the ability of citizens in the state to build and nurture financial savings and retirement assets. The state ranks 43rd nationally in unbanked households and 44th in consumers with prime credit (42.8%).

Nearly 16% of Oklahomans have an annual income below the federal poverty threshold and 12.9% of Oklahoma households live in extreme asset poverty. The state ranks 38th in average annual pay.

Oklahoma ranks 38th in residents with low-wage jobs (30% of Oklahoma 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 2015, 40 programs using various curricula were presented to 1,033 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 84% plan to regularly track their income and spending, while 59% 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, 55% plan to regularly track their income and spending, while 31% 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
2015	70

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahoma has some of the nation's highest populations of unbanked (10.9%, ranked 43rd nationally) and underbanked households (22.2%, ranked 37th nationally), families without savings accounts, and consumers with subprime credit. Oklahoma ranks 47th nationally on an index ranking the ability of citizens in the state to build and nurture financial savings and retirement assets. The state ranks 43rd nationally in unbanked households and 44th in consumers with prime credit (42.8%).

Nearly 16% of Oklahomans have an annual income below the federal poverty threshold and 12.9% of Oklahoma households live in extreme asset poverty. The state ranks 38th in average annual pay.

Oklahoma ranks 38th in residents with low-wage jobs (30% of Oklahoma 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.

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In 2015, 40 programs using various curricula were presented to 1,033 individuals across Oklahoma. Programs presented include:

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?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, 55% plan to regularly track their income and spending, while 31% plan to have an emergency savings fund equal to at least three months' pay.

In addition, surveys showed that - 57% decrease in those who do not plan on paying off their credit card balance each month; 79% decrease in those who do not plan to take steps to prevent identity theft; and 73% decrease in those adults who do not plan to order a copy of their credit

report on a regular basis.

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
2015	120

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahoma has some of the nation's highest populations of unbanked (10.9%, ranked 43rd nationally) and underbanked households (22.2%, ranked 37th nationally), families without savings accounts, and consumers with subprime credit. Oklahoma ranks 47th nationally on an index ranking the ability of citizens in the state to build and nurture financial savings and retirement assets. The state ranks 43rd nationally in unbanked households and 44th in consumers with prime credit (42.8%).

Nearly 16% of Oklahomans have an annual income below the federal poverty threshold and 12.9% of Oklahoma households live in extreme asset poverty. The state ranks 38th in average annual pay.

Oklahoma ranks 38th in residents with low-wage jobs (30% of Oklahoma 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 2015, 40 programs using various curricula were presented to 1,033 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 84% plan to regularly track their income and spending, while 59% 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, 55% plan to regularly track their income and spending, while 31% plan to have an emergency savings fund equal to at least three months? pay.

Participant surveys also showed - 81% increase in adults who plan to establish or update estate plans; 163% increase in adults who plan to regularly write down financial goals; 67% increase in youth who are cautious in how they spend their money; 33% increase in youth who know that the best time to start saving money is now; 40% increase in youth who would rather have \$15 a week from now than \$10 today.

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
2015	63

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahoma has some of the nation's highest populations of unbanked (10.9%, ranked 43rd nationally) and underbanked households (22.2%, ranked 37th nationally), families without savings accounts, and consumers with subprime credit. Oklahoma ranks 47th nationally on an index ranking the ability of citizens in the state to build and nurture financial savings and retirement assets. The state ranks 43rd nationally in unbanked households and 44th in consumers with prime credit (42.8%).

Nearly 16% of Oklahomans have an annual income below the federal poverty threshold and 12.9% of Oklahoma households live in extreme asset poverty. The state ranks 38th in average annual pay.

Oklahoma ranks 38th in residents with low-wage jobs (30% of Oklahoma 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 2015, 311 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.

Surveys of participants also showed - 60% increase in adult confidence of ability to get a job and

67% in adult confidence of ability to keep a job.

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
2015	75

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahoma has some of the nation's highest populations of unbanked (10.9%, ranked 43rd nationally) and underbanked households (22.2%, ranked 37th nationally), families without savings accounts, and consumers with subprime credit. Oklahoma ranks 47th nationally on an index ranking the ability of citizens in the state to build and nurture financial savings and retirement assets. The state ranks 43rd nationally in unbanked households and 44th in consumers with prime credit (42.8%).

Nearly 16% of Oklahomans have an annual income below the federal poverty threshold and 12.9% of Oklahoma households live in extreme asset poverty. The state ranks 38th in average annual pay.

Oklahoma ranks 38th in residents with low-wage jobs (30% of Oklahoma 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

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?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.

Surveys of participants also showed - 100% increase in preparation to balance family and job needs during major life changes and 50% increase in ability to positively respond to stress.

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
2015	67

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahoma has some of the nation's highest populations of unbanked (10.9%, ranked 43rd nationally) and underbanked households (22.2%, ranked 37th nationally), families without savings accounts, and consumers with subprime credit. Oklahoma ranks 47th nationally on an index ranking the ability of citizens in the state to build and nurture financial savings and retirement assets. The state ranks 43rd nationally in unbanked households and 44th in consumers with prime credit (42.8%).

Nearly 16% of Oklahomans have an annual income below the federal poverty threshold and 12.9% of Oklahoma households live in extreme asset poverty. The state ranks 38th in average annual pay.

Oklahoma ranks 38th in residents with low-wage jobs (30% of Oklahoma 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 2015, 311 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.

Survey of participants also showed - 67% increase in competence of life skills.

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
2015	100

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahoma has some of the nation's highest populations of unbanked (10.9%, ranked 43rd nationally) and underbanked households (22.2%, ranked 37th nationally), families without savings accounts, and consumers with subprime credit. Oklahoma ranks 47th nationally on an index ranking the ability of citizens in the state to build and nurture financial savings and retirement assets. The state ranks 43rd nationally in unbanked households and 44th in consumers with prime credit (42.8%).

Nearly 16% of Oklahomans have an annual income below the federal poverty threshold and 12.9% of Oklahoma households live in extreme asset poverty. The state ranks 38th in average annual pay.

Oklahoma ranks 38th in residents with low-wage jobs (30% of Oklahoma 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 2015, 40 programs using various curricula were presented to 1,033 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 84% plan to regularly track their income and spending, while 59% 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, 55% plan to regularly track their income and spending, while 31% plan to have an emergency savings fund equal to at least three months? pay.

Surveys of participants also showed - 118% increase in adults who plan to regularly make a written spending plan; 102% increase in adults who plan to regularly track income and spending; and 80% increase in preparation to manage finances during major life changes.

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

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

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 partnership of agencies and organizations interested in reducing hunger

Not Reporting on this Outcome Measure

Outcome #14

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 #15

1. Outcome Measures

Percentage increase in child competent behaviors

Not Reporting on this Outcome Measure

Outcome #16

1. Outcome Measures

Percentage decrease in child problematic behaviors

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

Brief Explanation

Statewide issue team format has changed educator focus and, coupled with vacancies in some counties, has reduced activity in some planned programs.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

135 adult respondents to hunger issue team evaluations reported the following planned behavior changes after participating in the program:

- 106% increase in those who plan to use money saving meal planning or food shopping practices
- 89% increase in those who plan to grow, produce, hunt or fish for some of their own food

174 adult respondents to finance issue team evaluations reported the following planned behavior changes after participating in the program:

- 102% increase in those to plan to regularly track income and spending
- 118% increase in those who plan to regularly make a written spending plan
- 57% decrease in those who do not plan on paying off their credit card balance each month
- 79% decrease in those who do not plan to take steps to prevent identity theft
- 73% decrease in those who do not plan to order a copy of their credit report on a regular basis
- 81% increase in those who plan to establish or update estate plans
- 163% increase in those who plan to regularly write down financial goals

17 youth respondents to finance issue team evaluations reported the following planned changes after participating in the program:

- 67% increase in caution in how money is spent
- 33% increase in knowledge that the best time to start saving money is now
- 40% increase in those who would rather have \$15 a week from now than \$10 today

12 adult respondents to jobs and employment readiness issue team evaluations reported the following planned changes after participating in the program:

- 60% increase in confidence of ability to get a job
- 67% in confidence of ability to keep a job
- 100% increase in preparation to balance family and job needs during major life changes
- 50% increase in ability to positively respond to stress
- 80% increase in preparation to manage finances during major life changes
- 67% increase in competence of life skills

Key Items of Evaluation

In 2015, Issue Team-specific Evaluation Questionnaires were collected after planned program curriculum delivery. These questions utilized a retrospective approach.

V(A). Planned Program (Summary)

Program # 20

1. Name of the Planned Program

Enhanced Goat Production in the South - Central United States (Langston University)

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
302	Nutrient Utilization in Animals	0%	30%	0%	30%
307	Animal Management Systems	0%	30%	0%	30%
313	Internal Parasites in Animals	0%	20%	0%	20%
502	New and Improved Food Products	0%	20%	0%	20%
	Total	0%	100%	0%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	2.0	0.0	3.0
Actual Paid	0.0	0.5	0.0	1.3
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	15261	0	54893
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	26360	0	26360
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	97418	0	163177

V(D). Planned Program (Activity)

1. Brief description of the Activity

We will publish scientific articles, present research papers at scientific meetings, write newsletters and present workshops and demonstrations.

2. Brief description of the target audience

All present/potential goat producers in Oklahoma and surrounding states.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	175	100	200	25

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

Patent Applications Submitted

Year: 2015

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	0	1	1

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- ● Number of Research projects completed on Enhanced Goat Products

Year	Actual
2015	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of goat producers learning new goat production techniques.
2	Number of goat producers using new goat production techniques.
3	Goat producers who have improved production efficiency by using the learned control techniques.

