

2017 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. 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. Program areas 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.

The Oklahoma Agricultural Experiment Station experienced further reductions in state funding resulting in not re-filling vacant faculty and staff positions. Faculty research FTEs reduced from 85 in 2015, to 78 in 2016, and to 73 in 2017. These reductions have impacted the service to Oklahoma and the agriculture industry. As state allocations were reduced, dependence on extramural funding increased and the faculty responded by increasing the number of proposals and awards to state and federal agencies, industry, and commodity groups. The research results were presented in 220 peer-reviewed journal articles and in numerous presentations at state, national, and international meetings. It would be impossible to reiterate all the findings from this amount of research and number of publications so only several examples will be listed.

The Oklahoma State Cooperative Extension Service conducted almost 25,000 meetings and workshops with over one million contacts in 2017. These values are slightly reduced from previous years due primarily to county, area, and state positions being unfilled because of reduced state funding over the last few years. We are currently maintaining at least one educator in each county and have garnered additional funding from about half of the counties to stabilize staffing in their counties. State specialist FTEs in 2017 was about 32 and all open positions are being heavily scrutinized. Even with reduced staff the impact of Extension programs remains significant with many successes highlighted in this report.

To summarize some of the programs within OAES and OCES we will highlight 8 distinct areas.

4-H Youth Development

Oklahoma 4-H participated in the first "National 4-H Day of Service" with over 40 service learning projects being reported. 4-H members and adults worked effectively to plan, implement and evaluate service learning projects all around the state. The Oklahoma 4-H Leadership Council set a goal to raise \$15,000 for the Children's Hospital Foundation for research. The council also learned about a new opportunity to collect children's books for children at the hospital so each child could read and take home a book from the hospital. The Leadership Council raised \$6,527 for the Children's Hospital Foundation and delivered over 200 books for the hospital to divide between their clinics for the children. Youth also encouraged county

participation and interaction with the Ronald McDonald House charity. During the yearlong effort to promote the positive benefits that the Children's Hospital and Ronald McDonald House Charities provides to Oklahoma families, State council members developed skills related to empathy, citizenship, and leadership.

Community

In 2017, a pilot project lending wireless hotspot devices began with libraries in 4 rural locations: Perkins, Seminole, Elgin, and Haskell (median population 2,700). Each library was provided with 4 hotspot devices with unlimited data. Starting in June, the devices were made available for 1-2 week checkouts to patrons. The hotspot devices have been loaned out over 300 times. Wait lists in each community range from 5 to over 20 people, and survey results have been extremely positive - with more than 90 percent of respondents ranking the program as a 9 or 10 (out of 10). Survey results suggest the program is reaching its target demographic (74% have incomes < \$50,000; 40% have a high school degree or less) and that the hotspot is being used with a variety of devices (smartphones, tablets, laptops). While entertainment ranks as a top use, other highly-listed uses include research, connecting with family and friends, keeping informed of current events, and helping a child with schoolwork. Also, 27% of respondents said that their Internet skills increased after using the device.

Crops

One of our signature programs is the Wheat Improvement Team which released 3 new varieties in 2017. "Lone Rider", Spirit Rider" and "Smith's Gold" are new varieties of hard red wheat with specific adaptation to the soils, precipitation, and disease pressures experienced in Oklahoma. These new varieties had limited seed distribution in 2017 but will increase in the future. Currently OSU varieties of wheat are planted on 60% of the wheat acres in Oklahoma and 15% of the wheat acres in the southern Great Plains. The Turfgrass development team also released a new variety of Turfgrass in 2017. OKC 1131 has received a commercial name of "Elevate" and has been licensed to a private company with an emphasis in the eastern US and in countries bordering the Mediterranean.

Food Safety

Meat color can have a positive, or a detrimental, effect on beef sales. Programs have been developed to determine the cause and solutions to dark-cutting beef that results in losses of up to 1 billion dollars each year in the meat industry, and to investigate methods for reducing Clostridium spores and E. coli from processed meats and fresh vegetables. Other programs include training and technical support about the Food Modernization act for produce growers, grain bin safety training, timing the withdrawal of grazing animals from pecan orchards to reduce pathogen outbreaks, and safety of farmer market products.

Health & Wellness

Thirty-four percent of Oklahoma youth are considered overweight or obese and for adults, Oklahoma ranks as the 9th most obese state in the nation. Half of all the state's adults reported consuming fruit less than once daily and 27 percent consumed vegetables less than once a day. Among Oklahoma youth, 44 percent reported consuming fruits and vegetables less than one time daily. In 2017, Family & Consumer Sciences nutrition programs were presented to 7,376 Oklahoma youth through 9 different curricula and 1,056 adult participants through 12 different curricula. More than 70 percent of participants reported that they intended to improve eating habits to be healthier.

Livestock

A multidisciplinary team from Animal Science, Agricultural Economics, Vet Med, and Entomology developed a brand-neutral health management protocol, verify its use, and sponsor sales at Oklahoma livestock marketing barns. The Oklahoma Quality Beef Network sponsored feeder cattle auctions increased revenue to Oklahoma cow-calf producers by an estimated \$1,153,326 in 2017. Other programs include matching cow phenotype and size to forage resources thereby reducing the input costs for producers, and determining the economic impact of beef cattle management practices. A new addition to our facilities includes a free-stall barn for dairy cattle research and teaching.

Water

Programs in Water are coordinated through the Oklahoma Water Resources Center located within the Division of Agricultural Sciences and Natural Resources. Specific accomplishments include developing an

auditing system for irrigation efficiency in the panhandle of western Oklahoma where pumping efficiency can increase by 4 dollars per hour of pumping; the ThinkWater Extension urban water conservation program distributed information to 250,000 water utilities customers reaching approximately 1,000,000 Oklahoma citizens in central Oklahoma; and landowners were empowered to manage Oklahoma's 326,000 ponds for multiple uses.

Natural Resources

Researchers and Extension Specialists in the Department of Natural Resource Ecology and Management have completed a 6-year study in the ecology and population management of bobwhite quail in western Oklahoma, a habitat quality study for lesser and greater prairies chickens, and a population study of black bears in eastern Oklahoma. The study of black bears has direct implications on setting hunting seasons and harvest limits.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	240.0	21.0	83.0	22.0
Actual	240.0	17.3	73.7	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

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.

The merit review process for Langston University 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 2017.

III. Stakeholder Input

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

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

Brief explanation.

A broad array of actions was used to encourage stakeholder input 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 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.

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

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 2017. 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.

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

1. Methods for collecting Stakeholder Input

- Meeting with traditional Stakeholder groups
- Survey of traditional Stakeholder groups
- Meeting with traditional Stakeholder individuals
- Survey of traditional Stakeholder individuals
- Meeting with the general public (open meeting advertised to all)
- Survey of the general public
- Meeting specifically with non-traditional groups

- Survey specifically with non-traditional groups
- Meeting specifically with non-traditional individuals
- Meeting with invited selected individuals from the general public
- Other (Peer reviews, grant proposal reviews, telephone surveys)

Brief explanation.

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 Staff Hiring Process

- In the Action Plans
- To Set Priorities
- Other (In team planning and budget requests)

Brief explanation.

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 .
- (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

Brief Explanation of what you learned from your Stakeholders

Depressed 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

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.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
{No Data Entered}	{No Data Entered}	{No Data Entered}	{No Data Entered}

2. Totalled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	7305873	223436	3273699	87673
Actual Matching	7305873	500840	3273699	131800
Actual All Other	21475637	1072192	17010183	679068
Total Actual Expended	36087383	1796468	23557581	898541

3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous				
Carryover	7205873	0	0	0

V. Planned Program Table of Content

S. No.	PROGRAM NAME
1	Animal Enterprises
2	Crop Enterprises
3	Plant Biological Technologies
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 and Safety Issues: Family and Youth
17	Food Safety - Hunger, Health and Safety
18	Global Food Security and Hunger - Families and Youth
19	Enhanced Goat Production in the South - Central United States (Langston University)
20	4-H Clubs (Langston University)
21	Extended Education (Langston University)
22	Family and Consumer Sciences (Langston University)
23	Food and Nutrition (Langston University)
24	Biotechnology (Langston University)
25	Water Gardens (Aquaculture) (Langston University)
26	Sustainable Internal Parasite Control for Small Ruminants (Langston University)
27	Fishery Management (Aquaculture) (Langston University)

28	Alternative Species (Aquaculture) (Langston University)
29	Goat Internet Website (Langston University)
30	Development of New Dairy Goat Products (Langston University)
31	Demonstration Clinic: Artificial Insemination for Goats (Langston University)
32	Meat Buck Performance Test (Langston University)
33	Fish Marketing (Aquaculture) (Langston University)
34	Goat Dairy Herd Improvement (DHI) Laboratory (Langston University)
35	Water, Weather, and Climate

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: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	21.0	0.0	15.0	0.0
Actual Paid	18.0	0.0	8.9	0.0
Actual Volunteer	1.2	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
629257	0	423482	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
629257	0	423482	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
1849703	0	2200595	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Conduct fundamental and applied research
- Construct research facilities
- Write extramural and intramural grant proposals
- Conduct workshops and organize other educational and scientific 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/social 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 re-purposed 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

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	63450	4614000	4500	450000

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

Year: 2017
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	0	48	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of educational meetings, class guest lectures, conferences organized, in-service trainings held, state and local educational presentations

Year	Actual
2017	928

Output #2

Output Measure

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

Year	Actual
2017	131

Output #3

Output Measure

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

Year	Actual
2017	12

Output #4

Output Measure

- Number of web sites maintained

Year	Actual
2017	4

Output #5

Output Measure

- Number of decision making tools developed
Not reporting on this Output for this Annual Report

Output #6

Output Measure

- Number of peer reviewed manuscripts published

Year	Actual
2017	0

Output #7

Output Measure

- Number of beef and pork quality assurance program participants

Year	Actual
2017	145

Output #8

Output Measure

- Number of blog and/or social media posts
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 cattle enrolled in value enhancement programs
2	Number of producers participating in beef cattle value enhancement programs
3	Number of participants gaining knowledge in methods to decrease the incidence and severity of bovine viral diarrhea virus and bovine respiratory disease
4	Number of producers gaining knowledge in pasture and rangeland management, forage use efficiency and pasture and rangeland recovery
5	Number of producers and educators with access to resources regarding adaptation solutions for climate change
6	Number of 'followers' or 'likes' on social media systems.

Outcome #1

1. Outcome Measures

Number of cattle enrolled in value enhancement programs

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	10078

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Past OSU research demonstrates that most Oklahoma cow-calf producers do not utilize management practices that are proven to add value to calves. Practices, including vaccinating, weaning, dehorning/pollled, and castration, are neglected by the majority of producers.

What has been done

A multidisciplinary team from Animal Science, Agricultural Economics, Vet Med, and Entomology developed a brand-neutral health management protocol, verify its use, and sponsor sales at Oklahoma livestock marketing barns. The Oklahoma Quality Beef Network was relaunched in 2008 with the goal of helping producers add value to their calf crops. The team promotes OQBN through Extension programming throughout the calendar year and provides timely research to monitor the value of OQBN practices to Oklahoma cattle producers.

Results

The Oklahoma Quality Beef Network sponsored feeder cattle auctions increased revenue to Oklahoma cow-calf producers by an estimated \$1,153,326 in 2017. The overall impact of OQBN is, however, much higher. The educational efforts of the OQBN team, including faculty, state staff, and county staff, have increased the use of value-added marketing practices substantially since the relaunch of the program in 2008.

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
2017	145

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.

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. OQBN held 7 sales for verified cattle in Oklahoma throughout 2017. 10,078 calves were enrolled representing 145 producers.

Results

Final premiums indicate a 14.24\$/cwt increase in price over non weaned cattle. The average price premium (on average for a 600 lbs calf) is 85.44\$/hd. The added weight gain over the 45 day preconditioning period on average is 90 lbs.with a value of gain at 1.10\$/hd for a gross increase in revenue of 184.44\$/hd. If the price of preconditioning is estimated at 70.00\$/hd, a net gain to producers is 114.44\$/hd. With total enrollments of 10,078, OQBN contributed 1,153,326\$ back to the Oklahoma Beef Industry.

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

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

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Number 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
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Land, fertilizer, feed, fuel and labor costs continue to increase relative to the value of carcass beef and weaned calves. Consequently, profit motivated commercial cow/calf operations must become more cost-efficient to maintain or improve profit margins. The trend is for seedstock enterprises to continually select for traits that maximize weaning and post-weaning performance by increasing expensive inputs so that maximum genetic potential can be expressed. However, the capability of modern cattle to express their genetic potential in the typical forage-based, commercial cow/calf enterprise found in the Southern Great Plains may be restricted. The problem with continually increasing genetic potential for output, with little to no regard for required inputs when resources are limited, is that maintenance cost of the cow herd increases over time.

What has been done

An educational thrust and applied research program was initiated in 2008 to improve our understanding of the balance between increased productive capacity of cattle and ranch resources. Selection for weaning and post-weaning growth and milk production had resulted in larger and larger cows each year requiring more and more expensive inputs. Our message has been to moderate cow size and milk production and in doing so, requirements for feed would go down, resulting in lower cost of production.

Results

According to national genetic trends in some of the major beef breeds, the message seems to be finally taking hold. For example, the genetic trend for increased mature cow weights is beginning to slow (Angus and Hereford). Mature cow weight has actually declined by 70 lb in the Red Angus breed. At the same time, cow carcass weights have stabilized (are no longer increasing). Similarly, it appears that the genetic trend for dry matter intake is stabilizing in the Angus breed. As an example of this potential impact, our research suggests that reducing mature cow weight by 100 lb will generate approximately \$29 more net return due primarily to reduced cost. With 2 million cows in the state, moderating commercial cow size by only 100 lb will generate \$58 million more income for beef cow/calf enterprises.

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

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

Not Reporting on this Outcome Measure

Outcome #6

1. Outcome Measures

Number of 'followers' or 'likes' on social media systems.

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

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

none

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%	0%	0%
201	Plant Genome, Genetics, and Genetic Mechanisms	7%	0%	25%	0%
204	Plant Product Quality and Utility (Preharvest)	13%	0%	10%	0%
205	Plant Management Systems	26%	0%	25%	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%	0%	0%
216	Integrated Pest Management Systems	5%	0%	10%	0%
405	Drainage and Irrigation Systems and Facilities	4%	0%	0%	0%
	Total	100%	0%	100%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	18.0	0.0	10.0	0.0
Actual Paid	22.0	0.0	9.7	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
628590	0	462975	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
628590	0	462975	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
1847742	0	2405595	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

1. Wheat cultivar performance testing and demonstration throughout Oklahoma
2. Wheat breeding, variety development, and introgression of new traits into elite germplasm
3. Publication of web sites, web-based updates, video presentations, and printed extension materials that disseminate research findings and address current and emerging issues in Oklahoma agriculture
4. Provide effective, non-classroom educational opportunities for industry professionals, Extension educators, farmers, and ranchers.
5. Conduct on-farm research and demonstration of nitrogen rich strips and use of hand-held sensors
6. Evaluate alternative irrigation methods and strategies that increase sustainability of irrigated cropping systems in the presence of changing climatic conditions and decreasing water resources.
7. Conduct on farm research and demonstration of soil health promoting practices such as no-till and reduced tillage systems that include diverse crop rotations, integrated with beef cattle production.

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

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	47500	2582000	2500	360000

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

Patent Applications Submitted

Year: 2017
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	0	70	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Field Demonstrations, field days, and conferences

Year	Actual
2017	696

Output #2

Output Measure

- Regionally adapted wheat cultivars

Year	Actual
2017	3

Output #3

Output Measure

- Educational materials developed

Year	Actual
2017	101

Output #4

Output Measure

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

Year	Actual
2017	15

Output #5

Output Measure

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

Year	Actual
2017	86

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	Utilizing cover crops to improve cropping systems in Oklahoma
5	Canopeo Mobile App

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
2017	3

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Seed producers in Oklahoma, and those seed producers who have membership in Oklahoma Genetics, Inc. but operate outside of Oklahoma, have limited varietal choice from the OSU wheat improvement program to market a competitive seed product in wheat production areas outside of Oklahoma. Competitive enterprises, public or private on the other hand, offer a wide choice to prosper in Oklahoma, yet at an less than desirable level of end-use quality. Gallagher has remained the principle source of OSU wheat genetics to be positioned beyond Oklahoma, though Gallagher is not serviceable in the High Plains of Texas, southeastern Colorado, and western Kansas. Iba could have serviced some of this area, but for reasons unknown, adoption has been below expectation.

What has been done

The OAES released Lonerider HRW wheat with a much wider target production area than any wheat variety released by OAES in the past 25 years (since the release of ?Chisholm?). Yield trials conducted by USDA-ARS and by neighboring state land-grant universities have demonstrated Lonerider?s yield competitiveness in the High Plains of Texas, southeastern Colorado, and western Kansas, and even into central Nebraska. Moreover, in addition to its yield competitiveness, Lonerider offers wheat producers in any locale an effective level of Hessian fly resistance, very early maturity, extremely short plant stature, above-average straw strength, and acceptable to desirable milling and baking quality when properly fertilized.