Outcome #1

1. Outcome Measures

Number of goat producers learning new goat production techniques.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	200

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Goat enterprises are important components of many farms and farming systems in the United States; particularly among small and resource-poor units. There is a growing number of farms where sales of goats or goat products provide the majority of their income. Many large operations have diversified by adding goats to more conventional production systems to benefit from the unique feeding habits of goats. Therefore, this project can lead to improvements in goat management practices, production systems, and use of goat products for increased levels and efficiencies of goat productivity and economic returns. This program is important to a large number of goat industry producers and consumers in Oklahoma, other parts of the United States and numerous countries worldwide. Goat production is very important to food security and economic security in many developing countries.

What has been done

A number of experiments were conducted in 2015. Principal outputs of the project have been disseminated via abstracts, associated poster presentations at scientific meetings. Scientific manuscripts (6) and abstracts (6) were published or submitted for publication. Information gained has been disseminated through the website of the American Institute for Goat Research and Extension activities such as the Annual Goat Field Day and various workshops held throughout the year.

Results

The resources employed and activities undertaken by this project are contributing to a better understanding of goat production, management and utilization of goat products. Both small and large diversified farming operations that utilize goats have been able to use the technology and information resulting from this project to increase their goat production levels, reduce losses in

their herds and increase production efficiency. These changes in knowledge and improvements in production methods have helped producers increase their economic returns in 2015.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Number of goat producers using new goat production techniques.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Goat enterprises are important components of many farms and farming systems in the United States; particularly among small and resource-poor units. There is a growing number of farms where sales of goats or goat products provide the majority of their income. Many large operations have diversified by adding goats to more conventional production systems to benefit from the unique feeding habits of goats. Therefore, this project can lead to improvements in goat management practices, production systems, and use of goat products for increased levels and efficiencies of goat productivity and economic returns. This program is important to a large number of goat industry producers and consumers in Oklahoma, other parts of the United States and numerous countries worldwide. Goat production is very important to food security and economic security in many developing countries.

What has been done

A number of experiments were conducted in 2015. Principal outputs of the project have been disseminated via abstracts, associated poster presentations at scientific meetings. Scientific manuscripts (6) and abstracts (6) were published or submitted for publication. Information gained has been disseminated through the website of the American Institute for Goat Research and

Extension activities such as the Annual Goat Field Day and various workshops held throughout the year.

Results

The resources employed and activities undertaken by this project are contributing to a better understanding of goat production, management and utilization of goat products. Both small and large diversified farming operations that utilize goats have been able to use the technology and information resulting from this project to increase their goat production levels, reduce losses in their herds and increase production efficiency. These changes in knowledge and improvements in production methods have helped producers increase their economic returns in 2015.

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

Goat producers who have improved production efficiency by using the learned control techniques.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Goat enterprises are important components of many farms and farming systems in the United States; particularly among small and resource-poor units. There is a growing number of farms where sales of goats or goat products provide the majority of their income. Many large operations have diversified by adding goats to more conventional production systems to benefit from the unique feeding habits of goats. Therefore, this project can lead to improvements in goat management practices, production systems, and use of goat products for increased levels and efficiencies of goat productivity and economic returns. This program is important to a large number of goat industry producers and consumers in Oklahoma, other parts of the United States

and numerous countries worldwide. Goat production is very important to food security and economic security in many developing countries.

What has been done

A number of experiments were conducted in 2015. Principal outputs of the project have been disseminated via abstracts, associated poster presentations at scientific meetings. Scientific manuscripts (6) and abstracts (6) were published or submitted for publication. Information gained has been disseminated through the website of the American Institute for Goat Research and Extension activities such as the Annual Goat Field Day and various workshops held throughout the year.

Results

The resources employed and activities undertaken by this project are contributing to a better understanding of goat production, management and utilization of goat products. Both small and large diversified farming operations that utilize goats have been able to use the technology and information resulting from this project to increase their goat production levels, reduce losses in their herds and increase production efficiency. These changes in knowledge and improvements in production methods have helped producers increase their economic returns in 2015.

4. Associated Knowledge Areas

KA Code	Knowledge Area
313	Internal Parasites in Animals

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Other ((Disease))

Brief Explanation

External factors did not affect outcomes.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

An advisory council evaluated the scientific merit and usefulness of this project. It was deemed acceptable and on-track in its efforts.

Key Items of Evaluation

The project was examined for its scientific merit and to establish if it could produce useable results.

V(A). Planned Program (Summary)

Program # 21

1. Name of the Planned Program

4-H Clubs (Langston University)

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	0%	100%	0%	100%
	Total	0%	100%	0%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	2.0	0.0	0.0
Actual Paid	0.0	0.7	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
0	40377	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	26360	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	121921	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The 4-H program will conduct meetings, training sessions, classes and use other learning vehicles to help youth develop life skills.

2. Brief description of the target audience

Youth in Oklahoma who qualify for the program.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	150	50	662	200

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

Patent Applications Submitted

Year: 2015

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- • Number of of Research Projects completed in the 4-H Club Program.

Year	Actual
2015	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of youth learning new information from the 4-H Club Program.
2	Number of youth using information learned in the 4-H Club program.
3	Youth who develop life skill.

Outcome #1

1. Outcome Measures

Number of youth learning new information from the 4-H Club Program.

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	200

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The need for 4-H Clubs in Oklahoma counties was identified as an issue by concerned parents and community leaders. Most Oklahoma communities offer limited youth education programs for young people (especially in the areas of science, mathematics and technology). Consequently, there is an unacceptably high number of students who are more susceptible to the lure and negative effects of drugs, alcohol, teen pregnancy, peer pressure, gang violence and school dropout. Inactivity among youth has also led to another health challenge for youth in the form of obesity.

What has been done

Langston University Cooperative Extension staff worked with 4-H volunteer leaders in order to help them maintain their volunteer certification. The staff visited each leader and provided training that included 4-H orientation, steps in starting new 4-H community clubs and serving as effective project leaders. The staff also provided information and materials to leaders in order to help them implement specific projects and events. Clubs conducted meetings during 2015 and presented tailored curriculum to youth. Club members worked on 4-H projects including gardening, woodworking, goats, fabrics and fashion, computer graphics, photography, visual arts, aquaponics, entrepreneurship, money management, public speaking, science, natural resources, biotechnology and robotics. Activities were also conducted to get youth to move and exercise.

Results

During 2015, over 600 youth were reached through Langston University 4-H Club efforts. Many, if not all, of these youth improved their skills in leadership, public speaking and proper human interaction. Youth were challenged to increase their science IQs in hopes of developing a population of future scientists and engineers. Materials were presented and sessions conducted that will potentially result in more youth choosing to stay away from gangs and drug involvement, become high school graduates and pursue science or technology as a college major.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #2

1. Outcome Measures

Number of youth using information learned in the 4-H Club program.

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	200

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The need for 4-H Clubs in Oklahoma counties was identified as an issue by concerned parents and community leaders. Most Oklahoma communities offer limited youth education programs for young people (especially in the areas of science, mathematics and technology). Consequently, there is an unacceptably high number of students who are more susceptible to the lure and negative effects of drugs, alcohol, teen pregnancy, peer pressure, gang violence and school dropout. Inactivity among youth has also led to another health challenge for youth in the form of obesity.

What has been done

Langston University Cooperative Extension staff worked with 4-H volunteer leaders in order to help them maintain their volunteer certification. The staff visited each leader and provided training that included 4-H orientation, steps in starting new 4-H community clubs and serving as effective project leaders. The staff also provided information and materials to leaders in order to help them implement specific projects and events. Clubs conducted meetings during 2015 and presented tailored curriculum to youth. Club members worked on 4-H projects including gardening, woodworking, goats, fabrics and fashion, computer graphics, photography, visual arts, aquaponics, entrepreneurship, money management, public speaking, science, natural resources, biotechnology and robotics. Activities were also conducted to get youth to move and exercise.

Results

During 2015, over 600 youth were reached through Langston University 4-H Club efforts. Many, if not all, of these youth improved their skills in leadership, public speaking and proper human

interaction. Youth were challenged to increase their science IQs in hopes of developing a population of future scientists and engineers. Materials were presented and sessions conducted that will potentially result in more youth choosing to stay away from gangs and drug involvement, become high school graduates and pursue science or technology as a college major.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #3

1. Outcome Measures

Youth who develop life skill.

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The need for 4-H Clubs in Oklahoma counties was identified as an issue by concerned parents and community leaders. Most Oklahoma communities offer limited youth education programs for young people (especially in the areas of science, mathematics and technology). Consequently, there is an unacceptably high number of students who are more susceptible to the lure and negative effects of drugs, alcohol, teen pregnancy, peer pressure, gang violence and school dropout. Inactivity among youth has also led to another health challenge for youth in the form of obesity.

What has been done

Langston University Cooperative Extension staff worked with 4-H volunteer leaders in order to help them maintain their volunteer certification. The staff visited each leader and provided training that included 4-H orientation, steps in starting new 4-H community clubs and serving as effective project leaders. The staff also provided information and materials to leaders in order to help them implement specific projects and events. Clubs conducted meetings during 2015 and presented tailored curriculum to youth. Club members worked on 4-H projects including gardening, woodworking, goats, fabrics and fashion, computer graphics, photography, visual arts, aquaponics, entrepreneurship, money management, public speaking, science, natural resources,

biotechnology and robotics. Activities were also conducted to get youth to move and exercise.

Results

During 2015, over 600 youth were reached through Langston University 4-H Club efforts. Many, if not all, of these youth improved their skills in leadership, public speaking and proper human interaction. Youth were challenged to increase their science IQs in hopes of developing a population of future scientists and engineers. Materials were presented and sessions conducted that will potentially result in more youth choosing to stay away from gangs and drug involvement, become high school graduates and pursue science or technology as a college major.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Appropriations changes
- Competing Public priorities

Brief Explanation

External factors did not affect outcomes.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Pre and post evaluations of activities showed them to be effective.

Key Items of Evaluation

- Build self-confidence
- Improved math skills
- Improved reading skill

V(A). Planned Program (Summary)

Program # 22

1. Name of the Planned Program

Extended Education (Langston University)

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	0%	100%	0%	100%
	Total	0%	100%	0%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	1.2	0.0	0.0
Actual Paid	0.0	2.0	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
0	86501	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	26360	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	121921	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Extension personnel will conduct classes and mini camps in reading, math and science for youth in Oklahoma.

2. Brief description of the target audience

Youth in Oklahoma

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	100	40	700	300

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

Patent Applications Submitted

Year: 2015

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- ● Number of Research Projects completed on Extended Education.

Year	Actual
2015	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of youth taught extended education techniques.
2	Number of youth grasping and using extended education techniques.
3	Number of youth who improve their academic performance and catch up in the classroom.

Outcome #1

1. Outcome Measures

Number of youth taught extended education techniques.

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	200

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The need for a summer literacy program in Logan County was identified as an issue by concerned parents and community leaders. Logan County offers limited youth education programs for young people after school and during the summer months. Consequently, there is an unacceptably high number of latchkey students. Students who do not participate in skills building and recreation programs during their summer vacation are more likely to experience a diminishment in their reading and math capabilities and health and physical fitness over the summer. Students who do not have something constructive to do are more susceptible to becoming engaged in destructive activities. There is a national effort through 4-H to increase the number of youth involved in programs in science, engineering and technology (SET). We addressed that challenge in 2015 through our summer literacy program, a 4-H SET Saturday Academy and a 4-H SET Summer Camp.

What has been done

Langston University Cooperative Extension staff planned and conducted an annual Literacy in Action Summer Reading Program designed to help Oklahoma Logan County youth (grades pre-kindergarten through fifth) learn developmental concepts that help to maintain their academic capabilities and strengthen their overall well-being. A setting was created that motivated life skill development during the months of June through July. Sixty-nine students received group and individualized instructions and hands-on practice in math, reading and writing. They participated in nutrition education workshops and performed physical fitness exercises daily. With the child obesity epidemic presently facing our country, physical fitness and proper nutrition were essential daily components of the program. During 2015, we also taught a curriculum that was age-specific in science, engineering and technology (SET). This was part of a program launched during the summer and fall of 2008. The 4-H SET Curriculum was taught during the summer, on weekends and during a summer camp. College support students, volunteers and university faculty and staff helped deliver this program. Participants built and launched rockets, engaged in SAT prep

vocabulary training, learned about distracted driving via fatal goggles simulations, received reptile, amphibian and ichthyology education and engaged in science-related field trips.

Results

The sixty-nine students who participated in our 4-H Literacy Program received reinforcement over the summer to help maintain or strengthen their skills in reading and mathematics. Post testing showed the success of the reading and mathematics components of this program. At the conclusion of the program 100% of youth participants demonstrated improvement in reading comprehension. One hundred percent showed improvement in understanding mathematical concepts. Instructors at a school in Logan County stated that students who participated in this summer program were more school-ready in the fall. Students who participated in the 4-H SET Summer Program received age-specific training in food science, computer technology, rocketry, aquaculture, robotics and other areas to create within them a thirst for science, engineering and technology. Three (3) of our former 4-H SET Program students have graduated from high school and are now enrolled at universities in Oklahoma and majoring in science-related fields.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #2

1. Outcome Measures

Number of youth grasping and using extended education techniques.

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	200

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The need for a summer literacy program in Logan County was identified as an issue by concerned parents and community leaders. Logan County offers limited youth education programs for young people after school and during the summer months. Consequently, there is an unacceptably high number of latchkey students. Students who do not participate in skills

building and recreation programs during their summer vacation are more likely to experience a diminishment in their reading and math capabilities and health and physical fitness over the summer. Students who do not have something constructive to do are more susceptible to becoming engaged in destructive activities. There is a national effort through 4-H to increase the number of youth involved in programs in science, engineering and technology (SET). We addressed that challenge in 2015 through our summer literacy program, a 4-H SET Saturday Academy and a 4-H SET Summer Camp.

What has been done

Langston University Cooperative Extension staff planned and conducted an annual Literacy in Action Summer Reading Program designed to help Oklahoma Logan County youth (grades pre-kindergarten through fifth) learn developmental concepts that help to maintain their academic capabilities and strengthen their overall well-being. A setting was created that motivated life skill development during the months of June through July. Sixty-nine students received group and individualized instructions and hands-on practice in math, reading and writing. They participated in nutrition education workshops and performed physical fitness exercises daily. With the child obesity epidemic presently facing our country, physical fitness and proper nutrition were essential daily components of the program. During 2015, we also taught a curriculum that was age-specific in science, engineering and technology (SET). This was part of a program launched during the summer and fall of 2008. The 4-H SET Curriculum was taught during the summer, on weekends and during a summer camp. College support students, volunteers and university faculty and staff helped deliver this program. Participants built and launched rockets, engaged in SAT prep vocabulary training, learned about distracted driving via fatal goggles simulations, received reptile, amphibian and ichthyology education and engaged in science-related field trips.

Results

The sixty-nine students who participated in our 4-H Literacy Program received reinforcement over the summer to help maintain or strengthen their skills in reading and mathematics. Post testing showed the success of the reading and mathematics components of this program. At the conclusion of the program 100% of youth participants demonstrated improvement in reading comprehension. One hundred percent showed improvement in understanding mathematical concepts. Instructors at a school in Logan County stated that students who participated in this summer program were more school-ready in the fall. Students who participated in the 4-H SET Summer Program received age-specific training in food science, computer technology, rocketry, aquaculture, robotics and other areas to create within them a thirst for science, engineering and technology. Three (3) of our former 4-H SET Program students have graduated from high school and are now enrolled at universities in Oklahoma and majoring in science- related fields.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #3

1. Outcome Measures

Number of youth who improve their academic performance and catch up in the classroom.

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	176

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The need for a summer literacy program in Logan County was identified as an issue by concerned parents and community leaders. Logan County offers limited youth education programs for young people after school and during the summer months. Consequently, there is an unacceptably high number of latchkey students. Students who do not participate in skills building and recreation programs during their summer vacation are more likely to experience a diminishment in their reading and math capabilities and health and physical fitness over the summer. Students who do not have something constructive to do are more susceptible to becoming engaged in destructive activities. There is a national effort through 4-H to increase the number of youth involved in programs in science, engineering and technology (SET). We addressed that challenge in 2015 through our summer literacy program, a 4-H SET Saturday Academy and a 4-H SET Summer Camp.

What has been done

Langston University Cooperative Extension staff planned and conducted an annual Literacy in Action Summer Reading Program designed to help Oklahoma Logan County youth (grades pre-kindergarten through fifth) learn developmental concepts that help to maintain their academic capabilities and strengthen their overall well-being. A setting was created that motivated life skill development during the months of June through July. Sixty-nine students received group and individualized instructions and hands-on practice in math, reading and writing. They participated in nutrition education workshops and performed physical fitness exercises daily. With the child obesity epidemic presently facing our country, physical fitness and proper nutrition were essential daily components of the program. During 2015, we also taught a curriculum that was age-specific in science, engineering and technology (SET). This was part of a program launched during the summer and fall of 2008. The 4-H SET Curriculum was taught during the summer, on weekends and during a summer camp. College support students, volunteers and university faculty and staff helped deliver this program. Participants built and launched rockets, engaged in SAT prep

vocabulary training, learned about distracted driving via fatal goggles simulations, received reptile, amphibian and ichthyology education and engaged in science-related field trips.

Results

The sixty-nine students who participated in our 4-H Literacy Program received reinforcement over the summer to help maintain or strengthen their skills in reading and mathematics. Post testing showed the success of the reading and mathematics components of this program. At the conclusion of the program 100% of youth participants demonstrated improvement in reading comprehension. One hundred percent showed improvement in understanding mathematical concepts. Instructors at a school in Logan County stated that students who participated in this summer program were more school-ready in the fall. Students who participated in the 4-H SET Summer Program received age-specific training in food science, computer technology, rocketry, aquaculture, robotics and other areas to create within them a thirst for science, engineering and technology. Three (3) of our former 4-H SET Program students have graduated from high school and are now enrolled at universities in Oklahoma and majoring in science- related fields.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Competing Public priorities

Brief Explanation

External factors did not affect outcomes.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

The sixty-nine students who participated in our 4-H Literacy program received reinforcement over the summer to help maintain or strengthen their skills in reading and mathematics. Post testing showed the success of the reading and mathematics component of this program. At the conclusion of the program 100% of youth participants demonstrated improvement in reading comprehension and 100% showed improvement in understanding mathematical concepts.