Results

Seed producers in Oklahoma, or those outside Oklahoma with membership in OGI, would have access to a much wider geography for distribution of seed wheat, including the entire Texas panhandle (~2M ac), southeastern Colorado (~0.25M ac), and the western third of Kansas (~2M ac). This area of HRW wheat production would nearly equal the total amount currently accessible in Oklahoma alone, thus effectively doubling the targeted production area for Lonerider versus

past releases from OAES.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	60

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

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

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Utilizing cover crops to improve cropping systems in Oklahoma

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Interest in conservation-based production practices have been increasing in recent years highlighted by a major push of cover crops from federal, state, and local agencies and industries. Potential benefits of cover crops are increased in crop productivity following the cover crop, increased soil health, and increased profitability. Other ?secondary? benefits include increased nutrient cycling, pest control, and better weed management. While the current literature has shown these are very promising practices for conservation land management, initial results from Oklahoma studies have been more variable, partly due to the differences in crops grown and different environmental conditions.

What has been done

A multi-year, multi-location study was established to evaluate the potential of cover crops, both summer and winter, to control weeds in soybean, sorghum, and wheat systems. Data collected from these studies have confirmed that cover crops can be utilized to help control weeds in major crop systems in Oklahoma. These covers, specifically winter covers ahead of soybean, resulted in a net decline of weed populations by 15%, on average, with nearly a 40% decrease in weed canopy coverage. While this effect was not season long, it typically would result in one less in-season herbicide application. Furthermore, the utilization of specific cover crops drastically decreased the amount of resistant weed populations in each field, both palmer pigweed and

marestail were evaluated.

Results

Data from a multi-year, multi-location studies have suggested that the use of cover crops could result in one less in-season herbicide application. This has applicability on several fronts. Firstly, a single herbicide application will average \$17 per acre with a higher cost if custom application is needed. Low-cost cover crop will average \$10 per acre, while a high cost cover crop would average \$27 per acre, including cover crop mixes. Therefore, this suggested that the use of cover crops could result in a \$7 per acre decrease in variable costs if a low-cost cover crop is utilized but a higher cost option would result in a \$-10 per acre. This would result in a cost savings of \$1,120 per quarter section if low-cost effective cover crops were integrated into the system. The decreased amount of herbicide being applied per acre paired with the additional tool for managing resistant weeds is difficult to measure; however, could be invaluable to producers in the future.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
205	Plant Management Systems
213	Weeds Affecting Plants

Outcome #5

1. Outcome Measures

Canopeo Mobile App

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Farmers, ranchers, crop consultants, and conservationists often need to make quick and accurate assessments of percent green canopy cover for cropland and grassland because green canopy cover is a key indicator of plant conditions. Percent green canopy cover can influence decisions regarding fertilization and grazing and assessments of soil erodibility. However, estimating green

canopy cover in the field has typically involved either subjective guesswork or labor-intensive objective methods, such as the NRCS line-transect method. The lack of a quick and accurate method to measure green canopy cover leaves managers in an information deficit.

What has been done

In 2015, the soil physics research group at Oklahoma State University partnered with the Oklahoma Cooperative Extension Service and the OSU App Center to create a mobile app to solve this problem. Their app, called Canopeo, is the first mobile app designed specifically for quick and accurate measurements of green canopy cover in cropland and grassland. Canopeo apps for iOS and Android devices were released in 2015, and a dedicated Canopeo server and website were established with the help of the DASNR IT group.

Results

The impact of the Canopeo app for iOS and Android devices has been rapid and global. In the two years since its release, the free Canopeo app has gained approximately 8,000 users worldwide. Those users have submitted >75,000 photos and measurements of green canopy cover to the Canopeo server, and many of those photos are geo-located. The app is being used by other researchers to monitor plant canopy size and as a component of fully-automated irrigation scheduling systems, as evidenced by peer-reviewed papers published in 2017. The app is also being used by crop consultants in their crop scouting reports, by turf grass companies screening turf varieties for drought tolerance, by farmers managing grazing on dual-purpose winter wheat, and by NRCS staff evaluating cover crop establishment. These and a wide array of other end-users have gained, through Canopeo, an entirely new capacity to measure green canopy cover in the field at the touch of a button.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
201	Plant Genome, Genetics, and Genetic Mechanisms
205	Plant Management Systems
405	Drainage and Irrigation Systems and Facilities

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 Technologies

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%	15%	0%
201	Plant Genome, Genetics, and Genetic Mechanisms	0%	0%	10%	0%
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%	0%	25%	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: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	10.0	0.0
Actual Paid	0.0	0.0	8.0	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	380658	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	380658	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	1977878	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
 - Provide research opportunities for students at OSU. Maintain a diverse environment in the lab and continue to support group members in their career development

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

2017	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: 2017
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	0	28	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Grant proposals written and submitted

Year	Actual
2017	0

Output #2

Output Measure

- Peer-reviewed publications including journal articles

Year	Actual
2017	28

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Graduate students graduated
2	Rapid utilization of a major gene for grain yield in winter wheat
3	Epigenetic Control of Seed Development and Stress Tolerance

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
2017	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
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

Rapid utilization of a major gene for grain yield in winter wheat

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Wheat is the most important crop planted in Oklahoma and provides one of the most important economic resources at the farm gate and in associated industries in this state. Nitrogen (N) is the most important nutrient for plant development and growth, and soil is often supplemented with N fertilizer to ensure successful seed production and high grain yield for non-N-fixing food crops such as wheat (*Triticum aestivum* L.). However, only 30-35% of added N fertilizers are taken up and used by wheat plants in the year of application, and the remaining 65-70% (assuming fertilizer-soil equilibrium) is lost. Developing varieties of wheat that require less N input yet maintain the same or higher grain yields is an economically and environmentally sustainable goal in international agriculture.

What has been done

In our previous studies supported by OCAST, we found that a major QTL (quantitative trait locus for nitrogen use efficiency (NUE) is genetically linked with TaVRN-A1, a gene that is well known for vernalization requirement duration in wheat. In 2017, we have cloned the QTL for N-related agronomic traits. We found that due to the Ala180/Val180 substitution, two proteins, TaVRN-A1a from cultivar 'Jagger' and TaVRN-A1b from cultivar '2174', had differential interactions with TaANR1 protein, which is encoded by a wheat orthologue of Arabidopsis nitrate regulated 1 (ANR1). A natural mutant of TaANR1 was found resulting in missing exon 6 in its mRNA, which had genetic effect on wheat development and growth. The transcripts of both TaVRN-A1 and TaANR1 were down-regulated by N. Genetically incorporating favorable alleles from TaVRN-A1, TaANR1, and TaHOX1 increased grain yield from 9.83% to 11.58% in a winter wheat population tested in the field.

Results

Our research article 'Nitrogen use efficiency was regulated by interacting proteins relevant to development in wheat' has been published in Plant Biotechnology Journal (Lei et al., 2017, doi:

10.1111/pbi.12864), which is one of top journals in Plant Science in the world. The revealing of the interacting proteins regulating NUE is a landmark event.

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

Epigenetic Control of Seed Development and Stress Tolerance

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Our understanding of the role of epigenetic factors in the regulation of plant development is incomplete. Understanding plant development is critical to the development of crop varieties with advantageous traits such as improved stand establishment, flowering time, and seed production. This project is focused on uncovering the regulatory factors that control the switch from seed maturation to seed germination and seedling growth.

What has been done

We have found that this developmental transition involved modification of the DNA packaging proteins known as histones, which affect the ability of genes to be expressed at appropriate times. We have identified a complex regulatory strategy in which a critical transcriptional repressor, called HSI2, that downregulates the expression of seed maturation transcriptional activator. This data was published in *The Plant Cell*, the top plant science journal.

Results

Our work opens new doors in our basic understanding of seedling development and provides new insight into the role of chromatin-based epigenetic mechanisms in plant development. Our work shows that evolutionarily conserved gene silencing regulatory mechanisms are active in plants and critical for seedling development. These insights could provide new strategies for crop

improvement to increase seedling establishment under stressful environmental conditions.

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

Our research benefits the state, the university, and the department by enhancing our reputation for to-level plant science. Our work directly benefits other plant scientists and plant breeders involved in research directed and basic plant biology and crop improvement.

Key Items of Evaluation

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	3%	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	7%	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: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	12.0	0.0	2.0	0.0
Actual Paid	15.0	0.0	2.5	0.0
Actual Volunteer	23.0	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
612416	0	120902	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
612416	0	120902	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
1800199	0	628199	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 to improve crop production in controlled environments. •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?

Specialists respond to horticulture questions through the Ask-an-Expert feature of eXtension.

V(E). Planned Program (Outputs)

1. Standard output measures

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	52250	16186000	5000	3000000

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

Year: 2017
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	0	7	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- New Master Gardeners trained

Year	Actual
2017	281

Output #2

Output Measure

- Manuscripts submitted for consideration of publication in peer-reviewed journals
 Not reporting on this Output for this Annual Report

Output #3

Output Measure

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

Year	Actual
2017	304

Output #4

Output Measure

- Number of statewide "Oklahoma Gardening" shows produced

Year	Actual
2017	36

Output #5

Output Measure

- Number of Funded Grant Proposals
Not reporting on this Output for this Annual Report

Output #6

Output Measure

- Number of potential fresh market growers of horticulture crops trained
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 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

Outcome #1

1. Outcome Measures

Number of horticultural crop producers newly certified as organic

Not Reporting on this Outcome Measure

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
2017	63360

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 Extension Master Gardener Volunteers 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.

Results

The service from the Extension Master Gardener volunteer program has proven to be a highly popular means of extending the knowledge of OCES to the residents of Oklahoma. The Oklahoma Extension Master Gardener Program now has 25 counties participating in the program

as of December 2017. Approximately 281 new Extension Master Gardeners were trained during the 2017 training season. Over 740 active Master Gardeners volunteered their time, contributing approximately 63,360 volunteer hours resulting in over 1,329,886 educational interventions with Oklahomans and as many as 894 educational and community programs and activities being conducted in their communities in 2017. This translates to over \$1,398,989.00 in service that was donated by volunteers (wage rate of \$22.08/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 2016 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."

In addition to the many hours donated, approximately 693 pounds of produce was donated to local food pantries/kitchens, shelters, and other organizations throughout Oklahoma by the Extension 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
2017	350

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Master gardeners are an important segment of cooperative extension services across the country. In Oklahoma, master gardener volunteers assist county extension personnel with questions from homeowners, land owners, and other citizens. This saves extension personnel countless hours in handling emails, phone calls, and in-person visits from the general public. However, master

gardeners must be knowledgeable in a wide range of topics related to horticulture, including integrated pest management (IPM). The basis of IPM is in correct identification of insects (and other pests) and plant damage related to pests. Thus, master gardeners must be trained in identification of insects and their relatives, insect biology, and diagnosing plant damage as it relates to insects and mites.

What has been done

Approximately 15 master gardener training sessions were conducted throughout Oklahoma. The session topics were identification of insects and their relatives, signs and symptoms associated with insects, and how to differentiate between pests and beneficial insects. In 2017, the impact of my training sessions were assessed by polling master gardeners from four counties with identical pre- and post-instruction questions using a classroom response system. These questions are designed to measure changes in knowledge and attitudes about insects and other arthropods.

Results

The impact of these master gardener training sessions was demonstrated by gains in knowledge. Over 50% indicated that they gained knowledge about insects and arthropods and 34% improved attitudes about arthropods.

4. Associated Knowledge Areas

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

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

none

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Ecosystem and Environmental Quality and Management including Weather and Climate

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
104	Protect Soil from Harmful Effects of Natural Elements	5%	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%	5%	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%	5%	0%
	Total	100%	0%	100%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	8.0	0.0	11.0	0.0
Actual Paid	8.0	0.0	14.2	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
399528	0	675191	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
399528	0	675191	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
1174414	0	3508262	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.

2. Brief description of the target audience

Scientists, students, related agencies (Federal, State, private), land owners, farmers, ranchers,

communities, consumers, land developers, state legislators, commodity groups, community leaders, homeowners,

3. How was eXtension used?

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

V(E). Planned Program (Outputs)

1. Standard output measures

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	21854	166688	4500	20000

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

Patent Applications Submitted

Year: 2017

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	0	89	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Grant proposals written and submitted

Year	Actual
2017	90

Output #2

Output Measure

- Manuscripts submitted for consideration of peer-reviewed publication

Year	Actual
2017	89

Output #3

Output Measure

- Extension conferences, workshops and training sessions

Year	Actual
2017	674

Output #4

Output Measure

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

Year	Actual
2017	53

Output #5

Output Measure

- Number of weather-based agricultural decision support tools

Year	Actual
2017	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	Urban Ecology of Tick-borne Disease
11	Wind energy and wildlife ecology

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
2017	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
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.

Not Reporting on this Outcome Measure

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
2017	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
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
2017	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
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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	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
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
121	Management of Range Resources
123	Management and Sustainability of Forest Resources
132	Weather and Climate
133	Pollution Prevention and Mitigation
134	Outdoor Recreation
135	Aquatic and Terrestrial Wildlife
136	Conservation of Biological Diversity
205	Plant Management Systems

403 Waste Disposal, Recycling, and Reuse
605 Natural Resource and Environmental Economics

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
2017	0

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; however, restoration of invaded rangelands has been met with little to no success.

What has been done

Results

We have completed multiple field and greenhouse experiments that show alterations of beneficial soil fungi (arbuscular mycorrhizal fungi) are a major mechanism in native plant growth suppression following non-native plant invasion, and restoration of the native fungi may be a fundamental consideration for successful establishment of native plant species; selection of native inoculum and local plants species is critical.

4. Associated Knowledge Areas

KA Code	Knowledge Area
104	Protect Soil from Harmful Effects of Natural Elements
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
121	Management of Range Resources
123	Management and Sustainability of Forest Resources
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
2017	500000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

As prescribed fire becomes an increasingly important land management tool, there is a need to train practitioners and educate the public about its potential, ecology and limitations.

What has been done

Our department has developed an active "hands-on" approach to training students in the classroom and the field and educating the public about how to apply prescribed fire and what role fire plays in forest, rangeland and riparian ecosystems.

Results

Results of a published survey indicated that since the year 2000, former students of NREM 4783/5783 Prescribed Fire and NREM 4793/5793 Advanced Prescribed Fire have conducted 6,247 burns on over 1.8 million acres since taking these courses. Many students reported that the courses changed their career trajectories by stimulating interest in obtaining fire-related jobs.

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
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

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

What has been done

The Oklahoma Mesonet has created multi-faceted agricultural and natural resource extension/outreach online data and models. Mesonet.org provides desktop and tablet access to weather data and products at no cost to Oklahoma farmers and ranchers. An Agriculture section organizes decision support products by crop and livestock commodity. Android and iPhone apps provide 5-minute Mesonet weather data and maps, NOAA National Weather Service (NWS) forecasts, NWS weather alerts, and NWS radar. Ongoing extension/outreach efforts inform growers about and how to use Mesonet and NWS products via farm show exhibits, educational presentations, television, YouTube videos and web tutorials, web blog, and printed materials.

Results

Farmers and ranchers turn to the Mesonet to monitor rainfall and soil moisture on a regular basis to monitor for drought. Conservative estimates of on-farm losses from the 2010-2015 drought in Oklahoma were over \$3 billion. An economic survey completed by OU graduate student Kim Klockow using recognized economic analysis techniques, estimated that the 10% of Oklahoma crop land being managed with Oklahoma Mesonet data saved \$8 million in production costs in 2008. This estimated value did not include the Mesonet value to livestock producers for that year and only covered 10% of Oklahoma cropland.

4. Associated Knowledge Areas

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

Outcome #10

1. Outcome Measures

Urban Ecology of Tick-borne Disease

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
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2017

0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Tick-borne disease risk is increasing dramatically throughout the U.S., including in urban areas, and Oklahoma is a hotbed for numerous tick-borne diseases. Now more than ever, urban and suburban Oklahomans are at risk of transmitting tick-borne diseases in or near their own backyards, yet little is known about the ecological factors influencing disease risk.

What has been done

In the Oklahoma City metro area, we are conducting the first comprehensive study of the urban ecology of tick-borne diseases. We are identifying biological and environmental factors that affect populations of ticks and their wildlife hosts, and ultimately, that influence disease risk for urban residents.

Results

Our study is finding abundant tick populations and a high prevalence of multiple tick-borne diseases in parks spanning the OKC metro area, including in close proximity to the downtown area and state capitol building. Continued sampling of ticks and their wildlife hosts will allow us to refine our ability to predict urban hotspots of tick-borne disease risk.

4. Associated Knowledge Areas

KA Code	Knowledge Area
134	Outdoor Recreation
135	Aquatic and Terrestrial Wildlife

Outcome #11

1. Outcome Measures

Wind energy and wildlife ecology

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Wind energy is a promising renewable alternative to fossil fuels, and Oklahoma is 4th in the nation in wind energy generation. However, the impacts of wind energy on wildlife remain unclear, particularly for bats, an animal group with many threatened and declining species that are known to collide with wind turbines in high numbers across the U.S.