Key Items of Evaluation

- Build self-confidence
- Improved math skills
- Improved reading skill

V(A). Planned Program (Summary)

Program # 23

1. Name of the Planned Program

Family and Consumer Sciences (Langston University)

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
801	Individual and Family Resource Management	0%	100%	0%	100%
Total		0%	100%	0%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.5	0.0	0.0
Actual Paid	0.0	0.3	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
0	23708	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	26360	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	121921	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Extension personnel will conduct classes, seminars, workshops and forums to share Family and Consumer Sciences resources.

2. Brief description of the target audience

Citizens of Oklahoma.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	250	100	450	300

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

Patent Applications Submitted

Year: 2015

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- ● Number of Research Projects completed on Family and Consumer Sciences

Year	Actual
2015	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of participants who learned about Family and Consumer Sciences.
2	Number of participants who used Family and Consumer Sciences resources.
3	Number of families that improved their quality of life at least in part from this program.

Outcome #1

1. Outcome Measures

Number of participants who learned about Family and Consumer Sciences.

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	400

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Public officials continue to sound the alarm about America's mounting obesity epidemic; which is no respecter of age, gender, race, or socioeconomic status. Over half a million people in Oklahoma live in households that are food insecure. With the continued sluggishness of the economy, many Americans are facing issues in stretching food, housing and medical dollars. The Family and Consumer Sciences Program at Langston University assist clientele in combating these challenges.

What has been done

During 2015, meetings were conducted and demonstrations carried out on healthy food selection, good nutrition, My Plate and tailoring diets. Exercise type and intensity were taught during demonstrations. Sessions were conducted on food and nutrition principles (including food safety selection and storage), childhood development and money management. Targeted audiences were primarily in Logan, Oklahoma and Tulsa Counties.

Results

Program participants reported that they were more selective in their food choices; choosing more healthy foods. Some participants introduced more fruits and vegetables into their meals. These adopted changes in food choices have resulted in weight lost and put some participants on the road to healthy living at least in part because of their diets. Program participants also stated that they have experienced reductions in food costs.

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management

Outcome #2

1. Outcome Measures

Number of participants who used Family and Consumer Sciences resources.

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	400

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Public officials continue to sound the alarm about America's mounting obesity epidemic; which is no respecter of age, gender, race, or socioeconomic status. Over half a million people in Oklahoma live in households that are food insecure. With the continued sluggishness of the economy, many Americans are facing issues in stretching food, housing and medical dollars. The Family and Consumer Sciences Program at Langston University assist clientele in combating these challenges.

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4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management

Outcome #3

1. Outcome Measures

Number of families that improved their quality of life at least in part from this program.

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	400

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Public officials continue to sound the alarm about America's mounting obesity epidemic; which is no respecter of age, gender, race, or socioeconomic status. Over half a million people in Oklahoma live in households that are food insecure. With the continued sluggishness of the economy, many Americans are facing issues in stretching food, housing and medical dollars. The Family and Consumer Sciences Program at Langston University assist clientele in combating these challenges.

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4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Competing Public priorities

Brief Explanation

External factors did not affect outcomes.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

- Improved food selection
- Improved food preparation and storage skills.

Key Items of Evaluation

- Obesity
- Food security
- Nutrition principles
- Childhood

V(A). Planned Program (Summary)

Program # 24

1. Name of the Planned Program

Food and Nutrition (Langston University)

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
504	Home and Commercial Food Service	0%	100%	0%	100%
	Total	0%	100%	0%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	1.0	0.0	0.0
Actual Paid	0.0	0.3	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
0	21337	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	26360	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	121921	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Extension personnel will conduct classes, seminars, workshops and hold community forums to teach healthy food and nutrition concepts.

2. Brief description of the target audience

Primarily limited resource families, youth and the elderly.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	200	50	700	100

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

Patent Applications Submitted

Year: 2015

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- ● Number of Research Projects completed on Food and Nutrition.

Year	Actual
2015	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of participants who learned about food and nutrition.
2	Number of participants who used knowledge/guidelines presented during food and nutrition sessions.
3	Number of participants who improve their lifestyles by following food and nutrition guidelines.

Outcome #1

1. Outcome Measures

Number of participants who learned about food and nutrition.

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	300

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Food and nutrition practices play a key role in the health of a nation. Many common diseases or conditions leading to diseases such as diabetes, hypertension and heart disease are linked to poor food and nutrition choices. This is especially true within minority populations. Oklahoma, and especially rural Oklahoma, ranks high among the states when it comes to overweight and obesity.

What has been done

During 2015, food and nutrition sessions and workshops were conducted at public and private schools, community centers and agencies. Pre-and post-tests were given to participants. Hands-on activities challenged participants to learn by doing. Educational exhibits were displayed at public schools, universities and other sites.

Results

During 2015, program participants made positive nutritional changes in their eating habits. New approaches resulting in healthier eating regiments were taken. Stakeholders saved money on food by cooking more and going out to eat less; consumed more fruits and vegetables; and applied food budgeting strategies taught in this program.

4. Associated Knowledge Areas

KA Code	Knowledge Area
504	Home and Commercial Food Service

Outcome #2

1. Outcome Measures

Number of participants who used knowledge/guidelines presented during food and nutrition sessions.

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	300

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Food and nutrition practices play a key role in the health of a nation. Many common diseases or conditions leading to diseases such as diabetes, hypertension and heart disease are linked to poor food and nutrition choices. This is especially true within minority populations. Oklahoma, and especially rural Oklahoma, ranks high among the states when it comes to overweight and obesity.

What has been done

During 2015, food and nutrition sessions and workshops were conducted at public and private schools, community centers and agencies. Pre-and post-tests were given to participants. Hands-on activities challenged participants to learn by doing. Educational exhibits were displayed at public schools, universities and other sites.

Results

During 2015, program participants made positive nutritional changes in their eating habits. New approaches resulting in healthier eating regiments were taken. Stakeholders saved money on food by cooking more and going out to eat less; consumed more fruits and vegetables; and applied food budgeting strategies taught in this program.

4. Associated Knowledge Areas

KA Code	Knowledge Area
504	Home and Commercial Food Service

Outcome #3

1. Outcome Measures

Number of participants who improve their lifestyles by following food and nutrition guidelines.

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	300

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Food and nutrition practices play a key role in the health of a nation. Many common diseases or conditions leading to diseases such as diabetes, hypertension and heart disease are linked to poor food and nutrition choices. This is especially true within minority populations. Oklahoma, and especially rural Oklahoma, ranks high among the states when it comes to overweight and obesity.

What has been done

During 2015, food and nutrition sessions and workshops were conducted at public and private schools, community centers and agencies. Pre-and post-tests were given to participants. Hands-on activities challenged participants to learn by doing. Educational exhibits were displayed at public schools, universities and other sites.

Results

During 2015, program participants made positive nutritional changes in their eating habits. New approaches resulting in healthier eating regiments were taken. Stakeholders saved money on food by cooking more and going out to eat less; consumed more fruits and vegetables; and applied food budgeting strategies taught in this program.

4. Associated Knowledge Areas

KA Code	Knowledge Area
504	Home and Commercial Food Service

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Government Regulations
- Competing Public priorities

Brief Explanation

External factors did not affect outcomes.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Participants indicated that they are making better decisions and choices related to food, nutrition, budgeting and balanced diets.

Key Items of Evaluation

- Improvement in food selection, preparation and storage skills
- Development of better budgeting skills

V(A). Planned Program (Summary)

Program # 25

1. Name of the Planned Program

Biotechnology (Langston University)

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%	100%	0%	100%
Total		0%	100%	0%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.2	0.0	1.1
Actual Paid	0.0	0.0	0.0	0.5
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	0	14664
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	26360	0	26360
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	97418	0	153019

V(D). Planned Program (Activity)

1. Brief description of the Activity

Researchers will develop a local peanut nucleotide database and build a bioinformatics pipeline for peanut gene discovery.

2. Brief description of the target audience

All peanut producers in Oklahoma

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	100	50	50	50

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

Patent Applications Submitted

Year: 2015

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of Research Projects completed on Biotechnology.

Year	Actual
2015	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of farmers learning about the peanut nucleotide database.
2	Number of farmers using the peanut nucleotide database.
3	Farmers who use the peanut nucleotide database or new peanut gene discoveries to improve their peanut production system.

Outcome #1

1. Outcome Measures

Number of farmers learning about the peanut nucelotide database.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	10

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

There is a need for developing improved peanut genotypes that are higher yielding and more disease and insect resistant. Improved nutritional varieties would include higher protein levels and alleviation of plant DNA that causes allergens. The peanut is relatively easily accessible and a less-expensive source of vegetable protein. Its improvement will significantly help in the global war against hunger and poverty. The pace for developing these improved genotypes will be accelerated through the use of modern techniques such as those used in the Biotechnology Program at Langston University.

What has been done

During 2015, biotechnology studies were conducted on the peanut. Gene re-isolation and library construction were carried out; as well as other protocols. One manuscript was written for publication.

Results

A number of potential impacts resulted from the 2015 Langston University Biotechnology Program's activities. Those impacts will be seen as we determine genetic differences between peanut groups. Activities this year also resulted in 2 undergraduates enhancing their hands-on lab skills. Those students benefited from biotechnology outreach activities. They enhanced their research knowledge, skills, critical thinking and scientific communication skills.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Number of farmers using the peanut nucleotide database.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	10

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

There is a need for developing improved peanut genotypes that are higher yielding and more disease and insect resistant. Improved nutritional varieties would include higher protein levels and alleviation of plant DNA that causes allergens. The peanut is relatively easily accessible and a less-expensive source of vegetable protein. Its improvement will significantly help in the global war against hunger and poverty. The pace for developing these improved genotypes will be accelerated through the use of modern techniques such as those used in the Biotechnology Program at Langston University.