What has been done

We compiled the largest database of bat collision mortality records in existence, including 218 studies from 100 U.S. wind facilities, to assess factors driving variation in bat mortality across wind facilities. We also used this database to identify biases in how bat fatality surveys are conducted and make recommendations about best practices for future studies of bat collision mortality.

Results

We found that migratory tree-roosting bats (Hoary Bat, Eastern Red Bat, and Silver-haired Bat) are the most frequent collision victims and that the most important factor driving mortality is the amount of forest land around wind facilities, with open areas having lower mortality. We also found that bat mortality surveys at most wind facilities occur too infrequently to accurately document numbers and species of bats killed.

4. Associated Knowledge Areas

KA Code	Knowledge Area
135	Aquatic and Terrestrial Wildlife
136	Conservation of Biological Diversity

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

None

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: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	2.0	0.0	4.0	0.0
Actual Paid	3.0	0.0	4.3	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
249705	0	202700	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
249705	0	202700	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
734010	0	1053220	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.
- Provide continuing educational opportunities for professionals with fumigation certification
- Provide base level education for people desiring to take the fumigation certification test for Oklahoma, Missouri, and Texas.
- Conduct research in entomological challenges in the grain and ag product storage industry

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

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	1137	3770	0	0

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

Patent Applications Submitted

Year: 2017

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
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Actual	0	25	0
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V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of conferences and other extension outreach presentations

Year	Actual
2017	100

Output #2

Output Measure

- External funding obtained
Not reporting on this Output for this Annual Report

Output #3

Output Measure

- Workshops, symposia, short courses, and round tables conducted
Not reporting on this Output for this Annual Report

Output #4

Output Measure

- Technical assistance projects completed
Not reporting on this Output for this Annual Report

Output #5

Output Measure

- Manuscripts submitted for publication in peer-reviewed journals
Not reporting on this Output for this Annual Report

Output #6

Output Measure

- Extension publications completed

Year	Actual
2017	68

Output #7

Output Measure

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

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Grain storage, food or pest control entities adopting new process or product
2	Number of food industry personnel newly certified as 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
10	Clientele Receiving Food Safety Modernization Act Training

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
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahoma grain and oilseed producers are faced with increasing pressure to provide to the market not only quantity of product but increased quality. To be responsive to time sensitive market needs and to segregate niche market products, storage at commercial facilities and on the farm must be constructed and managed diligently. To maintain product quality during Oklahoma high-temperature, high-humidity summer conditions, aeration and specific pest management techniques must be employed. Elevator managers must be aware of the latest technology and products available.

What has been done

While fact sheets and presentations are common activities of the extension specialists in Oklahoma, a concentrated effort by the Stored Product Team needed to be set forth in a manner that addressed the issue more effectively and expediently than normal process allows. The Stored Product Team worked together to offer several new and revised fact sheets and workshops that brought new techniques and updated old ones for Oklahoma producers. Closely tied to proper grain and fumigation management is grain bin safety and rescue. If the grain is not stored properly, hazardous working conditions exist and statistics prove the strong correlation between accidents and out of condition grain. Grain bin safety and entrapment rescue method research will continue to develop into first responder training opportunities for rural community fire departments. A partnership with the Oklahoma State University Fire Protection and Safety Training School has been established so that certification and training can be offered to the State's fire departments, both paid and volunteer. A DVD containing videos for entry-level workers, on farm storage owners and operators, and first response teams was published and then provided to every grain company and corresponding fire department in Oklahoma. In 2013, additional training was provided to support information in the DVD. In 2015, the training videos were provided in a USB ?thumb drive? format and distributed to ag workers and firefighters who

attended awareness level training. Financial support for initial research that analyzes the forces a victim of entrapment in a grain bin experiences has been obtained. Extensive testing commenced in 2016 and 2017 and will carry into 2018. Researchers at OSU's medical center in Tulsa are collaborating with the SPREC team to establish new response and recovery methods for emergency responders for grain bin accidents. This force knowledge will provide baseline safety equipment guidelines for new grain bin safety design for steel bins under construction.

Results

Seventy workshops, publications and presentations were offered to Oklahomans and the surrounding states in 2017 providing fumigation, safety and grain storage instruction. Some of these workshops were extended to managers from other countries. A total of 700 Oklahomans and approximately 1200 participants from other states and countries attended our workshops in 2017. Newsletter articles on grain bin safety and grain quality were published in the Grain Journal and Journal of Ag Safety and Health as well as academic journals such as Transactions of ASABE and the Journal of Food Engineering.

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
2017	98

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
2017	650

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
2017	178

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
2017	9

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
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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

Not Reporting on this Outcome Measure

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
2017	62

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
2017	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
503	Quality Maintenance in Storing and Marketing Food Products
723	Hazards to Human Health and Safety

Outcome #10

1. Outcome Measures

Clientele Receiving Food Safety Modernization Act Training

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	221

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

With finalization of the Produce Safety Rule (Food Safety Modernization Act (FSMA)), Oklahoma produce growers are required to follow new stringent standards for the growing, harvesting, packing and holding of produce for human consumption. The produce growers must be trained on the new practices, as well as understand the new regulatory paradigm in order to remain operationally viable. The overall goal of this proposal is to build an infrastructure in Oklahoma to support FSMA-compliant food safety training and technical assistance as it relates to the produce industry. This step is critical in order to advance awareness, understanding, and implementation of FSMA-derived regulations among produce growers.

What has been done

Ongoing discussions with stakeholders; including: specialty crop growers, trade organizations and government agencies; have identified a lack of financial resources to conduct training and scarcity of trainers to disseminate FSMA-compliant standardized curricula as two major obstacles in delivering training to owners and operators of small and medium-sized farms, as well as farmers

affected by FSMA associated rules. In order to receive financial support, Jadeja has been actively applying for state and federal grants. Since 2015, Jadeja has received 6 grants totaling over \$2 M as PI or CO-PI. As a result of these efforts, 7 Extension personnel from Oklahoma State University were able to attend a lead instructor training in Arkansas.

Results

The team has presented a total of 8 FDA approved ?Produce Safety Alliance Grower Training? workshops (6 in Oklahoma, 1 each in Texas and Tennessee). Two of these training were also opened as in-service training for Extension Educators and farmers market managers. Due to the training provided, 221 participants were able to receive FDA recognized certificates. This is an on-going project with the long-term goal of training at least 300 growers with FSMA produce rule requirements.

4. Associated Knowledge Areas

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

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

none

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 7

1. Name of the Planned Program

4-H Youth Development

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

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

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	84.0	0.0	0.0	0.0
Actual Paid	82.0	0.0	0.0	0.0
Actual Volunteer	53.0	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
1566862	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
1566862	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
4605795	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Well-trained extension personnel support the recruitment, training and retention of a volunteer base necessary to sustain and manage local and county clubs and programming. Youth involved in 4-H project work, project/community clubs and educational programs and activities will

develop an in-depth knowledge of career opportunities in through project work and educational activities and events.

Youth engaged in the Citizenship, Healthy Living and STEM programming will understand how social and physical sciences, technology, and culture all play an integral role in our personal lives, family life and society - school, community, country and world.

Youth, volunteers and educators will become good stewards of their personal and environmental resources by recognizing how the sound practices and actions of both the individual and society affect finances, energy, housing, food, and the environment.

Collaborate with other youth serving organizations and community leaders, sharing existing resources and training opportunities for youth and adult volunteers.

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?

- A total of 561 staff and volunteers reported having completed WWM training: 363 through eXtension and 198 with a university employee.
- 43 new volunteers reported receiving New volunteer orientation.
- 228 volunteers reported completing Title IX & IIV Training. 36 Counties reported one to six continuing education credits for volunteers.

V(E). Planned Program (Outputs)

1. Standard output measures

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	411134	7225418

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

Patent Applications Submitted

Year: 2017

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
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Actual	53	0	0
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V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of in-service training sessions for Extension educators

Year	Actual
2017	57

Output #2

Output Measure

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

Year	Actual
2017	119

Output #3

Output Measure

- Number of educational events and contests conducted

Year	Actual
2017	693

Output #4

Output Measure

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

Year	Actual
2017	27

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
2017	3736

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Based on research conducted by the American Camping Association, there is an appropriate youth to adult ratio, which helps to insure positive youth adult ratios and provides good risk management practices.

Youth programs that intentionally plan for positive youth development have been shown to increase youth contributions to their communities, identify and make healthier choices, increase participation in STEM activities outside of school hours.

What has been done

As a state we have increased efforts with county offices to insure an adequate number of adult volunteers are in place for charter clubs.

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.

Horticulture training was provided for 327 OCES educators, volunteers and teachers through a variety of in-services and workshop experiences and multiple locations across Oklahoma.

Results

592 club and cloverbud leaders for 824 chartered clubs with 14,732 members.

1644 certified volunteers of which 417 are teens and 1227 are adults serving as club, project, activity and general volunteers. The 1227 adult volunteers provide leadership to our 14,732 members resulting in a 1:12 ratio of youth to adults

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 were presented around the state to update volunteers on the new projects.

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
2017	908

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Research indicates youth involved with caring adults are better prepared to lead successful lives as contributing citizens within their community.

Through leadership development, youth have the opportunity to develop life skills which will help them become contributing members of society.

4-H Camps provide an exciting venue for young people to develop important life skills. The quality of camp counselors and the training that they receive directly relates success and safety of

our camps. To ensure 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

Through 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.

Youth on the Oklahoma 4-H Leadership Council are elected by their peers for a leadership role in the Oklahoma 4-H program. These youth leaders are trained 4 times a year, develop program goals for Oklahoma 4-H, and work to ensure all 4-H members are contributing to the goals they set forth. These youth are responsible for a large part of planning and conducting of Oklahoma 4-H Roundup and also Leadership Team Retreat. They are responsible for visiting each county in order to be a face of the Oklahoma 4-H program and a role model for other 4-H members.

4-H Ambassador Leadership Training ? Fall Meeting, Spring Meeting and Ambassador Retreat Leadership Team Retreat

4-H Healthy Living Ambassadors ? 2 trainings and attended 1 national training

Results

Volunteers who participate in continuing education are better prepared to meet the needs of the youth they work with and are better prepared to handle the mission and objectives of positive youth development. According to PARS more than 100,000 volunteer hours were reported.

The Oklahoma 4-H Leadership Council set a goal to raise \$15,000 for the Oklahoma Children's Hospital Foundation, conducted over 35 workshops, visited each of the 77 counties, assisted in planning and implementing of State 4-H Roundup, provided leadership for Oklahoma 4-H Day at the Capitol. State 4-H President presented their 4-H story on the House and Senate floor during 4-H Day at the Capitol.

The State 4-H Leadership Council has 6 fully functioning committees with chairs for ease of implementing tasks, four training/meeting events, and many update meetings. As a result these youth have learned leadership, communication, team work and decision making skills along with many other valuable life skills that will take them far after their time in 4-H.

4-H Ambassadors sharpened their leadership skills and took on leadership roles in their clubs, communities, counties and across the state. State 4-H Ambassadors conducted events reaching over 5,500 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.

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
2017	35487

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 participated in the first "National 4-H Day of Service" with over 40 service learning projects being reported. 4-H members and adults worked effectively to plan, implement and evaluate service learning projects all around the state.

The Oklahoma 4-H Leadership Council set a goal to raise \$15,000 for the Children's Hospital Foundation for research. The council also learned about a new opportunity to collect children's books for children at the hospital so each child could read and take home a book from the hospital

Results

The Leadership Council raised \$6,527 for the Children's Hospital Foundation and delivered over 200 books for the hospital to divide between their clinics for the children. Youth also encouraged

county participation and interaction with the Ronald McDonald House charity.

More than 650 demonstrations/conferences were conducted on Club Management.

During the yearlong effort to promote the positive benefits that the Children's Hospital and Ronald McDonald House Charities provides to Oklahoma families, State council members developed skills related to empathy, citizenship, and leadership.

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
2017	109144

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. Programs not only teach fitness and nutrition but also provide children the skills and confidence to incorporate recreation into their lifestyles.

What has been done

Camp TURF is a two-week residential summer academy for Oklahoma youth entering grades 9 and 10 which focuses 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 2017, 24 youth from around the state participated in Camp TURF.

One session of Grandparent University in 2017 gave 15 grandparent-grandchild pairs two days of hands-on instruction in 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

Presentations were given to youth at elementary schools, youth conferences, and youth after-school programs in Moore, Oklahoma City, Stillwater, Perkins, Tulsa, Snyder, Tulsa, Broken Arrow, Watonga, and Weatherford, Oklahoma. Demonstrations and displays about careers in horticulture were showcased at career fairs in Stillwater, Tulsa, and Oklahoma City.

Twelve (12) Shooting Sports certification workshops were hosted where 156 adult volunteers received certification as a shooting sports instructor.

Results

Over thirty-one thousand (31,221) youth and volunteers participated in educational trainings, events and activities related to Agriculture and Natural Science project areas.

Over twenty thousand (>20,000) participated in agriculture literacy and Ag in the Classroom activities and trainings.

One thousand three hundred and eighty-five (1,385) youth participated in state sponsored shooting sports events.

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

Thousands of youth around the state participated in hands-on opportunities to learn about horticulture and environmental science in day programs as well as residential programs. Thousands of youth participated in activities pertaining to careers in horticulture.

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

?83% knew food comes from the farm to the dinner plate.

?75% indicated a better understanding of how to take good care of their pets and/or livestock by feeding them and meeting their other needs.

?80% were setting goals but have not thought much about trying to reach a goal.

?81% 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
2017	37452

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

When considering the importance of science, technology, engineering, and mathematics (STEM) education, many reports speak of job opportunities and economic drivers in a global environment. Research strongly suggests that STEM educational initiatives are not just creating scientists and engineers, but producing STEM-literate persons in all areas of the workforce. Eighty percent of the fastest growing occupations in the U.S. require STEM adequacy, and science and technology jobs are projected to grow by 20.6 percent through 2018, more than doubling the 10.1 percent overall U.S. labor force's projected growth.

Oklahoma 4-H program focus on creating STEM-literacy and developing the future workforce of scientists, engineers, and technology experts and

What has been done

Nine STEM in-service trainings were held for 4-H OCES Educators. 108 educators participated.

Oklahoma 4-H started two new STEM contests; Lego Robotics and Digital Media.

Teams of youth and adults were trained in STEM topics through the Oklahoma 4-H AgSummit program and the STEM Robotics Institute.

Oklahoma 4-H partnered with the Science Museum Oklahoma to offer a STEM Night at the Museum.

Oklahoma 4-H partnered with U.S. Cellular to teach STEM through the National Youth Science Day event.

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. Activities included grafting plants in the greenhouse, cloning plants in the lab, constructing pervious pavers, dissecting grasshoppers under a microscope, measuring the metabolism of turfgrasses, extracting the DNA of strawberries, and other hands-on activities.

STEM technologies presented to youth at career fairs and schools included hydroponics, GPS, Brix readings using refractometers, chemical analysis of creek water samples, and drip irrigation.

Results

Educators presented a variety of 4-H STEM programs across the state through club and school enrichment to reach over 133,000 Oklahoma youth with STEM experiences.

Collegiate 4-H students were trained in STEM programming and taught 88 workshops to over 2000 youth.

Five 4-H robotics teams were trained and competed in Oklahoma 4-H's first robotics contest.

Ten youth and adults attended the national agri-science summit and returned to teach Oklahoma youth about the future of agriculture through the 4-H Ag Summit, 40 youth attended, other workshops were presented around the state.

591 youth and adults learned about STEM through a Science Night at the Museum.

Three in-depth National Youth Science Day STEM trainings for teams of youth and adults were taught. This activity included the purchase and distribution of 100 National Youth Science Day kits which were used to train volunteers and adults in the engineering design process and experimental design. Over 500 youth were introduced to science skills and careers through this single activity.

Oklahoma youth explored careers in horticulture while getting hands-on experience in cloning, grafting, DNA extraction, hydroponics, GPS use, scientific measurement, chemical analysis, refractometer use, and low-impact development technologies such as pervious pavement construction and the use of drip irrigation.

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
2017	62598

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 leas 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.

What has been done

Officially formed a 4-H Healthy Living Ambassador Program. Youth learned about healthy living resources focusing on social, emotion and physical health. Ambassadors planned two healthy living summits and taught Personal Development at the National 4-H Healthy Living Summit.

Results

More than 65,000 youth participated in a program related to foods and nutrition, health or personal safety.

Received \$58,000 Youth Voice/Youth Choice Walmart Healthy Living grant was awarded through National 4-H Council. An additional \$10,000 was granted to provide programming to native American youth.

To achieve our goals 0 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.

Offered two state wide Yoga for Kids training.

- 1)
- 2) Five Oklahoma youth attended the National 4-H Healthy Living Summit and have provided 120 activities and educational opportunities since returning home.
- 3)
- 4) 4-H HERO (Health Educators Reaching Others) are county-based healthy living ambassadors (4-H HERO) and partnership with Oklahoma State University, America's Healthiest Campus? as part of OSU Wellness Strategy.

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

V(I). Planned Program (Evaluation Studies)

Evaluation Results

none

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: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	2.0	0.0	3.0	0.0
Actual Paid	5.0	0.0	3.0	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
199765	0	117052	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
199765	0	117052	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
587210	0	608198	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 and/or develop 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. 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/lawn care and pest control operators) and turf managers (which include the golf course, parks & grounds, right of way managers and home consumers).

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	5495	14539	350	0

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

Patent Applications Submitted

Year: 2017
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	0	11	0

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
2017	1

Output #2

Output Measure

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

Year	Actual
2017	0

Output #3

Output Measure

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

Year	Actual
2017	2

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
2017	75

Output #5

Output Measure

- Number of scientific abstracts, posters or oral presentations presented to scientific audiences.
Not reporting on this Output for this Annual Report

Output #6

Output Measure

- Number of turfgrass managers trained in recognition and selection of improved varieties and implementation of integrated turfgrass management systems
Not reporting on this Output for this Annual Report

Output #7

Output Measure

- Number of email and news releases generated
Not reporting on this Output for this Annual Report

Output #8

Output Measure

- Number of consultation phone calls and emails completed
Not reporting on this Output for this Annual Report

Output #9

Output Measure

- Number of Extension reports and fact sheets generated

Year	Actual
2017	14

Output #10

Output Measure

- Number of extension field days, workshops, short courses and conferences conducted

Year	Actual
2017	52

Output #11

Output Measure

- Number of pesticide applicators receiving continuing education training (CEU workshops).

Year	Actual
2017	0

Output #12

Output Measure

- Number of initial pesticide applicator certification schools conducted.

Year	Actual
2017	12

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Percentage of ODOT employees achieving certified pesticide applicator status following initial certification training.
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 ODOT employees achieving certified pesticide applicator status following initial certification training.

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
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Use of Lawncare Best Management Programs increases lawn care business owner profits while reducing off-target environmental damage from pesticide and nutrient runoff and leaching. We do not have a monetary value for the reduced environmental damage by implementation of suggested BMPs such as confining phosphorus applications to lawns where only a phosphorus application is needed as determined by soil testing.

What has been done

Trainings have been conducted throughout the state.

Results

Over 400 certified turf & ornamental applicators and 650 certified right-of-way pesticide applicators receive continuing education via our turf extension and right-of-way outreach programming each year, resulting in improved turf management skill sets. The turf extension education efforts of my program are estimated to have increased profitability for Oklahoma lawn care businesses in an amount again exceeding \$500,000 in 2017.

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
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

ODOT manages over 800,000 acres of roadside right-of-way. Around 140,000 acres of this are mowed roadsides managed with three to four mowings per year. Between 90,000 and 110,000 acres of mowed state roadside are also treated by ODOT with herbicides each year as a part of the integrated program. Without the integrated program, at least one more mowing would need to be performed simply to reduce the height of several taller weed species which are not killed but are suppressed or lowered in height by mowing.

What has been done

The OSU RVM Program trains over 750 ODOT employees each year in effective, reduced risk pesticide selection and use. Between 75 and 100 new right of way applicators receive initial certification training and sprayer calibration training each year to improve their skills in roadside vegetation management.

Results

The comprehensive contracted research and extension training services provided by the OSU Dept of Horticulture & Landscape Architecture's Roadside Vegetation Management Program (OSU RVM) saves the Oklahoma Department of Transportation (ODOT) a conservative \$500,000 per year and possibly up to \$3.0 million per year in operating expenses. This is achieved by ODOT following a research-based integrated mowing and herbicide program for weed control as opposed to a "mowing only" program on Oklahoma roadsides.

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.

Not Reporting on this Outcome Measure

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
2017	39

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

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 2017 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.

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 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: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	11.0	0.0	1.0	0.0
Actual Paid	12.0	0.0	0.8	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
479434	0	38066	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
479434	0	38066	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
1409298	0	197788	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, training of county elected officials, engineering and manufacturing consulting, solid waste management training and education, 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

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	23984	672880	400	50000

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

Patent Applications Submitted

Year: 2017
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of community services plans completed

Not reporting on this Output for this Annual Report

Output #2

Output Measure

- Number of education modules (written curricula) completed

Year	Actual
2017	1

Output #3

Output Measure

- Number of county officer training courses conducted

Year	Actual
2017	55

Output #4

Output Measure

- Number of manufacturing firms receiving applications engineering assistance

Year	Actual
2017	19

Output #5

Output Measure

- Number of county officials completing an educational certificate of achievement

Year	Actual
2017	107

Output #6

Output Measure

- Number of solid waste-related trainings completed

Year	Actual
2017	3

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	Number improving public infrastructure management skills
8	Rural Library Hotspot Lending Pilot Program

Outcome #1

1. Outcome Measures

Number improving business skills

Not Reporting on this Outcome Measure

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
2017	208

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Of the nearly 3000+ small and mid-sized manufacturers in Oklahoma, over one-third are located in rural areas and are extremely important to their local economies. The majority of such manufacturers are in the Oklahoma City and Tulsa metropolitan areas. The loss or downsizing of even one of these companies (especially in rural areas) can have devastating consequences. With agriculture and energy industries fluctuating in their labor force needs, rural manufacturers supply much needed jobs in their communities. These 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. Engineering design expertise is invariably lacking for these companies.

What has been done

To address the difficulties faced by our small- to mid-sized manufacturers, the Division of Agricultural Sciences and Natural Resources (DASNR) with the College of Engineering, Architecture and Technology (CEAT) at Oklahoma State University work in partnership to provide technical assistance through the Applications Engineering Program. Since 1997, Applications Engineers (AEs) have been deployed across the state to provide on-site engineering assistance to manufacturers where such expertise is lacking. Funded by NIST (National Institute for

Standards and Technology) through the Manufacturing Extension Partnership (MEP) and OCAST (Oklahoma Center for the Advancement of Science and Technology) through the Oklahoma Manufacturing Alliance (OMA) and in partnership with the Oklahoma Cooperative Extension Service and Technical Schools across Oklahoma, this multi-faceted program, with engineering services, is unique among MEP programs across the country.

Results

Impact is measured through: 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 agency. 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 2017, the Applications Engineers client projects had the following economic impacts, which also included an additional 49 Jobs created and 159 Jobs Retained:

- Retention of Sales\$27,919,000
- Change in Sales\$7,850,000
- Cost savings\$1,912,300
- Capital Investment\$2,812,750
- Unnecessary Investment Avoided\$699,238
- Total impact\$41,193,288

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #3

1. Outcome Measures

Number of communities where capacity was increased

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Number of participants that plan to open/expand a business

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In 2015, the Grand River Dam Authority (GRDA) funded a project to examine the economic value associated with recreational use of the Grand River Lake. This was a 2 year project and received over \$87,000 in external funding. The project was funded by GRDA's Ecosystems and Lake Management program as a way of documenting the benefits of the shoreline management program, one program GRDA uses to protect the watershed's ecosystem.

What has been done

There were two components to this project. Visitor surveys were conducted to illicit visitor expenditure patterns at the 5 lakes within the watershed and estimate the recreational value of the watershed using the travel cost method. Housing premiums derived by homeowners on Grand Lake for having lakeshore access using hedonic and matched-pair analysis methods were examined. The estimated recreational value to visitors of the Grand Lake watershed was \$81 million per year, ranging from \$24 per visitor trip to Lake Council Grove to \$46 per visitor trip to Lakes Hudson and W. R. Holway. Watershed visitors support over 2,900 recreation-related jobs. The project also identified that increasing the likelihood of non-bodily contact warnings (associated with algae blooms) increases visitor satisfaction and water-based recreation demand.

Using a hedonic methods approach, researchers found that owning waterfront property on Grand Lake commanded an \$88,568 price premium over a similar, non-waterfront property on Grand Lake, while owning a home with a dock on Grand Lake commanded a \$46,599 premium over a similar, waterfront home without a dock. Furthermore, using matched-pair analysis, the researchers show that waterfront properties located on Grand Lake are valued at \$48,896 more than similar homes located on Lake Eufaula (a lake with similar amenities and proximity to a metropolitan area).

Results

These findings are significant, not just because they validate that the shoreline management program has positive economic benefits. These results will be critical information in justifying why GRDA is investing resources into ecosystem preservation to the Federal Energy Regulatory Commission during its license renewal hearing later this year. The issue in question is whether GRDA preservation of lake access impinges on GRDA's primary function as a power generator. Our results suggest that GRDA's preservation activities that ensure water quality and recreational access create positive economic activity, increase local government revenue through higher property valuation, and add quality of life to residents and visitors.

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

Not Reporting on this Outcome Measure

Outcome #7

1. Outcome Measures

Number improving public infrastructure management skills

Not Reporting on this Outcome Measure

Outcome #8

1. Outcome Measures

Rural Library Hotspot Lending Pilot Program

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Access to (and use of) broadband Internet has become essential to fully participating in today's society. Use of this technology has spread across nearly every facet of our lives, including keeping in touch with family and friends, searching or applying for jobs, or staying up-to-date on local events. There is, however, a very real "digital divide" between those who have their own home broadband connection and those that do not. Census survey data from 2015 indicates that only 44% of households with annual incomes of \$25,000 or less have a home broadband connection, which is less than half of the rate for households making \$100,000 or more (91%).

This extension program seeks to build upon recent library efforts to "loan out the Internet." By lending wireless hotspot devices (which connect to a local cellular provider), participating libraries are providing home (and road!) broadband connections for their constituents to use as they please. In 2017, a pilot project began with participating libraries in 4 rural locations: Perkins, Seminole, Elgin, and Haskell (median population 2,700). Each library was provided with 4 hotspot devices with unlimited data to loan out, and each developed their own lending policies. Starting in June, the devices were made available for 1-2 week checkouts to patrons.

What has been done

The hotspot devices have been loaned out over 300 times in the 6 months they have been available. Wait lists in each community range from 5 to over 20 people, and survey results have been extremely positive - with more than 90% of respondents ranking the program as a 9 or 10 (out of 10). The survey results suggest the program is reaching its target demographic (74% have incomes < \$50,000; 40% have a high school degree or less) and that the hotspot is being used with a variety of devices (smartphones, tablets, laptops). While entertainment ranks as a top use, other highly-listed uses include research, connecting with family and friends, keeping informed of current events, and helping a child with schoolwork. 27% of respondents said that their Internet skills increased after using the device.

Perhaps most insightful into the ways people are using the devices are the sample comments taken from the survey forms. These include comments such as:

- ??Great for research and helping my kids do their homework?
- ??I greatly appreciate it as I am a full-time student without Internet at home?
- ??Thank you, thank you, thank you. It's great!?
- ??It's a total blessing?
- ??This is a very helpful program that is extremely beneficial to my children.?

??It?s great, just wish there were more so there wasn?t such a long wait to check out.?

Results

This pilot project will be expanded to additional libraries in the future, and current participants will seek to continue their programs by developing their own funding mechanism. Future iterations of these impact statements will seek to quantify the social and economic benefits that this program is having.

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

V(I). Planned Program (Evaluation Studies)

Evaluation Results

none

Key Items of Evaluation

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: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	4.0	0.0	4.0	0.0
Actual Paid	5.0	0.0	3.2	0.0
Actual Volunteer	1.0	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
220093	0	151787	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
220093	0	151787	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
646964	0	788679	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, C. Keck,

Grapes COP: Dr. Eric Rebek

Red Imported Fire Ant COP: Dr. Eric Rebek, Dr. J. Talley

Urban Integrated Pest Management COP: C. Keck, C. Luper, Dr. T. Royer, K. Shelton,

V(E). Planned Program (Outputs)

1. Standard output measures

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	7559	42863	0	0

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

Year: 2017
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	0	12	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Stakeholder assessment

Year	Actual
2017	1

Output #2

Output Measure

- Pesticide applicator education schools and workshops

Year	Actual
2017	16

Output #3

Output Measure

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

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

2017 16

Output #4

Output Measure

- Extension publications will be created or revised

Year	Actual
2017	49

Output #5

Output Measure

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

Year	Actual
2017	48

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.
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	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.

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
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oklahoma State University Extension Specialist and Entomologists are involved in ongoing efforts to provide insecticide efficacy trial and management information to not only determine efficacy but to identify the most economic management strategies for control of alfalfa weevil (AW) and Aphids that are present in this crop. Alfalfa weevil and aphids can devastate seedling and established alfalfa stands in OK. In combination with IPM management practices research provides needed information on control strategies and variety selection against this insect, thus enabling alfalfa to be productive and providing economic stability for growers.

What has been done

Due to limited funding, field trial experiments for AW in 2017 were condensed to one field demonstration trial. Although not as relevant in 2017, spotted alfalfa aphids have developed into a yearly problem. Historically, when timed appropriately, one insecticide application is needed before first harvest in the spring to control AW and aphids, including SAA. While weather plays a significant role in the activity of aphids, the past several seasons, growers have had to apply multiple applications just to get to first harvest and with limited labeled chemistries available, management can be challenging. Efficacy trials indicate new chemistries or combinations of chemistries are showing promise for additional tools in the (AW) and (SAA) arsenal, but as some products are eliminated or become less effective, yearly trials continue to determine the best options for Oklahoma growers.

Results

While no official survey information is available at this time, informal feedback from field trial demonstrations, in-service, and producer meetings such as Oklahoma Crop Improvement Association (OCIA) throughout the state suggest increased utilization of IPM management strategies and the use of efficacy trial information for alfalfa management. Data from the 2016

National Agriculture Statistical Service (NASS) USDA indicated a total of 210,000 harvested acres of alfalfa in Oklahoma with a potential revenue of approximately 126,000,000. In normal years, if only fifty percent of those acres utilized IPM strategies and efficacy information for AW control at least one insecticide application could be avoided saving an estimated 1,470,000 in spray cost. With the incorporation of new resistant varieties to SAA even more treatments could be avoided in the summer months allowing beneficial insects a chance to naturally control aphids and reduce cost even further.

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
2017	4182

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The Pesticide Safety Education Program: teaching, training, and outreach impacts 10,000s of private and commercial pesticide applicators, Master Gardeners, native American Tribes pest control operators, government workers, and 1,000?s of Oklahoma citizens, and citizens of contiguous states. This Program results in conscientious use of pesticides for household and structural insect pests and reduces the probability of environmental pollution. This program also

enhances the success of pest control operations.

What has been done

Pesticide Safety Education programs have been expanded and revised to meet changing needs of pesticide applicators. Additional "Test Help" sessions have been implemented to meet growing needs of the pest control industry.

Results

Pesticide safety, teaching, and training programs were provided to a total of 4,182 pesticide applicators, Master Gardeners, New Extension Agent training, control product suppliers, OK Vegetation Management Association, OAAA (aerial) Association, and interested parties. This participation number is now stable during each year and training practical classes and hands-on training will continue into the foreseeable future. General household pests and structural pest control training programs resulted in a 90% reduction of OK citizen complaints to ODAFF concerning problems with pest management company services and successful pest control operations. New commercial applicators continuing their certifications or applicators who re-certified, that received training manuals or in-class training numbered 3,156. 3,751 additional training manuals distributed to private and commercial applicators.

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.

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

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

Not Reporting on this Outcome Measure

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.

Not Reporting on this Outcome Measure

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.

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

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

none

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 11

1. Name of the Planned Program

Food Safety - Agricultural Biosecurity

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
211	Insects, Mites, and Other Arthropods Affecting Plants	0%	0%	5%	0%
212	Pathogens and Nematodes Affecting Plants	0%	0%	50%	0%
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	0%	0%	35%	0%
903	Communication, Education, and Information Delivery	0%	0%	10%	0%
	Total	0%	0%	100%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	1.0	0.0	3.0	0.0
Actual Paid	0.0	0.0	3.2	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	151787	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	151787	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	788679	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

2017	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: 2017

Actual: 2

Patents listed

9,423,398 submitted in 2016

9,615,5909 submitted in 2017

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	0	6	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of peer reviewed publications

Year	Actual
2017	6

Output #2

Output Measure

- Number of outside-OSU researchers, agencies and entities sponsoring, collaborating with or benefiting from NIMFFAB activities.
Not reporting on this Output for this Annual Report

Output #3

Output Measure

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

Year	Actual
2017	20

Output #4

Output Measure

- Number of grants/contracts awarded in those areas.