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4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

Farmers who use the peanut nucleotide database or new peanut gene discoveries to improve their peanut production system.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	10

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

There is a need for developing improved peanut genotypes that are higher yielding and more disease and insect resistant. Improved nutritional varieties would include higher protein levels and alleviation of plant DNA that causes allergens. The peanut is relatively easily accessible and a less-expensive source of vegetable protein. Its improvement will significantly help in the global war against hunger and poverty. The pace for developing these improved genotypes will be accelerated through the use of modern techniques such as those used in the Biotechnology Program at Langston University.

What has been done

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4. Associated Knowledge Areas

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

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Competing Public priorities

Brief Explanation

- Time series (multiple points before and after program).

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Annual progress with mapping pathways and developing DNA libraries for improving test species.

Key Items of Evaluation

- Developing DNA libraries.

V(A). Planned Program (Summary)

Program # 26

1. Name of the Planned Program

Water Gardens (Aquaculture) (Langston University)

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
401	Structures, Facilities, and General Purpose Farm Supplies	0%	100%	0%	100%
Total		0%	100%	0%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	1.0	0.0	0.6
Actual Paid	0.0	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
0	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	26360	0	26360
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	97418	0	154046

V(D). Planned Program (Activity)

1. Brief description of the Activity

Studies were conducted on water garden filtration utilizing native submergent aquatic vegetation and on biological filter design for koi ponds.

2. Brief description of the target audience

All aquaculture farmers in Oklahoma.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2015	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: 2015
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- • Number of Research Projects completed on Water Gardens

Year	Actual
2015	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of farmers learning water garden techniques.
2	Number of farmers using water garden techniques.
3	Farmers who improve the water quality of their water gardens and reduce operational costs.

Outcome #1

1. Outcome Measures

Number of farmers learning water garden techniques.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Development of the Oklahoma water garden industry is dependent on producing high quality Koi fish. Also, aesthetically pleasing and efficient production systems are needed. Filtration systems for ornamental ponds are derived from technologies developed for municipal waste treatment and/or swimming pools. While treatment cost is secondary for municipalities, both capital and operating costs are primary concerns for owners of private ornamental ponds. Costs can be reduced by using systems that rely on low pressure, high volume pumps. The cost reduction can be enhanced by combining technologies to maximize performance for solids removal and biotransformation of organic waste materials.

What has been done

Due to drought, there are no results to report this year.

Results

Due to drought, there are no results to report this year.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Number of farmers using water garden techniques.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Development of the Oklahoma water garden industry is dependent on producing high quality Koi fish. Also, aesthetically pleasing and efficient production systems are needed. Filtration systems for ornamental ponds are derived from technologies developed for municipal waste treatment and/or swimming pools. While treatment cost is secondary for municipalities, both capital and operating costs are primary concerns for owners of private ornamental ponds. Costs can be reduced by using systems that rely on low pressure, high volume pumps. The cost reduction can be enhanced by combining technologies to maximize performance for solids removal and biotransformation of organic waste materials.

What has been done

Due to drought, there are no results to report this year.

Results

Due to drought, there are no results to report this year.

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

Farmers who improve the water quality of their water gardens and reduce operational costs.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Development of the Oklahoma water garden industry is dependent on producing high quality Koi fish. Also, aesthetically pleasing and efficient production systems are needed. Filtration systems for ornamental ponds are derived from technologies developed for municipal waste treatment and/or swimming pools. While treatment cost is secondary for municipalities, both capital and operating costs are primary concerns for owners of private ornamental ponds. Costs can be reduced by using systems that rely on low pressure, high volume pumps. The cost reduction can be enhanced by combining technologies to maximize performance for solids removal and biotransformation of organic waste materials.

What has been done

Due to drought, there are no results to report this year.

Results

Due to drought, there are no results to report this year.

4. Associated Knowledge Areas

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

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)

Brief Explanation

External factors did not affect outcomes.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Development of best management practices for the water garden industry.

Key Items of Evaluation

Sharing best management practices with clientele.

V(A). Planned Program (Summary)

Program # 27

1. Name of the Planned Program

Alternative Species (Aquaculture) (Langston University)

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
307	Animal Management Systems	0%	100%	0%	100%
	Total	0%	100%	0%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.4	0.0	0.2
Actual Paid	0.0	0.6	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
0	24559	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Buffalo fish species will be tested for sustainability and profitability in Oklahoma.

2. Brief description of the target audience

All aquaculture farmers in Oklahoma.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	200	50	50	25

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

Patent Applications Submitted

Year: 2015

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- ● Number of Research Projects completed on Alternative Species.

Year	Actual
2015	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of farmers learning alternative fish species techniques.
2	Number of farmers using alternative fish species techniques.
3	Farmers who improved their yearly income by using alternative fish species.

Outcome #1

1. Outcome Measures

Number of farmers learning alternative fish species techniques.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	50

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Pushed by years of limited and diminishing freshwater supplies, some Oklahoma fish farmers are now learning to operate completely closed recirculating systems to bolster and stabilize their enterprises. Many Oklahoma consumers are becoming more concerned with the quality and environmental friendliness of their foods. They are eager to learn more about food from aquaponics production. 4-H leaders are learning to use the LU aquaponics facility to widen their club's agricultural experiences.

What has been done

Research and experiential results were presented at the annual LU aquaculture workshop and at the Inter-Tribal Environmental Conference in Tulsa, OK. Additional efforts were extended to improve the performance of the Chickasaw and Peoria Nations aquaculture and aquaponics projects. The Cheyenne-Arapaho and Comanche Nations have requested our assistance in planning and developing their systems.

Results

One Oklahoma fish farm has built and begun to operate an indoor recirculating system for tilapia production to offset any future drought conditions which hamper fish production. They are investigating constructing a greenhouse for aquaponics.

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems

Outcome #2

1. Outcome Measures

Number of farmers using alternative fish species techniques.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	50

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Pushed by years of limited and diminishing freshwater supplies, some Oklahoma fish farmers are now learning to operate completely closed recirculating systems to bolster and stabilize their enterprises. Many Oklahoma consumers are becoming more concerned with the quality and environmental friendliness of their foods. They are eager to learn more about food from aquaponics production. 4-H leaders are learning to use the LU aquaponics facility to widen their club's agricultural experiences.

What has been done

Research and experiential results were presented at the annual LU aquaculture workshop and at the Inter-Tribal Environmental Conference in Tulsa, OK. Additional efforts were extended to improve the performance of the Chickasaw and Peoria Nations aquaculture and aquaponics projects. The Cheyenne-Arapaho and Comanche Nations have requested our assistance in planning and developing their systems.

Results

One Oklahoma fish farm has built and begun to operate an indoor recirculating system for tilapia production to offset any future drought conditions which hamper fish production. They are investigating constructing a greenhouse for aquaponics.

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems

Outcome #3

1. Outcome Measures

Farmers who improved their yearly income by using alternative fish species.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	50

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Pushed by years of limited and diminishing freshwater supplies, some Oklahoma fish farmers are now learning to operate completely closed recirculating systems to bolster and stabilize their enterprises. Many Oklahoma consumers are becoming more concerned with the quality and environmental friendliness of their foods. They are eager to learn more about food from aquaponics production. 4-H leaders are learning to use the LU aquaponics facility to widen their club's agricultural experiences.

What has been done

Research and experiential results were presented at the annual LU aquaculture workshop and at the Inter-Tribal Environmental Conference in Tulsa, OK. Additional efforts were extended to improve the performance of the Chickasaw and Peoria Nations aquaculture and aquaponics projects. The Cheyenne-Arapaho and Comanche Nations have requested our assistance in planning and developing their systems.

Results

One Oklahoma fish farm has built and begun to operate an indoor recirculating system for tilapia production to offset any future drought conditions which hamper fish production. They are investigating constructing a greenhouse for aquaponics.

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)

Brief Explanation

Droughts can hinder research efforts.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Cost analysis will be used to determine if use of alternative fish species resulted in increased income for producers.

Key Items of Evaluation

Producers who improved their fish production practices.

V(A). Planned Program (Summary)

Program # 28

1. Name of the Planned Program

Fishery Management (Aquaculture) (Langston University)

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
307	Animal Management Systems	0%	100%	0%	100%
	Total	0%	100%	0%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.4	0.0	0.3
Actual Paid	0.0	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
0	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Work will be performed in fishery management under such conditions as drought, aquatic vegetation infestation and pond leaks.

2. Brief description of the target audience

All aquaculture farmers in Oklahoma.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2015	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: 2015

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- ● Number of Research Projects completed on Fishery Management.

Year	Actual
2015	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of farmers learning new fishery management techniques.
2	Number of farmers using new fishery management techniques.
3	Farmers who have improved their production efficiency and raised their profits with the new fishery management techniques.

Outcome #1

1. Outcome Measures

Number of farmers learning new fishery management techniques.

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

No activity occurred during 2015.

What has been done

No activity occurred during 2015.

Results

No activity occurred during 2015.

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems

Outcome #2

1. Outcome Measures

Number of farmers using new fishery management techniques.

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

No activity occurred during 2015.

What has been done

No activity occurred during 2015.

Results

No activity occurred during 2015.

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems

Outcome #3

1. Outcome Measures

Farmers who have improved their production efficiency and raised their profits with the new fishery management techniques.

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

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

2015

0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

No activity occurred during 2015.

What has been done

No activity occurred during 2015.

Results

No activity occurred during 2015.

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)

Brief Explanation

External factors affected outcomes.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Overall improvement in urban pond water quality at specific sites and consequently improvement in the quality of some watershed streams.