Year	Actual
2017	5

Output #5

Output Measure

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

Year	Actual
2017	6

Output #6

Output Measure

- Number of students taking classes or seminars developed as part of the OSU Agricultural Biosecurity initiative.
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 invitations to agricultural biosecurity team members for participation in initiatives, programs, presentations, and consultations related to agricultural biosecurity and microbial forensics
2	Number of team-associated individuals who a. Performed a project related internship b. Were hired into a professional position in the biosecurity or food safety field c. Served on agricultural biosecurity or food safety review committees or panels
3	Graduate students who will populate laboratories whose testing is related to the protection of human, animal, and plant health from infection by pathogenic organisms
4	Number of students enrolled in courses that contain a significant portion of material on agro-terrorism, bio-terrorism, or food safety
5	Integrative Plant Virology, Biosecurity and Microbial Forensics
6	Whole-chain traceability
7	Integrative Geneology, Ecology of Deltocephaline Leafhoppers (Hemiptera: Cicadellidae) and their microbial associates

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

Not Reporting on this Outcome Measure

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

Not Reporting on this Outcome Measure

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

Not Reporting on this Outcome Measure

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

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

Integrative Plant Virology, Biosecurity and Microbial Forensics

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Our country functions and competes in a global economy in which no nation is self-sufficient, and the U.S. is not an exception to that rule. This program studies: 1) Plant pathogens including waterborne plant viruses and microbes threatening Oklahoma's Agriculture and the U.S.A. 2) Addresses creative technological solutions for regulatory plant health emergencies and forensic plant pathology, 3) Develops and adapt new technologies for sampling, detection and discrimination based on molecular identification of genomic landmarks that are applicable to agricultural biosecurity scenarios and epidemiological aspects of these microorganisms.

What has been done

The core of the 2017 technological contributions/solutions are three technologies published in refereed scientific journals. These are:

1. A field deployable detection assay for Rose rosette virus that uses an isothermal probe-based reverse transcription-recombinase polymerase amplification method.
2. A single-target and multiplex discrimination method of whiteflies (Hemiptera: Aleyrodidae) Bemisia tabaci and Trialeurodes vaporariorum that uses modified priming oligonucleotide thermodynamics.
3. An assessment of different RNA extraction methods using the fungus Xylaria sp (a wood degrader) as model.

Results

Novel detection techniques for Rose rosette disease, caused by Rose rosette virus (RRV; genus Emaravirus), whitefly species Bemisia tabaci (Gennadius) and Trialeurodes vaporariorum (Westwood)virus vectors, and obtaining high quality RNA for successful gene/pathogen detection analysis have been completed and published in the scientific literature.

4. Associated Knowledge Areas

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

Outcome #6

1. Outcome Measures

Whole-chain traceability

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Traceability is a key component in developing a safe food supply, as evidenced by the recent outbreak of foodborne illnesses attributed to spinach, peppers, and tomatoes in the United States and the ongoing e-coli outbreak in Europe with 27 deaths reported to date. The Centers for Disease Control reported that salmonella infection rates are on the rise with one million people sickened by food-borne pathogens each year. Unfortunately, the current approach to product traceability is one-up, one-back information sharing at the GTIN (global trade item number) lot level.

What has been done

The long-term goal of this project is to develop and implement an internet-based stakeholder-driven traceability and marketing system for food products that is not punitive or profit-limiting but that adds value to the process while providing a method to limit and remedy food safety outbreaks and biosecurity breaches. This system will include data input by producers, vendors, and consumers. This data not only provides information to facilitate mitigation but also marketing information, value-added details, cultural and sociological features about the production or handling of the produce, quality standards criteria, and a feedback opportunity for consumers to rate or improve product quality.

Results

The resulting field-tested system will be built using GS1 GTIN identification. This system will interface with internationally recognized and active traceability and marketing systems. It will interface with social networking internet opportunities and consumer information technologies. This system incorporates both traceability functions for food safety and biosecurity and data marketing functions.

4. Associated Knowledge Areas

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

Outcome #7

1. Outcome Measures

Integrative Geneology, Ecology of Deltocephaline Leafhoppers (Hemiptera: Cicadellidae) and their microbial associates

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The deltocephaline leafhoppers are very diverse, with many species prone to becoming agricultural pests or invasive species. In depth genomic and transcriptomic analysis of these leafhoppers is minimal at best. Tools are needed for predicting which species are likely to become problematic, and for taxonomic identification of such species. This comprehensive study is aimed at providing identification tools, microbial associates and genetic factors related to vector competence.

What has been done

Illumina sequencing of genomes and transcriptomes of 6 leafhopper species was completed in 2017. Additionally, PacBio genomic sequencing was completed for one species. This data will be used for comparative analysis of the genomic and transcriptomic data of vector vs. non-vector species. In an effort to expand the species available for genomic analysis a project determining the optimum storage conditions for shipment of whole insects was conducted. Additionally, insight into the variation of the karyotypes between species of leafhoppers was begun.

Results

Leafhoppers are important pests of crops largely because they transmit phytopathogens. The genomic and transcriptomic analysis and the karyotype information will serve as a research platform aiding efforts in identifying key genetic factors associated with vector competence. Analysis of a very broad, diverse and numerous species both collected in the US and internationally strengthens the validity and applicability of this information. The information

regarding optimum conditions of storage through shipment enables a broader breadth of species for the genetic analysis.

4. Associated Knowledge Areas

KA Code	Knowledge Area
211	Insects, Mites, and Other Arthropods Affecting Plants

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

Renovation of a BSL2 laboratory took longer than expected and delayed research. Renovations are complete now.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

None

Key Items of Evaluation

None

V(A). Planned Program (Summary)

Program # 12

1. Name of the Planned Program

Farm and Agribusiness Systems Economics

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
601	Economics of Agricultural Production and Farm Management	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: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	7.0	0.0	4.0	0.0
Actual Paid	9.0	0.0	1.0	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
352310	0	47582	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
352310	0	47582	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
1035616	0	247235	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.

Develop and support innovative information delivery and education systems including Communities of Practice on eXtension, webinars and social media.

2. Brief description of the target audience

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

3. How was eXtension used?

The cooperatives CoP was used extensively to develop and deliver information to cooperative managers, board of director members and producer members.

V(E). Planned Program (Outputs)

1. Standard output measures

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	8565	320460	700	4000

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

Patent Applications Submitted

Year: 2017

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	0	36	0

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
Not reporting on this Output for this Annual Report

Output #2

Output Measure

- Number of software decision analysis aids developed

Year	Actual
2017	0

Output #3

Output Measure

- Number of manuscripts submitted to refereed journals
Not reporting on this Output for this Annual Report

Output #4

Output Measure

- Number of farm income tax management schools conducted

Year	Actual
2017	9

Output #5

Output Measure

- Number of participatory experiential learning workshops conducted

Year	Actual
2017	58

Output #6

Output Measure

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

Year	Actual
2017	82

Output #7

Output Measure

- Number of Extension educational meetings and workshops conducted

Year	Actual
2017	257

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, agribusiness managers, or lenders 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	Modeling Bilateral Oligopoly for the U.S. Beef Industry

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
2017	1375

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The mission of the Oklahoma State University Tax Schools is to provide a quality tax education experience for income tax preparers. The instructor team consists of veteran tax professionals, educators, and representatives of various agencies, including the Internal Revenue Service, the Oklahoma Tax Commission, and the Oklahoma Employment Security Commission.

What has been done

In 2017, 1,375 tax preparers attended the nine fall institutes conducted during November and December. High quality, professional instruction is provided to make continuing professional education credit available for Certified Public Accountants, Enrolled Agents, and Tax Attorneys as well as provide technical education for all tax return preparers. Most of the taxpreparers that attend are from Oklahoma however some come from Kansas, Texas, and Arkansas in order to maintain their Oklahoma accreditation. Many of our participants have indicated that the ability to speak with a representative from Internal Revenue Service and/or the Oklahoma Tax Commission as well as one-on-one with the instructors is a major reason they attend plus the ability to learn about agriculture tax issues. We have a few participants that have been attending the schools for more than 50 years. This was the 57th year that the institutes have been conducted in Oklahoma.

Results

Participants in these schools have indicated on the evaluation form that they file approximately 270,000 Federal income tax returns which include about 61,400 Federal farm returns. For 2017 this is roughly 75 percent of the total farm returns (Schedule F) filed in Oklahoma. Several participants at each location were asked to place a subjective value on the education received which they then use to assist their clients with tax planning advice to reduce Federal and Oklahoma income taxes, to increase return filing accuracy, to provide retirement planning assistance, and/or to educate their clients of important income tax and estate tax planning tools. The average value they provided was just slightly greater than \$20.00 per return for 2017. These

preparers indicated that the education they received significantly reduced the amount of time needed to complete a return.

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)

Not Reporting on this Outcome Measure

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
2017	152

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.

Results

Approximately 1,342 students have enrolled in the Master Cattleman program since 2004 and 1,083 have completed the program, with 152 graduating in 2017. In program evaluation surveys, graduates in 2017 estimate annual improvement in their cattle operation's profitability at approximately \$4,300. With an average of 83 producers graduating per year, the impact is approximately \$356,900 each year for 13 years for a total impact of \$4.6 million over the program's history if the increase is a one-time event. Arguably, the \$4,300 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 several times per month and that they have referred 5 additional people to the Beef Cattle Manual and 8 people to the Master Cattleman program.

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

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

Number of producers, agribusiness managers, or lenders gaining an improved understanding of risk management through participatory experiential learning experiences

Not Reporting on this Outcome Measure

Outcome #6

1. Outcome Measures

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

Not Reporting on this Outcome Measure

Outcome #7

1. Outcome Measures

Modeling Bilateral Oligopoly for the U.S. Beef Industry

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The structure of the U.S. beef industry has significantly changed in recent years. At the farm level, a multi-year drought in the Southern Plains caused high feed prices and large financial losses, and as a result, many small cattle feeders went out of business. At the processor level, the beef packing industry has become increasingly concentrated. The market share of the largest four packers has increased from 78% to 85% over the period of 1998 to 2010. Furthermore, at the retail level, sales by the 20 largest food retailers accounted for 64.2% of total U.S. grocery sales in 2009, which is a significant increase from 39.2% in 1992. Therefore, it is not surprising that the possibility of non-competitive market conduct exists in both beef processing and retail industries. Previous NEIO literature focuses on horizontal concentration and vertical integration as sources of market power while maintaining the hypothesis of price taking behavior on one side of the market (either output or input market). Many of these studies examine market power in food and agriculture industries and assume that processors have either oligopoly or oligopsony market power. However, one-sided measures of market power may lead to inaccurate results about market power exertion because market power can potentially be exercised in both input and output markets.

What has been done

First, my recent research with graduate students extends previous studies by developing a general model to estimate potential market power exertion in all buying (input) and selling (output) markets for processors and retailers, respectively. Where market characteristics point to the possibility of market power at multiple transaction points, it is important to consider all four adjacent upstream and downstream markets. To that end, Monte Carlo experiments first generate industry data for market structures such as perfect competition, monopoly, monopsony, bilateral imperfect competition with an integrated processor/retailer, bilateral imperfect competition with separate processor and retailer, and bilateral imperfect competition with four adjacent upstream and downstream markets. Data are then used to estimate NEIO models with true and alternative market structures. The base data used for the Monte Carlo experiments are compiled from various publications of the United States Department of Agriculture (USDA) for the U.S. beef industry.

Secondly, our research applies the new full bilateral oligopoly model to the U.S. beef industry to estimate the market power exertion of its processors and retailers, and results are compared to findings from previous studies. Our full bilateral oligopoly model uses a primal (production function) approach which avoids the symmetry assumption on conjectural elasticities between input and output markets. Therefore, our model is more flexible and is also more consistent with oligopoly and oligopsony theory than those derived from the dual (cost function) approach with fixed proportions technology.

Finally, our study investigates the sensitivity of market power estimates using three alternative functional forms of the production function: transcendental logarithmic, generalized Leontief, and normalized quadratic functions.

Results

The general framework developed in this study does not make a priori assumptions regarding the direction of market power exertion and is also flexible enough to allow the full range of market structures. Results of Monte Carlo simulations clearly show the importance of using the full model to estimate the bilateral market power relationship between retailers and processors and that the full model is flexible enough to represent other alternative market structures. When the true market structure is full bilateral imperfect competition, the model selection test rejects the misspecified alternative econometric specifications while favoring the simulated market structure 100% of the time. Even if the true market structure is one of alternative structures, the test chooses the full bilateral imperfect competition over the true market structures in some cases. Results from bias tests on market power parameter estimates indicate that any erroneous modeling of market structures can lead to biased market power parameter estimates when the true market structure is the full bilateral relationship. Even if true market structures are perfect competition monopoly, monopsony, integrated and separate bilateral imperfect competition, the flexible full bilateral model is able to estimate correct market power parameters with zero biases in most cases. Finally, results of bias tests with market power indices are consistent with those from the model selection test and market power parameter bias tests. When the true market structure is the full bilateral imperfectly competitive, all alternative model specifications result in biased estimates of market power indices. Overall, our findings indicate that less flexible models lead to biased market power estimates in the presence of market power in the corresponding input and output markets.

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management

603 Market Economics
607 Consumer 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

none

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 13

1. Name of the Planned Program

Integrated Bioenergy and BioBased Products Development

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
511	New and Improved Non-Food Products and Processes	0%	0%	100%	0%
	Total	0%	0%	100%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	2.0	0.0	4.0	0.0
Actual Paid	0.0	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
0	0	200797	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	200797	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	1043331	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

2017 Oklahoma State University and Langston University Combined Research and Extension Annual Report of Accomplishments and Results

- 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

2017	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: 2017
 Actual: 1

Patents listed

9,635,801

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	0	30	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Technical papers and presentations
Not reporting on this Output for this Annual Report

Output #2

Output Measure

- New processes or products developed
Not reporting on this Output for this Annual Report

Output #3

Output Measure

- Technology demonstrations conducted
Not reporting on this Output for this Annual Report

Output #4

Output Measure

- Educational Publications
Not reporting on this Output for this Annual Report

Output #5

Output Measure

- Extension programs developed
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	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

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Best management practices identified for sustainable feedstock production

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Logistics is a critical issue and can make or break a sustainable bioenergy and/or biobased products system. A holistic and integrated logistics research and extension program that includes harvesting, packaging, storage, transportation, and pre-processing are essential. Currently one of the major logistics issues is the lack of industry material specifications. This issue has forced the logistics research to be extremely broad.

What has been done

The harvesting component included 6 harvesting locations from fields in the Panhandle, Central and South Central Oklahoma; 4 harvesting dates; 3 years of harvesting data; use of commercial size equipment; 3 biomass feedstocks that included about 1074, 498 and 130 acres of switchgrass, perennial grasses and forage sorghum, respectively. The storage studies include: 4 locations; 4 harvest dates; 3 storage treatments; and 5 storage times. A total of 117 stacks were included and more than 23,000 core samples were pulled during the study.

Results

These projects provide the crucial harvesting and storage data that is desperately needed by

venture capitalists and larger companies looking to expanded into the cellulosic bioenergy industry. For Oklahoma, this work will prove to be invaluable as we continue the quest to establish a bioenergy industry within the state. It was demonstrated that a common set of commercially available equipment could be used in a production scale biomass collection system in Oklahoma.

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

Fundamental knowledge of engineering or science gained in developing biobased products

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Fast pyrolysis is a promising technology for the production of liquid fuels or bio-oil through thermal decomposition of biomass or municipal solid waste in the absence of oxygen. Bio-oil can be converted into hydrocarbons and has potential application in the transportation sector. The overall goal of this project is to demonstrate a novel natural Gas and Biomass To Liquids (GBTL) technology that will directly produce hydrocarbon fuels and chemicals compatible with existing infrastructure.

What has been done

We focused on upscaling the micro-level reactor results to a bench-scale. The best catalysts and reactor conditions were used in the bench-scale reactor tests. Influence of methane on fast catalytic pyrolysis of eastern red cedar over MoZn/HZSM-5 and HZSM-5 catalysts at 650 and 750°C; were assessed in fixed bed reactor and Pyroprobe reactors.

Results

The results successfully demonstrated that co-pyrolysis of methane (a major component of natural gas) with eastern red cedar (biomass) over MoZn/HZSM-5 improved yields of aromatic

hydrocarbons and total bio-oil produced. However, further assessment of technical and economic feasibility of the technology is needed to pursue commercialization of the GBTL technology.

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
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The development and production of fuels and chemicals from readily available renewable sources or waste materials is essential to supplement the petroleum-based economy with more environmentally sustainable biobased economy and improve the U.S energy security. Thermochemical, biochemical and hybrid conversion technologies 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.

What has been done

We continued to refine tools to facilitate designing and control of large-scale bioreactors to increase alcohol productivity and selectivity and gas utilization. Models are used to construct

process control methods that ensure high conservation of energy, product specificity and alcohol yield. Syngas fermentations with and without activated carbon were compared. Butanol has been produced by the traditional acetone-butanol-ethanol (ABE) fermentation using molasses and hydrolyzed starches. However, about 50% of the sugar in the ABE process is lost to production of coproducts. Detoxification using activated carbon was implemented to remove inhibitors. Results showed that the microorganism's activity to produce ABE was retained after detoxification and 19% improvement in ABE yield.

Results

The developed tools represent a break-through characterization of the production mechanisms that underline the commercially deployed fermentation process, and can be implemented in industrial control systems for process operation. These tools can be used on an industrial scale to maintain high conversion of syngas components to alcohols. The novel biocatalytic conversion process will provide a venue to reduce redcedar infestation in Oklahoma and across grasslands in the Central Plains by converting redcedar into a biobased product such as butanol. In addition, the novel method can be used with other biomass feedstocks such as switchgrass, forage sorghum, corncobs and corn stover.

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
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

There is an increasing demand for low cost, small-scale (50-100 kWe), portable biomass-to-electricity generation units that utilize local carbonaceous feedstocks. These units could be deployed in remote and/or energy deficit locales domestically and internationally. Areas devastated by natural disasters could use these units as stand-alone or supplemental electricity

sources. Unlike conventional diesel/gasoline generators, which require fuel to be transported in at fully-burdened costs, often ranging from over 10 times local service station costs, these units would be indefinitely fueled by locally available biomass resources.

What has been done

A 100 Kg/h up-scaled downdraft gasifier system was designed, built and evaluated using switchgrass and eastern redcedar as feedstocks. In our recent studies, we demonstrated co-gasification of two underutilized resources: MSW and agricultural biomass. The MSW, in pellet form, had the higher heating value (HHV) of 19.02 MJ/kg, while chopped switchgrass had the HHV of 15.24 MJ/kg. The hot and cold gas efficiencies, syngas compositions, heating value and yield, gasifier temperatures and tar content were analyzed and reported.

Results

co-gasification of up to 40% MSW performed satisfactorily. Using MSW in a mix higher than 40% resulted in the formation of ash agglomeration. The heating values of syngas varied in the range of 6.5 to 7.0 MJ/Nm³ for co-gasification ratios of 20 and 40%. The hot and cold gas efficiencies were 56.7, 51.1 and 60 % and 62.5, 55.2 and 64.4 % for co-gasification ratio of 0, 20 and 40%, respectively. A spark ignition engine with total capacity of 10 kW was used to generate electricity from the syngas produced. The syngas composition, cold gas efficiency (CGE), engine efficiency, and exhaust gas emissions were determined with change in MSW to biomass ratio and load applied to the engine. Results showed that CGE of 62, 54, and 49% with the maximum syngas heating value (LHV) of 6.91, 7.74, and 6.78 MJ/Nm³ were generated at MSW to biomass ratios of 0, 0.2 and 0.4, respectively. The emissions of CO₂, CO, NO_x, and SO₂ were found to decrease with increasing load on the engine.

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

V(I). Planned Program (Evaluation Studies)

Evaluation Results

None

Key Items of Evaluation

None

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
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	23%	0%	0%	0%
	Total	100%	0%	0%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	24.0	0.0	0.8	0.0
Actual Paid	19.0	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
549350	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
549350	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
1614816	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 evaluation tools
- Delivery through classes, one-on-one, news releases/TV/radio, social media, 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

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	101409	7087505	25210	614327

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

Patent Applications Submitted

Year: 2017
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	1	18	19

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of OSU Facts published

Year	Actual
2017	8

Output #2

Output Measure

- Number of other publications including but not limited to Bulletins, Technical Manuals, Reports as well as PowerPoint presentations and curricula, and core competency modules distributed for use by others.

Year	Actual
2017	27

Output #3

Output Measure

- Number of in-service training sessions

Year	Actual
2017	39

Output #4

Output Measure

- Number of certification training sessions

Year	Actual
2017	7

Output #5

Output Measure

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

Year	Actual
2017	14

Output #6

Output Measure

- Number of presentations at Extension organized meetings

Year	Actual
2017	6

Output #7

Output Measure

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

Year	Actual
2017	24

Output #8

Output Measure

- Number of workshops, conferences, etc. organized

Year	Actual
2017	20

Output #9

Output Measure

- Number of posters, displays, exhibits, or models

Year	Actual
2017	13

Output #10

Output Measure

- Number of demonstrations

Year	Actual
2017	0

Output #11

Output Measure

- Number of newsletters

Year	Actual
2017	14

Output #12

Output Measure

- Number of web pages created or updated

Year	Actual
2017	7

Output #13

Output Measure

- Number of radio and television presentations

Year	Actual
2017	143

Output #14

Output Measure

- Number of newspaper, and magazine articles written

Year	Actual
2017	25

Output #15

Output Measure

- Average number of phone calls and/or email requests responded to on a weekly basis
Not reporting on this Output for this Annual Report

Output #16

Output Measure

- Number of webcasts or guest appearances on webinars

Year	Actual
2017	1

Output #17

Output Measure

- Number of OSU Fact Sheets revised

Year	Actual
2017	85

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Percentage of participants increasing consumption of fruits
2	Percentage of participants increasing consumption of vegetables
3	Percentage of participants increasing consumption of whole grains
4	Percentage of participants increasing consumption of low-fat dairy and other calcium-rich foods
5	Percentage of participants decreasing consumption of foods high in fat, sugar and salt
6	Percentage of participants decreasing consumption of sugar-sweetened beverages
7	Percentage of participants increasing physical activity
8	Percentage of participants increasing safe food handling practices
9	Percentage of participants increasing positive parenting skills
10	Percentage of participants increasing positive youth peer involvement
11	Percentage of participants increasing parenting competence
12	Percentage of participants increasing child competent behaviors
13	Percentage of participants with increased access to affordable, healthy foods
14	Percentage of participants decreasing child problematic behaviors
15	Percentage of participants decreasing disengaged or hostile parenting

Outcome #1

1. Outcome Measures

Percentage of participants increasing consumption of fruits

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	76

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Thirty-four percent of Oklahoma youth are considered overweight or obese and the state has poor fruit and vegetable consumption. For adults, Oklahoma ranks as the 9th most obese state in the nation. This ranking reflects the state's high density of fast food establishments and low fruit consumption. Half of all the state's adults reported consuming fruit less than once daily and 26.8% consumed vegetables less than once a day. Among Oklahoma youth, 44% reported consuming fruits and vegetables less than one time daily. Thirty percent of the state's adults report engaging in no leisure-time physical activity and 74% report having access to places for physical activity.

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 2017, Family and Consumer Sciences nutrition programs were presented to 7,376 Oklahoma youth through 9 different curricula and 1,056 adult participants through 12 different curricula. Programs presented include:

?OrganWise Guys (OWG) program targets Pre-K through 5th grade students in low-income schools and teaches the healthy eating and physical activity habits of maintaining a low-fat diet, consuming high-fiber foods, drinking plenty of water, and engaging in regular physical activity. OWG served approximately 4,482 youth in over 150 Pre-K through 5th grade classrooms.

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

?The redesigned Farm to You exhibit debuted in September and traveled to 8 counties in Oklahoma, often serving more than one school district within each county. It was featured at summer camps, county fairs, and community events. Approximately 5,958 students experienced the Farm to You exhibit.

?Live Well, Eat, Well, be Active with Diabetes (LEAD) is a four week education program which helps people with diabetes and their family members learn helpful ways to control diabetes, physical activity that can improve glucose levels, and how to follow a low carbohydrate diet. 125 adults participated in this program.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Percentage of participants increasing consumption of vegetables

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	70

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

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4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

724 Healthy Lifestyle

Outcome #3

1. Outcome Measures

Percentage of participants increasing consumption of whole grains

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	65

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

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What has been done

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4. Associated Knowledge Areas

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

Outcome #4

1. Outcome Measures

Percentage of participants increasing 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
2017	64

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

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4. Associated Knowledge Areas

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

Outcome #5

1. Outcome Measures

Percentage of participants decreasing 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
2017	62

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

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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 of participants decreasing consumption of sugar-sweetened beverages

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	75

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

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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 of participants increasing physical activity

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	89

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Thirty-four percent of Oklahoma youth are considered overweight or obese and for adults, Oklahoma ranks as the 9th most obese state in the nation. Thirty percent of the state's adults report engaging in no leisure-time physical activity and 74% report having access to places for physical activity.

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 2017, Family and Consumer Sciences programs focused on physical activity were presented to 7,102 Oklahoma youth and 5,998 adult participants. Programs presented include:

?OrganWise Guys (OWG) program targets Pre-K through 5th grade students in low-income schools and teaches the healthy eating and physical activity habits of maintaining a low-fat diet, consuming high-fiber foods, drinking plenty of water, and engaging in regular physical activity. OWG served approximately 4,482 youth in over 150 Pre-K through 5th grade classrooms.

?1,479 Oklahomans participated in Tai Chi for Better Balance, the purpose of which is to reduce risk of fall among older adults. Participants perform a series of eight exercises, beginning with simple weight shifting and sequentially building towards more complex forms. The program is taught in a community setting over period of eight weeks. The program is proven to improve functional balance and physical performance among participants.

?The Arthritis Foundation Exercise Program (AFEP) had 2,697 participants in 2017. Its purpose is to reduce symptoms of arthritis and arthritis-related diseases among participants. The program features a variety of exercises, gradually increasing in intensity over the duration of the program. The program is taught in a community setting over a period of time, ranging from eight weeks to an ongoing basis. The program is proven to reduce pain and stiffness and improve physical performance among participants.

?The Walk with Ease program had 417 participants. The Arthritis Foundation Walk With Ease program is designed to help participants make physical activity part of their everyday life. Walk With Ease is a six-week program that has been proven to increase balance, strength, and walking pace. The program also helps to reduce arthritis symptoms. Walk With Ease is a way to help increase physical activity, alone or in a group setting.

?2,589 Oklahoma youth participated in 4-H Yoga for Kids in 2017. The purpose of this program is to increase fitness, decrease stress, and improve mental focus in noncompetitive manner.

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle

Outcome #8

1. Outcome Measures

Percentage of participants increasing safe food handling practices

Not Reporting on this Outcome Measure

Outcome #9

1. Outcome Measures

Percentage of participants increasing positive parenting skills

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	66

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. In 2017 there were 4,802 births to Oklahoma 15-19 year old teens. Six percent of 12-17 year olds reported using marijuana at least once during a 30 day period in 2014, and 6% of 12-17 year olds reported binge drinking at least once during a 30 day period in 2014.

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. In Oklahoma, 9% youth statewide were not attending school and not working in 2016.

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

?294 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, Character Counts, and Take a Stand against Bullying provided lessons on topics such as respect, fairness, and responsibility to 2,500 Oklahoma youth

?Oklahoma Cooperative Extension conducted the award-winning Co-Parenting for Resilience classes in 52 counties to over 2,593 parents.

4. Associated Knowledge Areas

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

Outcome #10

1. Outcome Measures

Percentage of participants increasing positive youth peer involvement

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	29

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. In 2017 there were 4,802 births to Oklahoma 15-19 year old teens. Six percent of 12-17 year olds reported using marijuana at least once during a 30 day period in 2014, and 6% of 12-17 year olds reported binge drinking at least once during a 30 day period in 2014.

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What has been done

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4. Associated Knowledge Areas

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

Outcome #11

1. Outcome Measures

Percentage of participants increasing parenting competence

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	77

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. In 2017 there were 4,802 births to Oklahoma 15-19 year old teens. Six percent of 12-17 year olds reported using marijuana at least once during a 30 day period in 2014, and 6% of 12-17 year olds reported binge drinking at least once during a 30 day period in 2014.

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What has been done

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4. Associated Knowledge Areas

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

Outcome #12

1. Outcome Measures

Percentage of participants increasing child competent behaviors

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	67

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. In 2017 there were 4,802 births to Oklahoma 15-19 year old teens. Six percent of

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What has been done

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4. Associated Knowledge Areas

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

Outcome #13

1. Outcome Measures

Percentage of participants with increased access to affordable, healthy foods

Not Reporting on this Outcome Measure

Outcome #14

1. Outcome Measures

Percentage of participants decreasing child problematic behaviors

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

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. In 2017 there were 4,802 births to Oklahoma 15-19 year old teens. Six percent of 12-17 year olds reported using marijuana at least once during a 30 day period in 2014, and 6% of 12-17 year olds reported binge drinking at least once during a 30 day period in 2014.

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What has been done

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4. Associated Knowledge Areas

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

Outcome #15

1. Outcome Measures

Percentage of participants decreasing disengaged or hostile parenting

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

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.

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What has been done

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4. Associated Knowledge Areas

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

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

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

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: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	9.0	0.0
Actual Paid	0.0	0.0	6.3	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	300720	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	300720	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	1562524	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.

Experimental paradigms will be designed and basic research will be conducted 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

2017	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: 2017
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	0	8	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Research discoveries, procedural and technological advances, and dissemination of results of research efforts.

Year	Actual
2017	0

Output #2

Output Measure

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

Year	Actual
2017	2

Output #3

Output Measure

- Training of students and post-docs.

Year	Actual
2017	20

Output #4

Output Measure

- Research discoveries, procedural and technological advances, and solicitation of support for research efforts.
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 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 invitations that faculty members received to present research findings at universities and colleges, and to national and international meetings.
6	Number of trainees attending workshops designed to train individuals in aspects of structural biology, proteomics, and bioinformatics.
7	Number of Instrumentation Grants Funded
8	Isolation of human pathogens from horses

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
2017	8

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
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.

Not Reporting on this Outcome Measure

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.

Not Reporting on this Outcome Measure

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
2017	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
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 invitations that faculty members received to present research findings at universities and colleges, and to national and international meetings.

Not Reporting on this Outcome Measure

Outcome #6

1. Outcome Measures

Number of trainees attending workshops designed to train individuals in aspects of structural biology, proteomics, and bioinformatics.

Not Reporting on this Outcome Measure

Outcome #7

1. Outcome Measures

Number of Instrumentation Grants Funded

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	2

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

To provide inexpensive and high-capacity sequencing, we installed and began full operations using an Illumina NextSeq500 genome sequencer. The sequencer services are one of the least expensive for this instrument in the United States. To support the expected throughput of the sequences, we have installed an Agilent BRAVO liquid handling robot, to prepare libraries in high-throughput (96-samples per run) for the sequencer.

What has been done

: The sequencer is located in the Genomics center of the Henry Bellmon Research Center. The

sequencing instrument is fully operational and a long list of library preparation types (>136) are being scrutinized for initial public offerings. Users come from 2 colleges (five departments) at OSU as well as two external Universities have used the sequencer. Nearly one-trillion bp of sequence data from over 500 different samples have been sequenced. Error-free billing, data management, and determining the level of services that can reasonably be offered are now the priority.

Results

Research already using the NextSeq at OSU includes big-data-based phylogenetic resolution of environmentally important (essential to Monarch butterfly) milkweeds, genetic mechanisms of tillering (production of additional grain-bearing branches) in the arid-resistant cereal crop *Setaria* spp., and whole genome sequencing of *Arabidopsis*. Future projects include population genetics of bald and golden eagles in collaboration with Native American tribes in Oklahoma, crop improvement of wheat including increased yield combined with improved resistance to drought or disease, plant virus biodiversity, host-pathogen interactions, genetic evolution of emerging pathogens, environmental metagenomics, plant bioterrorism forensics, bovine respiratory diseases, toxicology and environmental metagenomics projects related to evolution, climate, and ecosystem remediation.

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
311	Animal Diseases

Outcome #8

1. Outcome Measures

Isolation of human pathogens from horses

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Two multiple antibiotic-resistant Elizabethkingia anophelis strains were isolated from two horses and the draft genomes were constructed. In collaboration with a group from the Centers for Disease Control and Prevention, we have determined that both horse strains were almost identical to strains of Elizabethkingia anophelis that were responsible for human infections. The source of Elizabethkingia anophelis involved in a large Midwestern US outbreak has not been determined.

What has been done

We report the isolation and characterization of two Elizabethkingia anophelis strains isolated from horses in Oklahoma. Both strains demonstrated resistance to many different classes of antibiotics. Typical of the Elizabethkingia, both draft genomes contained multiple copies of genes that produce penicillinases which degrade penicillins and related drugs, as well as genes predicted to function in removing antimicrobials from the interior of the cell. Genetic analysis of the draft genomes revealed that both strains isolated from the horses were almost identical to strains of Elizabethkingia anophelis that were responsible for human infections.

Results

These findings raise the possibility that Elizabethkingia might have the potential to move between humans and animals in a manner similar to known zoonotic pathogens. This work was also done in collaboration with the Centers for Disease Control and Prevention.

4. Associated Knowledge Areas

KA Code	Knowledge Area
305	Animal Physiological Processes
311	Animal Diseases

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

None

V(I). Planned Program (Evaluation Studies)

Evaluation Results

None

Key Items of Evaluation

Shrinking appropriations and increased competition for research funding is now impacting the ability of team members to obtain grant funds. Team members increased the numbers of grants they received in 2017, but 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. However, team members have increased their productivity as measured by the number of manuscripts published.