Key Items of Evaluation

Increase in water quality for specific residential ponds.

V(A). Planned Program (Summary)

Program # 29

1. Name of the Planned Program

Sustainable Internal Parasite Control for Small Ruminants (Langston University)

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
313	Internal Parasites in Animals	0%	100%	0%	100%
	Total	0%	100%	0%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.3	0.0	0.1
Actual Paid	0.0	0.2	0.0	0.1
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	11733	0	733
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	26360	0	26360
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	97418	0	163177

V(D). Planned Program (Activity)

1. Brief description of the Activity

Internal parasites are the most important health issue in small ruminants; causing greater morbidity, mortality and lost production than the next three most important diseases. The problems with internal parasites include lack of knowledge on biology and management practices to control them, internet

2. Brief description of the target audience

The target audience is primarily small ruminant producers.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	194	40	8	8

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

Patent Applications Submitted

Year: 2015
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- • Number of Research Projects completed on sustainable internal parasite control.

Year Actual
 2015 0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of goat producers learning internal parasite control techniques.
2	Number of goat producers using internal parasite control techniques.
3	Goat producers who have gotten internal parasites under control by using the learned control techniques.

Outcome #1

1. Outcome Measures

Number of goat producers learning internal parasite control techniques.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	50

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Internal parasites (Gastrointestinal Nematodes) are the most important health issue in sheep and goats; causing greater morbidity, mortality and lost production than the next three most important diseases. The problems with internal parasites include lack of knowledge on biology and management practices to control them, internet misinformation and dewormer resistance. All goat producers in this region of the country have internal parasite challenges with their herds and significant to severe dewormer resistance. Therefore, both goat and sheep producers are interested in practices to better control internal parasites in their animals.

What has been done

During 2015, four parasite workshops were presented in Oklahoma with a total of 53 people in attendance. At a breakout session during our annual meat goat field day, 63 producers participated. A parasite workshop was conducted at a Meat Goat Boot Camp to 48 producers. Two, one-on-one workshops were conducted for producers with serious goat herd parasite problems. Also, two exchange students and two producers were taught how to do fecal egg counts.

Results

2015 Field Day surveys indicated that most of the 63 participants planned to make changes based upon information presented. Earlier results from this program reported that fifteen out of the twenty-two producers experienced a reduction in the number of required dewormings (68%). Thirteen producers (59%) indicated a cost saving of \$75 to \$400 by reducing the number of herd dewormings. Also, seven out of the twenty-two producers (32%) reported a reduction in animal losses that was a saving of \$300-\$2,500.

4. Associated Knowledge Areas

KA Code	Knowledge Area
313	Internal Parasites in Animals

Outcome #2

1. Outcome Measures

Number of goat producers using internal parasite control techniques.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	50

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Internal parasites (Gastrointestinal Nematodes) are the most important health issue in sheep and goats; causing greater morbidity, mortality and lost production than the next three most important diseases. The problems with internal parasites include lack of knowledge on biology and management practices to control them, internet misinformation and dewormer resistance. All goat producers in this region of the country have internal parasite challenges with their herds and significant to severe dewormer resistance. Therefore, both goat and sheep producers are interested in practices to better control internal parasites in their animals.

What has been done

During 2015, four parasite workshops were presented in Oklahoma with a total of 53 people in attendance. At a breakout session during our annual meat goat field day, 63 producers participated. A parasite workshop was conducted at a Meat Goat Boot Camp to 48 producers. Two, one-on-one workshops were conducted for producers with serious goat herd parasite problems. Also, two exchange students and two producers were taught how to do fecal egg counts.

Results

2015 Field Day surveys indicated that most of the 63 participants planned to make changes based upon information presented. Earlier results from this program reported that fifteen out of the twenty-two producers experienced a reduction in the number of required dewormings (68%).

Thirteen producers (59%) indicated a cost saving of \$75 to \$400 by reducing the number of herd dewormings. Also, seven out of the twenty-two producers (32%) reported a reduction in animal losses that was a saving of \$300-\$2,500.

4. Associated Knowledge Areas

KA Code	Knowledge Area
313	Internal Parasites in Animals

Outcome #3

1. Outcome Measures

Goat producers who have gotten internal parasites under control by using the learned control techniques.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	50

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Internal parasites (Gastrointestinal Nematodes) are the most important health issue in sheep and goats; causing greater morbidity, mortality and lost production than the next three most important diseases. The problems with internal parasites include lack of knowledge on biology and management practices to control them, internet misinformation and dewormer resistance. All goat producers in this region of the country have internal parasite challenges with their herds and significant to severe dewormer resistance. Therefore, both goat and sheep producers are interested in practices to better control internal parasites in their animals.

What has been done

During 2015, four parasite workshops were presented in Oklahoma with a total of 53 people in attendance. At a breakout session during our annual meat goat field day, 63 producers participated. A parasite workshop was conducted at a Meat Goat Boot Camp to 48 producers. Two, one-on-one workshops were conducted for producers with serious goat herd parasite problems. Also, two exchange students and two producers were taught how to do fecal egg counts.

Results

2015 Field Day surveys indicated that most of the 63 participants planned to make changes based upon information presented. Earlier results from this program reported that fifteen out of the twenty-two producers experienced a reduction in the number of required dewormings (68%). Thirteen producers (59%) indicated a cost saving of \$75 to \$400 by reducing the number of herd dewormings. Also, seven out of the twenty-two producers (32%) reported a reduction in animal losses that was a saving of \$300-\$2,500.

4. Associated Knowledge Areas

KA Code	Knowledge Area
313	Internal Parasites in Animals

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)

Brief Explanation

Drought

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Eagerness of goat producers to adopt alternative parasite control methods.

Key Items of Evaluation

Goat producers adopt practices and experience improvements in their herds' health.

V(A). Planned Program (Summary)

Program # 30

1. Name of the Planned Program

Goat Internet Website (Langston University)

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
903	Communication, Education, and Information Delivery	0%	100%	0%	100%
Total		0%	100%	0%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.2	0.0	0.1
Actual Paid	0.0	0.2	0.0	0.1
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	6614	0	1771
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	26360	0	26360
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	97418	0	163177

V(D). Planned Program (Activity)

1. Brief description of the Activity

Meat goat production is one of the fastest growing sectors of the livestock industry in the United States. New producers, as well as some established ones, have an expressed need for current, correct

information on how to raise goats and produce safe, wholesome products in demand by the public. As the meat goat industry grows and evolves, a quality assurance (QA) program is essential. Such a QA program ensures the production of a wholesome product that satisfies consumers and increases profits for the meat goat industry.

2. Brief description of the target audience

The target audience is primarily goat producers interested in becoming certified in meat goat production.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	58970	40000	5800	200

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

Patent Applications Submitted

Year: 2015
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- • Number of Research Projects completed on Goat Internet Website.

2015 Oklahoma State University and Langston University Combined Research and Extension Annual Report of Accomplishments and Results

Year	Actual
2015	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of goat producers learning about information found on the goat internet website.
2	Number of goat producers using the goat internet website.
3	Goat producers who improved their operations with information from the goat internet website.

Outcome #1

1. Outcome Measures

Number of goat producers learning about information found on the goat internet website.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	1000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Meat goat production is one of the fastest growing sectors of the livestock industry in the United States. New producers, as well as some established ones, have an expressed need for current, correct information on how to raise goats and produce safe, wholesome products in demand by the public. Many producers obtain goat production information from the World Wide Web. While scientifically-based information does exist on the internet, producers with little to no livestock experience may not be able to distinguish between good and bad information. As the meat goat industry grows and evolves, a quality assurance (QA) program is essential. Such a QA program ensures the production of a wholesome product that satisfies consumers and increases profit for the meat goat industry.

What has been done

Langston University was awarded funding by the Food Safety and Inspection Service of USDA to develop training and certification for meat goat producers. Langston University organized and led a consortium of 1890 universities and producer associations in this project. The consortium identified the subject topics most pertinent and pressing for the instructional modules. The consortium then identified experts on the selected subject topics and pursued these experts as module authors. These authors represent the most qualified persons in their field in academia as well as in the industry. Langston University translated the 22 instructional modules into web pages with accompanying images, and pre- and post-tests for those producers wishing to pursue certification. This program is known as the Quality Producer (QP) Online Certification. All modules are also available in pdf for easy printing and the introductory module is available as a podchapter for downloading and listening on your favorite mp3 player. The web-site (<http://www2.luresext.edu/goats/training/qa.html>) was well received by the goat community. In 2015 to better understand internet user's preferences, a tracking code for Goggle Analytics was again embedded in each web page.

Results

More than two thousand five hundred (2,500) goat producers have enrolled in the online certification program and 343 goat producers have been certified via the site to date. Knowledge gained by producers for more efficient and effective goat production will potentially result in increased profits for many of these 343 producers. Based upon Goggle Analytics data, there were 80,539 visits to the online site in 2015 and visitors spent an average of 2 minutes and 44 seconds per visit. These visits represented 194 countries or territories, all 50 U.S. States and the District of Columbia.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Number of goat producers using the goat internet website.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	200

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Meat goat production is one of the fastest growing sectors of the livestock industry in the United States. New producers, as well as some established ones, have expressed a need for current, correct information on how to raise goats and produce safe, wholesome products in demand by the public. Many producers obtain goat production information from the World Wide Web. While scientifically-based information does exist on the internet, producers with little to no livestock experience may not be able to distinguish between good and bad information. As the meat goat industry grows and evolves, a quality assurance (QA) program is essential. Such a QA program ensures the production of a wholesome product that satisfies consumers and increases profit for the meat goat industry.