V(A). Planned Program (Summary)

Program # 16

1. Name of the Planned Program

Environmental and Safety Issues: Family 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
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 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: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	12.0	0.0	0.0	0.0
Actual Paid	6.0	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
428067	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
428067	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
1258304	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, demonstration, 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, Social Media, 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 was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	9509	1154678	4396	23323

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

Patent Applications Submitted

Year: 2017

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	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
2017	3

Output #2

Output Measure

- Number of other publications including but not limited to Bulletins, Technical Manuals, Reports as well as digital resources such as PowerPoint presentations, curricula, and core competency modules distributed for use by others

Year	Actual
2017	4

Output #3

Output Measure

- Number of in-service training sessions

Year	Actual
2017	5

Output #4

Output Measure

- Number of certification training sessions

Year	Actual
2017	3

Output #5

Output Measure

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

Year	Actual
2017	9

Output #6

Output Measure

- Number of presentations at Extension organized meetings

Year	Actual
2017	2

Output #7

Output Measure

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

Year	Actual
2017	4

Output #8

Output Measure

- Number of workshops, conferences, etc. organized

Year	Actual
2017	0

Output #9

Output Measure

- Number of demonstrations

Year	Actual
2017	0

Output #10

Output Measure

- Number of displays, exhibits, and models

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

2017 2

Output #11

Output Measure

- Number of newsletters

Year	Actual
2017	0

Output #12

Output Measure

- Number of radio and television presentations

Year	Actual
2017	15

Output #13

Output Measure

- Number of newspaper, and magazine articles written

Year	Actual
2017	29

Output #14

Output Measure

- Number of OSU Fact Sheets revised

Year	Actual
2017	0

Output #15

Output Measure

- Number of webpages created or updated

Year	Actual
2017	1

Output #16

Output Measure

- Average number of phone calls and/or email requests responded to on a weekly basis
Not reporting on this Output for this Annual Report

Output #17

Output Measure

- Number of webcasts or guest appearances on webinars

Year	Actual
2017	11

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Percentage of participants increasing selection and home preservation of home, locally and regionally produced foods
2	Percentage of participants increasing composting, donation of goods for others to use, repurposing, and recycling of items
3	Percentage of participants increasing maintenance, conservation, and protection of natural resources (air, land, water)
4	Number of participants who are prepared for emergencies
5	Percentage of participants increasing proper home thermostat management
6	Percentage of participants managing safety hazards in the home
7	Number of participants who are using assistive technology as necessary
8	Number of participants using available assistance for injury/disability
9	Number of participants increasing practice of safety and injury/secondary injury prevention.
10	Percentage of participants increasing participation in maintaining, conserving and protecting natural resources (air, land, water)

Outcome #1

1. Outcome Measures

Percentage of participants increasing selection and home preservation of home, locally and regionally produced foods

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Percentage of participants increasing composting, donation of goods for others to use, repurposing, and recycling of items

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The average American produces 4.4 pounds of garbage every day. 40% of municipal garbage is made up of kitchen and garden waste. Two-thirds of Oklahomans have access to drop-off or curbside recycling.

What has been done

Abuse of the state's natural resources can have far-reaching and long-lasting consequences for Oklahoma's economy and the well-being of its citizens. In order to advance the socio-economic development of the state, educational programs have been created and implemented to educate Oklahomans on how to be better stewards of the environment.

Results

In 2017, 636 individuals attended educational programs which taught them how to repurpose and upcycle items such as books, china and glassware, and textiles.

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

Percentage of participants increasing maintenance, conservation, and protection of natural resources (air, land, water)

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Number of participants who are prepared for emergencies

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

304 magnitude 3+ earthquakes occurred in Oklahoma in 2017. In addition, 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. In 2017 there were 17,883 reported deaths resulting from injury (92 per 100,000 residents.)

What has been done

In order to advance the socio-economic development of the state, and have an impact on issues that address safety, educational programs have been created and implemented to educate Oklahomans on how to improve their quality of life.

Results

In 2017, 1,068 adults and youth participated in programs that taught them how to avoid hazards and stay safe in their homes. An additional 4,593 Oklahoma adults participated in the Walk with Ease, 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.

A total of 2,275 youth attended Progressive Ag Safety Day across Oklahoma and learned how to keep safe at home, at play, and during severe weather.

4. Associated Knowledge Areas

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

Outcome #5

1. Outcome Measures

Percentage of participants increasing proper home thermostat management

Not Reporting on this Outcome Measure

Outcome #6

1. Outcome Measures

Percentage of participants managing safety hazards in the home

Not Reporting on this Outcome Measure

Outcome #7

1. Outcome Measures

Number of participants who are using assistive technology as necessary

Not Reporting on this Outcome Measure

Outcome #8

1. Outcome Measures

Number of participants using available assistance for injury/disability

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	94

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

304 magnitude 3+ earthquakes occurred in Oklahoma in 2017. In addition, 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. In 2017 there were 17,883 reported deaths resulting from injury (92 per 100,000 residents.)

What has been done

In order to advance the socio-economic development of the state, and have an impact on issues that address safety, educational programs have been created and implemented to educate Oklahomans on how to improve their quality of life.

Results

In 2017, 1,068 adults and youth participated in programs that taught them how to avoid hazards and stay safe in their homes. An additional 4,593 Oklahoma adults participated in the Walk with Ease, 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.

A total of 2,275 youth attended Progressive Ag Safety Day across Oklahoma and learned how to keep safe at home, at play, and during severe weather.

4. Associated Knowledge Areas

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

Outcome #9

1. Outcome Measures

Number of participants increasing 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
2017	88

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

304 magnitude 3+ earthquakes occurred in Oklahoma in 2017. In addition, 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. In 2017 there were 17,883 reported deaths resulting from injury (92 per 100,000 residents.)

What has been done

In order to advance the socio-economic development of the state, and have an impact on issues that address safety, educational programs have been created and implemented to educate Oklahomans on how to improve their quality of life.

Results

In 2017, 1,068 adults and youth participated in programs that taught them how to avoid hazards and stay safe in their homes. An additional 4,593 Oklahoma adults participated in the Walk with Ease, 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.

A total of 2,275 youth attended Progressive Ag Safety Day across Oklahoma and learned how to keep safe at home, at play, and during severe weather.

4. Associated Knowledge Areas

KA Code	Knowledge Area
723	Hazards to Human Health and Safety

Outcome #10

1. Outcome Measures

Percentage of participants increasing participation in maintaining, conserving and protecting natural resources (air, land, water)

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

32 adult respondents to Tai Chi program evaluation questions reported the following changes after participating in the program:

- 84% of Tai Chi Participants became less likely to be afraid of falling because of the Tai Chi program
- 92% of Tai Chi Participants said practicing Tai Chi has improved their balance

65 adult respondents to Arthritis Foundation Exercise Program evaluation questions reported the following changes after participating in the program:

- 95% of Arthritis Foundation Exercise Program participants said the program has helped them better function during daily activities
- 94% of Arthritis Foundation Exercise Program participants said the program has made a difference in their arthritis symptoms

Key Items of Evaluation

In 2017, Issue Team-specific Evaluation Questionnaires were collected after planned program curriculum delivery. Evaluation participation was completely voluntary and does not include all program participants. While no Oklahoma Family and Consumer Sciences educators chose Environment as a primary issue team for their county, and therefore did not participate in issue team evaluation, some educators still conducted environment activities.

V(A). Planned Program (Summary)

Program # 17

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: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	12.0	0.0	0.0	0.0
Actual Paid	14.0	0.0	0.0	0.0
Actual Volunteer	5.2	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
466116	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
466116	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
1370149	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, Social Media, 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

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	1310	48600	1915	665064

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

Patent Applications Submitted

Year: 2017
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of OSU Fact Sheets Newly Developed

Year	Actual
2017	0

Output #2

Output Measure

- Number of other publications including but not limited to Bulletins, Technical Manuals, Reports as well as digital resources such as PowerPoint presentations, curricula, core competency modules, etc. distributed for use by others

Year	Actual
2017	0

Output #3

Output Measure

- Number of in-service training sessions

Year	Actual
2017	0

Output #4

Output Measure

- Number of certification Training sessions

Year	Actual
2017	0

Output #5

Output Measure

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

Year	Actual
2017	0

Output #6

Output Measure

- Number of presentations at Extension organized meetings

Year	Actual
2017	0

Output #7

Output Measure

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

Year	Actual
2017	0

Output #8

Output Measure

- Number of workshops, conferences, etc. organized

Year	Actual
2017	0

Output #9

Output Measure

- Number of posters or displays, exhibits, and models

Year	Actual
2017	0

Output #10

Output Measure

- Number of other demonstrations

Year	Actual
2017	0

Output #11

Output Measure

- Number of newsletters

Year	Actual
2017	0

Output #12

Output Measure

- Number of radio and television presentations

Year	Actual
2017	0

Output #13

Output Measure

- Number of newspaper, and magazine articles written

Year	Actual
2017	0

Output #14

Output Measure

- Number of OSU Fact Sheets revised

Year	Actual
2017	0

Output #15

Output Measure

- Number of webpages created or updated

Year	Actual
2017	0

Output #16

Output Measure

- Number of website hits

Year	Actual
2017	0

Output #17

Output Measure

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

Year	Actual
2017	0

Output #18

Output Measure

- Number of webcasts or guest appearances on webinars

2017 Oklahoma State University and Langston University Combined Research and Extension Annual Report of Accomplishments and Results

Year	Actual
2017	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Percentage of participants increasing meal preparation at home
2	Percentage of participants increasing food cooking skills
3	Percentage of participants increasing safe food handling practices
4	Percentage participants increasing safe and effective food preservation practices
5	Percentage of participants increasing practice of safety and injury/secondary injury prevention

Outcome #1

1. Outcome Measures

Percentage of participants increasing meal preparation at home

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	72

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Nine percent of Oklahomans have limited access to healthy food. In the United States, Oklahoma ranks sixth in the nation for restaurant food waste; \$100 billion dollars is spent each year transporting perishable foods to landfills.

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 2017, 2,194 youth and adult participants across Oklahomans learned safe food handling and food preparation practices through programs such as Cooking for 1 or 2, Teen Cuisine, and Cooking Together is Fun. An additional 659 adults and youth participated in home food preservation workshops.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

Outcome #2

1. Outcome Measures

Percentage of participants increasing food cooking skills

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	68

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Nine percent of Oklahomans have limited access to healthy food. In the United States, Oklahoma ranks sixth in the nation for restaurant food waste; \$100 billion dollars is spent each year transporting perishable foods to landfills.

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 2017, 2,194 youth and adult participants across Oklahomans learned safe food handling and food preparation practices through programs such as Cooking for 1 or 2, Teen Cuisine, and Cooking Together is Fun. An additional 659 adults and youth participated in home food preservation workshops.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

Outcome #3

1. Outcome Measures

Percentage of participants increasing safe food handling practices

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	62

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Nine percent of Oklahomans have limited access to healthy food. In the United States. Oklahoma ranks sixth in the nation for restaurant food waste; \$100 billion dollars is spent each year transporting perishable foods to landfills.

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 2017, 2,194 youth and adult participants across Oklahomans learned safe food handling and food preparation practices through programs such as Cooking for 1 or 2, Teen Cuisine, and Cooking Together is Fun. An additional 659 adults and youth participated in home food preservation workshops.

4. Associated Knowledge Areas

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

Outcome #4

1. Outcome Measures

Percentage participants increasing 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
2017	91

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Nine percent of Oklahomans have limited access to healthy food. In the United States. Oklahoma ranks sixth in the nation for restaurant food waste; \$100 billion dollars is spent each year transporting perishable foods to landfills.

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 2017, 2,194 youth and adult participants across Oklahomans learned safe food handling and food preparation practices through programs such as Cooking for 1 or 2, Teen Cuisine, and Cooking Together is Fun. An additional 659 adults and youth participated in home food preservation workshops.

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 of participants increasing practice of safety and injury/secondary injury prevention

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

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 18

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	17%	0%	0%	0%
608	Community Resource Planning and Development	3%	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: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	15.0	0.0	0.0	0.0
Actual Paid	21.0	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
524380	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
524380	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
1541417	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, Social Media, 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

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	29751	7263648	12096	128428

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

Patent Applications Submitted

Year: 2017
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	0	4	4

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of OSU Fact sheets revised

Year	Actual
2017	0

Output #2

Output Measure

- Number of other publications including but not limited to Bulletins, Technical Manuals, Reports as well as digital resources such as PowerPoint presentations, curricula, core competency modules, etc. distributed for use by others

Year	Actual
2017	18

Output #3

Output Measure

- Number of in-service training sessions

Year	Actual
2017	10

Output #4

Output Measure

- Number of certification training sessions

Year	Actual
2017	0

Output #5

Output Measure

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

Year	Actual
2017	2

Output #6

Output Measure

- Number of presentations at Extension organized meetings

Year	Actual
2017	9

Output #7

Output Measure

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

Year	Actual
2017	13

Output #8

Output Measure

- Number of workshops, conferences, etc. organized

Year	Actual
2017	2

Output #9

Output Measure

- Number of posters or displays, exhibits, and models

Year	Actual
2017	1

Output #10

Output Measure

- Number of other demonstrations

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

2017 0

Output #11

Output Measure

- Number of newsletters

Year	Actual
2017	1

Output #12

Output Measure

- Number of radio and television presentations

Year	Actual
2017	59

Output #13

Output Measure

- Number of newspaper, and magazine articles written

Year	Actual
2017	0

Output #14

Output Measure

- Number of OSU Fact Sheets revised

Year	Actual
2017	0

Output #15

Output Measure

- Number of webpages created or updated

Year	Actual
2017	1

Output #16

Output Measure

- Number of webcasts or guest appearances on webinars

Year	Actual
2017	2

Output #17

Output Measure

- Average number of phone calls and/or email requests responded to on a weekly basis
Not reporting on this Output for this Annual Report

Output #18

Output Measure

- Number of website hits
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	Percentage of participants increasing money saving meal planning or food shopping practices
2	Percentage of participants increasing food money management practices
3	Percentage of participants increasing growth, production, hunting, or fishing for some food
4	Percentage of participants decreasing likelihood of using high-risk negative financial practices such as overusing credit, failing to save money or planning for the future
5	Percentage of participants decreasing risk of default on loans, credit card debt, unpaid bills, mortgage foreclosure, and identity theft
6	Percentage of participants increasing financial planning practices across the life cycle and skills to manage financial risk
7	Percentage of participants increasing readiness for employment opportunities
8	Percentage of participants increasing readiness for life changes
9	Percentage of participants increasing life skills for personal competence
10	Percentage of participants increasing ability to manage personal and family finances
11	Percentage of participants increasing child competent behaviors
12	Percentage of participants decreasing child problematic behaviors
13	Percentage of participants increasing positive parenting attitudes and behaviors
14	Percentage of participants decreasing disengaged or hostile parenting

Outcome #1

1. Outcome Measures

Percentage of participants increasing 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
2017	63

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In 2017, 17% of Oklahomans did not have access to a reliable source of food and 9% had limited access to healthy food. The Regional Food Bank of Oklahoma feeds more than 136,000 Oklahomans every week, 37% of which are children. The Community Food Bank of Eastern Oklahoma provides more than 396,000 meals to Oklahomans each week.

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 2017, 344 Oklahomans participated in programs such as MyPlate for My Family that focused on reducing hunger and helped family provide nutritious meals on a budget. 479 adults participated in programs designed to help them grow or produce their own food.

4. Associated Knowledge Areas

KA Code	Knowledge Area
607	Consumer Economics
704	Nutrition and Hunger in the Population
801	Individual and Family Resource Management

Outcome #2

1. Outcome Measures

Percentage of participants increasing food money management practices

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	79

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In 2017, 17% of Oklahomans did not have access to a reliable source of food and 9% had limited access to healthy food. The Regional Food Bank of Oklahoma feeds more than 136,000 Oklahomans every week, 37% of which are children. The Community Food Bank of Eastern Oklahoma provides more than 396,000 meals to Oklahomans each week.

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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 #3

1. Outcome Measures

Percentage of participants increasing growth, production, 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
2017	54

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In 2017, 17% of Oklahomans did not have access to a reliable source of food and 9% had limited access to healthy food. The Regional Food Bank of Oklahoma feeds more than 136,000 Oklahomans every week, 37% of which are children. The Community Food Bank of Eastern Oklahoma provides more than 396,000 meals to Oklahomans each week.

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 2017, 344 Oklahomans participated in programs such as MyPlate for My Family that focused on reducing hunger and helped family provide nutritious meals on a budget. 479 adults participated in programs designed to help them grow or produce 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

Outcome #4

1. Outcome Measures

Percentage of participants decreasing 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
2017	62

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In 2017 the statewide unemployment rate was 4.9% and the median household income in Oklahoma was \$51,424. Four percent of all homes with mortgages in the state were foreclosed. Seventeen percent of Oklahomans, including 23% of Oklahoma children, live below the poverty level. Twenty percent of Oklahoma adults and 8% of children do not have health insurance. Nine percent of teens ages 16-19 are not attending school or employed.

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 2017, programs using various curricula were presented to 1,575 adults and 1,140 youth 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.

?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

?Welcome to the Real World and Reality Check provide youth with opportunities to learn life skills like budgeting and check writing

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 of participants decreasing 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
2017	65

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In 2017 the statewide unemployment rate was 4.9% and the median household income in Oklahoma was \$51,424. Four percent of all homes with mortgages in the state were foreclosed. Seventeen percent of Oklahomans, including 23% of Oklahoma children, live below the poverty level. Twenty percent of Oklahoma adults and 8% of children do not have health insurance. Nine percent of teens ages 16-19 are not attending school or employed.