What has been done

Langston University was awarded funding by the Food Safety and Inspection Service of USDA to develop training and certification for meat goat producers. Langston University organized and led a consortium of 1890 universities and producer associations in this project. The consortium identified the subject topics most pertinent and pressing for the instructional modules. The consortium then identified experts on the selected subject topics and pursued these experts as module authors. These authors represent the most qualified persons in their field in academia as well as in the industry. Langston University translated the 22 instructional modules into web pages with accompanying images, and pre- and post-tests for those producers wishing to pursue certification. This program is known as the Quality Producer (QP) Online Certification. All modules are also available in pdf for easy printing and the introductory module is available as a podchapter for downloading and listening on your favorite mp3 player. The web-site (<http://www2.luresext.edu/goats/training/qa.html>) was well received by the goat community. In 2015 to better understand internet user's preferences, a tracking code for Goggle Analytics was again embedded in each web page.

Results

More than two thousand five hundred (2,500) goat producers have enrolled in the online certification program and 343 goat producers have been certified via the site to date. Knowledge gained by producers for more efficient and effective goat production will potentially result in increased profits for many of these 343 producers. Based upon Goggle Analytics data, there were 80,539 visits to the online site in 2015 and visitors spent an average of 2 minutes and 44seconds per visit. These visits represented 194 countries or territories, all 50 U. S. States and the District of Columbia.

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

Goat producers who improved their operations with information from the goat internet website.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	200

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Meat goat production is one of the fastest growing sectors of the livestock industry in the United States. New producers, as well as some established ones, have an expressed need for current, correct information on how to raise goats and produce safe, wholesome products in demand by the public. Many producers obtain goat production information from the World Wide Web. While scientifically-based information does exist on the internet, producers with little to no livestock experience may not be able to distinguish between good and bad information. As the meat goat industry grows and evolves, a quality assurance (QA) program is essential. Such a QA program ensures the production of a wholesome product that satisfies consumers and increases profit for the meat goat industry.

What has been done

Langston University was awarded funding by the Food Safety and Inspection Service of USDA to develop training and certification for meat goat producers. Langston University organized and led a consortium of 1890 universities and producer associations in this project. The consortium identified the subject topics most pertinent and pressing for the instructional modules. The consortium then identified experts on the selected subject topics and pursued these experts as module authors. These authors represent the most qualified persons in their field in academia as well as in the industry. Langston University translated the 22 instructional modules into web pages with accompanying images, and pre- and post-tests for those producers wishing to pursue certification. This program is known as the Quality Producer (QP) Online Certification. All modules are also available in pdf for easy printing and the introductory module is available as a podchapter for downloading and listening on your favorite mp3 player. The web-site (<http://www2.luresext.edu/goats/training/qa.html>) was well received by the goat community. In 2015 to better understand internet user's preferences, a tracking code for Goggle Analytics was again embedded in each web page.

Results

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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.)

Brief Explanation

External factors did not affect outcomes.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Eagerness of goat producers to register for and complete the goat producer certification module.

Key Items of Evaluation

Certified goat producers who improved their goat production practices.

V(A). Planned Program (Summary)

Program # 31

1. Name of the Planned Program

Development of New Dairy Goat Products (Langston University)

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
502	New and Improved Food Products	0%	100%	0%	100%
	Total	0%	100%	0%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.3	0.0	0.3
Actual Paid	0.0	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
0	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

No activity to report this year.

2. Brief description of the target audience

All goat producers in Oklahoma.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2015	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: 2015

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- ● Number of Research projects completed on Development of New Dairy Goat Products

Year	Actual
2015	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of goat producers learning about techniques for developing new dairy goat products.
2	Number of goat producers using techniques for developing new dairy goat products.
3	Goat producers developing increasing yearly income from new dairy goat products.

Outcome #1

1. Outcome Measures

Number of goat producers learning about techniques for developing new dairy goat products.

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

No activity occurred during 2015.

What has been done

No activity occurred during 2015.

Results

No activity occurred during 2015.

4. Associated Knowledge Areas

KA Code	Knowledge Area
502	New and Improved Food Products

Outcome #2

1. Outcome Measures

Number of goat producers using techniques for developing new dairy goat products.

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

No activity occurred during 2015.

What has been done

No activity occurred during 2015.

Results

No activity occurred during 2015.

4. Associated Knowledge Areas

KA Code	Knowledge Area
502	New and Improved Food Products

Outcome #3

1. Outcome Measures

Goat producers developing increasing yearly income from new dairy goat products.

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

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

2015

0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

No activity occurred during 2015.

What has been done

No activity occurred during 2015.

Results

No activity occurred during 2015.

4. Associated Knowledge Areas

KA Code	Knowledge Area
502	New and Improved Food Products

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)

Brief Explanation

No activity occurred during 2015.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

No activity occurred during 2015.

Key Items of Evaluation

No activity occurred during 2015.

V(A). Planned Program (Summary)

Program # 32

1. Name of the Planned Program

Demonstration Clinic: Artificial Insemination for Goats (Langston University)

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
301	Reproductive Performance of Animals	0%	100%	0%	100%
	Total	0%	100%	0%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.1	0.0	0.0
Actual Paid	0.0	0.1	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
0	4634	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	26360	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	97418	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Hands-on artificial insemination (AI) workshops will be conducted to teach AI techniques to goat producers. These AI skills will allow goat producers to gain access to genetically superior sires for

2. Brief description of the target audience

All goat producers in Oklahoma.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	17	50	1	20

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

Patent Applications Submitted

Year: 2015
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of Research projects completed on Demonstration Clinic: Artificial Insemination for Goats

Year **Actual**
2015 0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of goat producers learning about artificial insemination techniques.
2	Number of goat producers using artificial insemination techniques.
3	Goat producers who improved their herds by using artificial insemination techniques.

Outcome #1

1. Outcome Measures

Number of goat producers learning about artificial insemination techniques.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	17

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The use of superior sires is imperative for improving the genetic composition of breeding stock. Artificial insemination (AI) has long been used in the dairy cattle industry and is a simple technology that goat producers can acquire. However, opportunities for goat producers to acquire the necessary skills via formal and practical instruction are not widespread. Langston University has instituted a practical workshop for instruction in artificial insemination in goats. Producers are instructed in the anatomy and physiology of the female goat, estrus detection and handling and storage of semen. Producers participate in a hands-on insemination exercise. An understanding of the anatomy and physiology enable the producer to devise seasonal breeding plans and to troubleshoot problem breeders. Acquiring goat artificial insemination skills also allows producers to save money by conducting the inseminations themselves, rather than hiring an inseminator.

What has been done

In 2015, AI workshops were held on 09/12/15 and 10/10/15 on the Langston University Campus (Langston, Oklahoma). Seventeen (17) participants enrolled and received AI training.

Results

Two workshops were conducted in AI for goats. Goat producers are under-served in this area of herd improvement because traditional AI courses are geared toward cattle and the AI techniques differ drastically between the species. Goat producers participating in the workshops saved money by being able to conduct their own herd artificial inseminations. They can also potentially improve their herds with access to genetic material from superior sires.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Number of goat producers using artificial insemination techniques.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	5

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The use of superior sires is imperative for improving the genetic composition of breeding stock. Artificial insemination (AI) has long been used in the dairy cattle industry and is a simple technology that goat producers can acquire. However, opportunities for goat producers to acquire the necessary skills via formal and practical instruction are not widespread. Langston University has instituted a practical workshop for instruction in artificial insemination in goats. Producers are instructed in the anatomy and physiology of the female goat, estrus detection and handling and storage of semen. Producers participate in a hands-on insemination exercise. An understanding of the anatomy and physiology enable the producer to devise seasonal breeding plans and to troubleshoot problem breeders. Acquiring goat artificial insemination skills also allows producers to save money by conducting the inseminations themselves, rather than hiring an inseminator.

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4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals

Outcome #3

1. Outcome Measures

Goat producers who improved their herds by using artificial insemination techniques.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	5

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The use of superior sires is imperative for improving the genetic composition of breeding stock. Artificial insemination (AI) has long been used in the dairy cattle industry and is a simple technology that goat producers can acquire. However, opportunities for goat producers to acquire the necessary skills via formal and practical instruction are not widespread. Langston University has instituted a practical workshop for instruction in artificial insemination in goats. Producers are instructed in the anatomy and physiology of the female goat, estrus detection and handling and storage of semen. Producers participate in a hands-on insemination exercise. An understanding of the anatomy and physiology enable the producer to devise seasonal breeding plans and to troubleshoot problem breeders. Acquiring goat artificial insemination skills also allows producers to save money by conducting the inseminations themselves, rather than hiring an inseminator.

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In 2015, AI workshops were held on 09/12/15 and 10/10/15 on the Langston University Campus (Langston, Oklahoma). Seventeen (17) participants enrolled and received AI training.

Results

Two workshops were conducted in AI for goats. Goat producers are under-served in this area of herd improvement because traditional AI courses are geared toward cattle and the AI techniques differ drastically between the species. Goat producers participating in the workshops saved money by being able to conduct their own herd artificial inseminations. They can also potentially

improve their herds with access to genetic material from superior sires.

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)

Brief Explanation

External factors did not affect outcomes.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Goat producers acquiring artificial insemination skills.

Key Items of Evaluation

- Goat producers saving money by performing artificial insemination on their own herds.
- Goat producers improving their herds via genetic material from superior sires.

V(A). Planned Program (Summary)

Program # 33

1. Name of the Planned Program

Fish Marketing (Aquaculture) (Langston University)

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	0%	100%	0%	100%
	Total	0%	100%	0%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.4	0.0	0.2
Actual Paid	0.0	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
0	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Methods of marketing alternative fish species will be explored to increase fish producers' profits.

2. Brief description of the target audience

All aquaculture producers in Oklahoma

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2015	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: 2015

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of Research Projects completed on Fish Marketing.

Year	Actual
2015	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of farmers learning new fish marketing techniques.
2	Number of farmers using new fish marketing techniques.
3	Farmers who use new fish marketing techniques to increase their profits.

Outcome #1

1. Outcome Measures

Number of farmers learning new fish marketing techniques.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Aquaculture producers need additional sale venues to withstand economic uncertainties. Competition from a state agency is an ongoing obstacle to sales. Aquaculture production of buffalo fishes and grass carp can meet consumer desires and provide additional income opportunities for channel catfish producers, but more buyers must be found for buffalo and grass carp.

What has been done

Due to severe drought, no activity occurred in 2015.

Results

Due to severe drought, no activity occurred in 2015.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Number of farmers using new fish marketing techniques.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Aquaculture producers need additional sale venues to withstand economic uncertainties. Competition from a state agency is an ongoing obstacle to sales. Aquaculture production of buffalo fishes and grass carp can meet consumer desires and provide additional income opportunities for channel catfish producers, but more buyers must be found for buffalo and grass carp.

What has been done

Due to severe drought, no activity occurred in 2015.

Results

Due to severe drought, no activity occurred in 2015.

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

Farmers who use new fish marketing techniques to increase their profits.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Aquaculture producers need additional sale venues to withstand economic uncertainties. Competition from a state agency is an ongoing obstacle to sales. Aquaculture production of buffalo fishes and grass carp can meet consumer desires and provide additional income opportunities for channel catfish producers, but more buyers must be found for buffalo and grass carp.

What has been done

Due to severe drought, no activity occurred in 2015.

Results

Due to severe drought, no activity occurred in 2015.

4. Associated Knowledge Areas

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

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)

Brief Explanation

External factors affected outcomes.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Development of new markets or marketing methods for fish producers.

Key Items of Evaluation

Fish producers improving their income via direct marketing of fish.

V(A). Planned Program (Summary)

Program # 34

1. Name of the Planned Program

Meat Buck Performance Test (Langston University)

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
303	Genetic Improvement of Animals	0%	100%	0%	100%
	Total	0%	100%	0%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.2	0.0	0.1
Actual Paid	0.0	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
0	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Extension personnel will conduct the annual meat goat performance test for young, growing meat bucks to evaluate growth and feed efficiency.

2. Brief description of the target audience

All goat producers in Oklahoma.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2015	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: 2015

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- ● Number of Research Projects completed on Meat Buck Performance Test.

Year	Actual
2015	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of goat producers learning about the meat buck performance test.
2	Number of goat producers using the meat goat performance test.
3	Goat producers who improve their herds via the meat buck performance test.

Outcome #1

1. Outcome Measures

Number of goat producers learning about the meat buck performance test.

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

An influential aspect of meat goat production is the growth rate and/or efficiency of kids. Objective performance records are needed when making informed genetic selections to improve average daily gain, feed efficiency and/or residual feed intake. In order to compare animals from different ranches or environments, a central performance meat buck testing is conducted. In 1997, Langston University established a meat buck performance test to promote the identification and increased utilization of genetically superior sires.

What has been done

No activity occurred in 2015.

Results

No activity occurred in 2015.

4. Associated Knowledge Areas

KA Code	Knowledge Area
303	Genetic Improvement of Animals

Outcome #2

1. Outcome Measures

Number of goat producers using the meat goat performance test.

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

An influential aspect of meat goat production is the growth rate and/or efficiency of kids. Objective performance records are needed when making informed genetic selections to improve average daily gain, feed efficiency and/or residual feed intake. In order to compare animals from different ranches or environments, a central performance meat buck testing is conducted. In 1997, Langston University established a meat buck performance test to promote the identification and increased utilization of genetically superior sires.

What has been done

No activity occurred in 2015.

Results

No activity occurred in 2015.

4. Associated Knowledge Areas

KA Code	Knowledge Area
303	Genetic Improvement of Animals

Outcome #3

1. Outcome Measures

Goat producers who improve their herds via the meat buck performance test.

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

An influential aspect of meat goat production is the growth rate and/or efficiency of kids. Objective performance records are needed when making informed genetic selections to improve average daily gain, feed efficiency and/or residual feed intake. In order to compare animals from different ranches or environments, a central performance meat buck testing is conducted. In 1997, Langston University established a meat buck performance test to promote the identification and increased utilization of genetically superior sires.

What has been done

No activity occurred in 2015.

Results

No activity occurred in 2015.

4. Associated Knowledge Areas

KA Code	Knowledge Area
303	Genetic Improvement of Animals

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)

Brief Explanation

External factors did not affect outcomes.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Meat buck performance tests give producers an accurate assessment of the market value of their animals.

Key Items of Evaluation

- Some meat goat producers are able to demand higher market values for their animals because of an accurate buck performance test.

V(A). Planned Program (Summary)

Program # 35

1. Name of the Planned Program

Goat Dairy Herd Improvement (DHI) Laboratory (Langston University)

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
308	Improved Animal Products (Before Harvest)	0%	100%	0%	100%
Total		0%	100%	0%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.2	0.0	1.1
Actual Paid	0.0	0.2	0.0	1.0
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	6269	0	22944
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	26360	0	26360
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	97418	0	163177

V(D). Planned Program (Activity)

1. Brief description of the Activity

Extension personnel will conduct goat milk quality tests in the Langston University Goat Dairy Herd Improvement Laboratory.

2. Brief description of the target audience

All goat producers in Oklahoma.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	210	100	1000	200

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

Patent Applications Submitted

Year: 2015

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- ● Number of Research Projects completed on Goat Dairy Herd Improvement (DHI) Laboratory.

Year	Actual
2015	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of goat producers who learned about the Goat Dairy Herd Improvement Laboratory.
2	Number of goat producers who are using the Goat Dairy Herd Improvement Laboratory.
3	Goat producers who have increased their production profits by utilizing the Goat Dairy Herd Improvement Laboratory.

Outcome #1

1. Outcome Measures

Number of goat producers who learned about the Goat Dairy Herd Improvement Laboratory.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	35

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Dairy Herd Improvement Association (DHIA) has been serving cow producers for decades. However, for many years dairy goat producers had to deal with records written in cow language. This meant that they could not get accurate information in goat terms and that all the reports reflected cows, bulls and calves rather than does, bucks and kids. The records produced by our DHI lab are used to identify high producing does. These records are useful for the exportation of does to foreign countries and accurate data could enhance the resale value of does and offspring for the producers domestically as well. DHI programs are playing a significant role in increasing goat milk production and quality. Langston University operates a certified laboratory that operates under the supervision of the National Dairy Herd Improvement Association.

What has been done

During 2015, we used a program developed in cooperation with other institutions to utilize goat language for accurate data measurements and recordings. Accurate records were produced on dairy goat breeds along with correct gender identification and expected delivery dates for pregnant does. Workshops were conducted on the benefits of having DHIA records and how to collect raw data and milk samples for DHI laboratory processing. Numerous tours and demonstrations were conducted for goat producers, high school and college students. Updates made in 2015 allowed the DHI laboratory to produce more precise data at a faster rate.

Results

Goat producers are now able to get records for their animals that reflect accurate information with the correct language. These records not only reflect higher fat and protein values for a doe, but also are easier to understand when used for genetic evaluation and for herd management. Currently, we are serving over 150 goat producers in 33 states. Information provided by the Langston University DHI Laboratory has allowed goat producers to demand higher prices for their

animals during sales. Of the 150 plus participating producers, information from this program can help them increase their profits.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Number of goat producers who are using the Goat Dairy Herd Improvement Laboratory.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	700

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

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4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

Goat producers who have increased their production profits by utilizing the Goat Dairy Herd Improvement Laboratory.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	35

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Dairy Herd Improvement Association (DHIA) has been serving cow producers for decades. However, for many years dairy goat producers had to deal with records written in cow language. This meant that they could not get accurate information in goat terms and that all the reports reflected cows, bulls and calves rather than does, bucks and kids. The records produced by our DHI lab are used to identify high producing does. These records are useful for the exportation of does to foreign countries and accurate data could enhance the resale value of does and offspring for the producers domestically as well. DHI programs are playing a significant role in increasing goat milk production and quality. Langston University operates a certified laboratory that operates under the supervision of the National Dairy Herd Improvement Association.

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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.)

Brief Explanation

External factors did not affect outcomes.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Goat producers are able to get accurate milk fat and protein records for their dairy goats.

Key Items of Evaluation

- Goat producers are able to get accurate milk fat and protein values to use in marketing their does and improving their herds.

VI. National Outcomes and Indicators

1. NIFA Selected Outcomes and Indicators

Childhood Obesity (Outcome 1, Indicator 1.c)	
7915	Number of children and youth who reported eating more of healthy foods.
Climate Change (Outcome 1, Indicator 4)	
1	Number of new crop varieties, animal breeds, and genotypes with climate adaptive traits.
Global Food Security and Hunger (Outcome 1, Indicator 4.a)	
30000	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)	
25	Number of new or improved innovations developed for food enterprises.
Food Safety (Outcome 1, Indicator 1)	
78	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.