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

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their money personality type. Money Habitudes help individuals understand their money personality and spending habits

?Welcome to the Real World and Reality Check provide youth with opportunities to learn life skills like budgeting and check writing

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 of participants increasing 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
2017	70

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In 2017 the statewide unemployment rate was 4.9% and the median household income in Oklahoma was \$51,424. Four percent of all homes with mortgages in the state were foreclosed. Seventeen percent of Oklahomans, including 23% of Oklahoma children, live below the poverty level. Twenty percent of Oklahoma adults and 8% of children do not have health insurance. Nine percent of teens ages 16-19 are not attending school or employed.

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

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?Welcome to the Real World and Reality Check provide youth with opportunities to learn life skills like budgeting and check writing

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 of participants increasing readiness for employment opportunities

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	91

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In 2017 the statewide unemployment rate was 4.9% and the median household income in Oklahoma was \$51,424. Four percent of all homes with mortgages in the state were foreclosed. Seventeen percent of Oklahomans, including 23% of Oklahoma children, live below the poverty level. Twenty percent of Oklahoma adults and 8% of children do not have health insurance. Nine

percent of teens ages 16-19 are not attending school or employed.

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 2017, 1,811 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.

?The Pathways to Success program provided 216 Oklahoma adults with basic living skills to help them succeed in gaining employment and managing their finances.

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 of participants increasing readiness for life changes

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	91

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In 2017 the statewide unemployment rate was 4.9% and the median household income in Oklahoma was \$51,424. Four percent of all homes with mortgages in the state were foreclosed. Seventeen percent of Oklahomans, including 23% of Oklahoma children, live below the poverty level. Twenty percent of Oklahoma adults and 8% of children do not have health insurance. Nine percent of teens ages 16-19 are not attending school or employed.

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 2017, 1,811 participants attended programs such as:

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?The Pathways to Success program provided 216 Oklahoma adults with basic living skills to help them succeed in gaining employment and managing their finances.

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 of participants increasing life skills for personal competence

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	88

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In 2017 the statewide unemployment rate was 4.9% and the median household income in Oklahoma was \$51,424. Four percent of all homes with mortgages in the state were foreclosed. Seventeen percent of Oklahomans, including 23% of Oklahoma children, live below the poverty level. Twenty percent of Oklahoma adults and 8% of children do not have health insurance. Nine percent of teens ages 16-19 are not attending school or employed.

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 2017, programs using various curricula were presented to 1,575 adults and 1,140 youth 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

?Welcome to the Real World and Reality Check provide youth with opportunities to learn life skills like budgeting and check writing

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 of participants increasing 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
2017	81

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In 2017 the statewide unemployment rate was 4.9% and the median household income in Oklahoma was \$51,424. Four percent of all homes with mortgages in the state were foreclosed. Seventeen percent of Oklahomans, including 23% of Oklahoma children, live below the poverty level. Twenty percent of Oklahoma adults and 8% of children do not have health insurance. Nine percent of teens ages 16-19 are not attending school or employed.

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 2017, programs using various curricula were presented to 1,575 adults and 1,140 youth across Oklahoma. Programs presented include:

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?Welcome to the Real World and Reality Check provide youth with opportunities to learn life skills like budgeting and check writing

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 of participants increasing child competent behaviors

Not Reporting on this Outcome Measure

Outcome #12

1. Outcome Measures

Percentage of participants decreasing child problematic behaviors

Not Reporting on this Outcome Measure

Outcome #13

1. Outcome Measures

Percentage of participants increasing positive parenting attitudes and behaviors

Not Reporting on this Outcome Measure

Outcome #14

1. Outcome Measures

Percentage of participants decreasing 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
- Government Regulations
- Competing Public priorities

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 19

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: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.5	0.0	1.3
Actual Paid	0.0	2.2	0.0	10.2
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

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	175	100	175	25

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

Patent Applications Submitted

Year: 2017

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	0	4	4

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of Research projects completed on Enhanced Goat Products

Year	Actual
2017	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 Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	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 2017. Principal outputs of the project have been disseminated via abstracts, associated poster presentations at scientific meetings. Scientific manuscripts (4) and abstracts (4) were published. Nine (9) presentations were given at scientific venues. 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 2017.

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 Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	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.

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Results

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4. Associated Knowledge Areas

KA Code	Knowledge Area
313	Internal Parasites in Animals

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 Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	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

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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 2017.

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 # 20

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

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	2.0	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	40377	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	263600	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

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	100	50	600	200

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

Patent Applications Submitted

Year: 2017

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	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
2017	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 Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

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 2017 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 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 2017 and presented tailored curriculum to youth. Club members worked on 4-H projects including gardening, woodworking, food science, 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

The seventy-six 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. All parents indicated that the 4-H Literacy Program improved their child's reading and mathematics skills. 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 enrolled in universities in Oklahoma, majoring in science-related fields.

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 Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

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 2017 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. Seventy-six 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 2017, 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, received reptile, amphibian and ichthyology education and engaged in science-related field trips.

Results

The seventy-six 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. All parents indicated that the 4-H Literacy Program improved their child's reading and mathematics skills. 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 enrolled in universities in Oklahoma, majoring in science-related fields.

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 Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

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 2017 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. Seventy-six 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 2017, 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, received reptile, amphibian and ichthyology education and engaged in science-related field trips.

Results

The seventy-six 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. All parents indicated that the 4-H Literacy Program improved their child's reading and mathematics skills. Students who participated in the

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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

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

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 # 21

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

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	2.0	0.0	0.0
Actual Paid	0.0	1.0	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

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	76	40	300	200

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

Patent Applications Submitted

Year: 2017

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of Research Projects competed on Extended Education.

Year	Actual
2017	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 Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

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 2017 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. Seventy-eight 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 2017, 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 seventy-eight 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. All parents indicated that the 4-H Literacy Program improved their children's reading and mathematics skills. Students who participated in the 4-H SET Summer Program received age-specific training in food science, computer technology, 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 enrolled in universities in Oklahoma 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 Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

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

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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
2017	0

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 2017 through our summer literacy program, a 4-H SET Saturday Academy and a 4-H SET Summer Camp.

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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. Seventy-eight 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 2017, 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.

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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 seventy-eight 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 # 22

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

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.3	0.0	0.0
Actual Paid	0.0	0.3	0.0	0.0
Actual Volunteer	0.0	0.3	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

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	100	50	100	40

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

Patent Applications Submitted

Year: 2017

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	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
2017	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 Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

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 assists clientele in combating these challenges.

What has been done

During 2017 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. This is very important to many families that live from paycheck to paycheck.

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 Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	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 assists 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
2017	400

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

During 2017 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.

What has been done

During 2017 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.

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4. Associated Knowledge Areas

KA Code	Knowledge Area
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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 # 23

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

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.3	0.0	0.0
Actual Paid	0.0	0.2	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	21007	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

Citizens of Oklahoma

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	250	50	800	100

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

Patent Applications Submitted

Year: 2017

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of Research Projects competed on Food and Nutrition.

Year	Actual
2017	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 Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

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

Food and nutrition sessions were conducted with both adult and youth audiences. Sessions consisted of lessons on menu planning, health, wellness, diet, exercise, food storage, food preparation and etiquette.

Results

Participants have indicated that this program was a factor in improving their health and the health of their families through better nutrition choices. They have also been able to reduce food costs by reducing food loss (via better food storage methods).

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 Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

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

Food and nutrition sessions were conducted with both adult and youth audiences. Sessions consisted of lessons on menu planning, health, wellness, diet, exercise, food storage, food preparation and etiquette.

Results

Participants have indicated that this program was a factor in improving their health and the health of their families through better nutrition choices. They have also been able to reduce food costs by reducing food loss (via better food storage methods).

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
2017	0

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

Food and nutrition sessions were conducted with both adult and youth audiences. Sessions consisted of lessons on menu planning, health, wellness, diet, exercise, food storage, food preparation and etiquette.

Results

Participants have indicated that this program was a factor in improving their health and the health of their families through better nutrition choices. They have also been able to reduce food costs by reducing food loss (via better food storage methods).

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 # 24

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: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	0.0	1.0
Actual Paid	0.0	0.2	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	7332	0	7332
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	26360

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

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	100	50	100	50

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

Patent Applications Submitted

Year: 2017

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	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
2017	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 Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

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. Daylily production serves as a profitable alternative crop for producers who want to diversify their operation. The pace for developing improved genotypes of these two crops 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 2017 biotechnology studies were conducted on the peanut. Gene re-isolation and library construction were carried out; as well as other protocols. Genetic stock was established for daylilies. High school and college students were trained in biotechnology protocol and instrumentation.

Results

Activities in 2017 resulted in students increasing their interest in research and their skills in laboratory procedures. Students gained skills in field experimental design, soil preparation, transplanting, monitoring, nutrition and biotechnology techniques.

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 Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	0

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. Daylily production serves as a profitable alternative crop for producers who want to diversify their operation. The pace for developing improved genotypes of these two crops 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 2017 biotechnology studies were conducted on the peanut. Gene re-isolation and library construction were carried out; as well as other protocols. Genetic stock was established for daylilies. High school and college students were trained in biotechnology protocol and instrumentation.

Results

Activities in 2017 resulted in students increasing their interest in research and their skills in laboratory procedures. Students gained skills in field experimental design, soil preparation, transplanting, monitoring, nutrition and biotechnology techniques.

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
2017	0

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. Daylily production serves as a profitable alternative crop for producers who want to diversify their operation. The pace for developing improved genotypes of these two crops 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 2017 biotechnology studies were conducted on the peanut. Gene re-isolation and library construction were carried out; as well as other protocols. Genetic stock was established for daylilies. High school and college students were trained in biotechnology protocol and instrumentation.

Results

Activities in 2017 resulted in students increasing their interest in research and their skills in laboratory procedures. Students gained skills in field experimental design, soil preparation, transplanting, monitoring, nutrition and biotechnology techniques.

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 # 25

1. Name of the Planned Program

Water Gardens (Aquaculture) (Langston University)

- Reporting on this Program
 - Reason for not reporting
 - No activity occurred in 2017.

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	1.0	0.0	0.6
Actual Paid	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
Actual Volunteer	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
1862 Matching	1890 Matching	1862 Matching	1890 Matching
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
1862 All Other	1890 All Other	1862 All Other	1890 All Other
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}

V(D). Planned Program (Activity)

1. Brief description of the Activity

Fish loading testing will be performed and fish loading modeling will be conducted. Nutrient uptake experiments will be conducted.

2. Brief description of the target audience

All aquaculture farmers in Oklahoma.

3. How was eXtension used?

{No Data Entered}

V(E). Planned Program (Outputs)

1. Standard output measures

2017	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: 2017

Actual: {No Data Entered}

Patents listed

{No Data Entered}

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	{No Data Entered}	{No Data Entered}	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of Research Projects completed on Water Gardens

Year	Actual
2017	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
2017	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
{No Data}	null

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
2017	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
{No Data}	null

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
2017	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
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{No Data}	null
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V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 26

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: 2017	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	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

misinformation and dewormer resistance.

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

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	228	40	9	8

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

Patent Applications Submitted

Year: 2017

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	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
2017	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
2017	0

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 2017, one parasite workshop was presented in Langston, Oklahoma with a total of 8 people in attendance. A parasite workshop was conducted at a Meat Goat Boot Camp to 51 producers. A parasite section was taught during a small ruminant class at Oklahoma State University. Parasite control was also taught at a small producers' meeting in Oklahoma and at two national goat producers' meetings.

Results

2017 Meat Goat Boot Camp post-tests showed a 28% increase in participant's knowledge about internal parasite control in small ruminants. 2017 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
2017	0

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 2017, one parasite workshop was presented in Langston, Oklahoma with a total of 8 people in attendance. A parasite workshop was conducted at a Meat Goat Boot Camp to 51 producers. A parasite section was taught during a small ruminant class at Oklahoma State University. Parasite control was also taught at a small producers' meeting in Oklahoma and at two national goat producers' meetings.

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(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
2017	0

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 2017, one parasite workshop was presented in Langston, Oklahoma with a total of 8 people in attendance. A parasite workshop was conducted at a Meat Goat Boot Camp to 51 producers. A parasite section was taught during a small ruminant class at Oklahoma State University. Parasite control was also taught at a small producers' meeting in the Oklahoma and at two national goat producers' meetings.

Results

2017 Meat Goat Boot Camp post-tests showed a 28% increase in participant's knowledge about internal parasite control in small ruminants. 2017 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

Draught

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 # 27

1. Name of the Planned Program

Fishery Management (Aquaculture) (Langston University)

- Reporting on this Program
 - Reason for not reporting
 - No activity occurred in 2017.

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.4	0.0	0.3
Actual Paid	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
Actual Volunteer	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
1862 Matching	1890 Matching	1862 Matching	1890 Matching
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
1862 All Other	1890 All Other	1862 All Other	1890 All Other
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}

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?

{No Data Entered}

V(E). Planned Program (Outputs)

1. Standard output measures

2017	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: 2017

Actual: {No Data Entered}

Patents listed

{No Data Entered}

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	{No Data Entered}	{No Data Entered}	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of Research Projects completed on Fishery Management.

Year	Actual
2017	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
2017	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
{No Data}	null

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
2017	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
{No Data}	null

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
------	--------

2017

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
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{No Data}	null
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V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 28

1. Name of the Planned Program

Alternative Species (Aquaculture) (Langston University)

Reporting on this Program

Reason for not reporting

No activities occurred in 2017.

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.6	0.0	0.2
Actual Paid	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
Actual Volunteer	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
1862 Matching	1890 Matching	1862 Matching	1890 Matching
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
1862 All Other	1890 All Other	1862 All Other	1890 All Other
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}

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?

{No Data Entered}

V(E). Planned Program (Outputs)

1. Standard output measures

2017	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: 2017

Actual: {No Data Entered}

Patents listed

{No Data Entered}

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	{No Data Entered}	{No Data Entered}	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of Research Projects completed on Alternative Species.

Year	Actual
2017	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
2017	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
{No Data}	null

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 Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	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
{No Data}	null

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
2017	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
{No Data}	null

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 29

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: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.2	0.0	0.1
Actual Paid	0.0	0.3	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

2017	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: 2017
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	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.

Year Actual

2017

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
2017	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. In 2017, an additional 48 participants were certified as

Meat Producers and 9 as Quality Dairy Producers.

Results

More than two thousand seven hundred (2,700) goat producers have enrolled in the online certification program and 397 goat producers have been certified via the site to date. Fifty-seven producers were certified in 2017. Knowledge gained by producers for more efficient and effective goat production will potentially result in increased profits for many of these 397 producers. Based upon Goggle Analytics data, there were 68,674 visits to the online site in 2017. These visits represented 178 countries or territories, all 50 U.S. States and the District of Columbia.

Producers following quality assurance guidelines can expect higher values and profits from their animals.

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
2017	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. In 2017, an additional 48 participants were certified as Quality Meat Producers and 9 as Quality Dairy Producers.

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More than two thousand seven hundred (2,700) goat producers have enrolled in the online certification program and 397 goat producers have been certified via the site to date. Fifty-seven producers were certified in 2017. Knowledge gained by producers for more efficient and effective goat production will potentially result in increased profits for many of these 397 producers. Based upon Goggle Analytics data, there were 68,674 visits to the online site in 2017. These visits represented 178 countries or territories, all 50 U.S. States and the District of Columbia. Producers following quality assurance guidelines can expect higher values and profits from their animals.

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
2017	0

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. In 2017, an additional 48 participants were certified as Quality Meat Producers and 9 as Quality Dairy Producers.

Results

More than two thousand seven hundred (2,700) goat producers have enrolled in the online certification program and 397 goat producers have been certified via the site to date. Fifty-seven producers were certified in 2017. Knowledge gained by producers for more efficient and effective goat production will potentially result in increased profits for many of these 397 producers. Based upon Goggle Analytics data, there were 68,674 visits to the online site in 2017. These visits represented 178 countries or territories, all 50 U.S. States and the District of Columbia. Producers following quality assurance guidelines can expect higher values and profits from their animals.

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 # 30

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: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.3	0.0	0.3
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	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 to develop new dairy goat products and create new opportunities for goat producers.

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

2017	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: 2017

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	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
2017	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
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

No activity occurred during 2017.

What has been done

No activity occurred during 2017.

Results

No activity occurred during 2017.

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
2017	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

No activity occurred during 2017.

What has been done

No activity occurred during 2017.

Results

No activity occurred during 2017.

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
------	--------

2017

0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

No activity occurred during 2017.

What has been done

No activity occurred during 2017.

Results

No activity occurred during 2017.

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 2017.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

No activity occurred during 2017.

Key Items of Evaluation

No activity occurred during 2017.

V(A). Planned Program (Summary)

Program # 31

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: 2017	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

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	11	40	1	20

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

Patent Applications Submitted

Year: 2017
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	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**
 2017 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
2017	0

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 2017 AI workshops were held on 10/07/17 on the Langston University Campus (Langston, Oklahoma). Elven (11) 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
2017	0

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 2017 AI workshops were held on 10/07/17 on the Langston University Campus (Langston, Oklahoma). Eleven (11) 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

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
2017	0

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 2017 AI workshops were held on 10/07/17 on the Langston University Campus (Langston, Oklahoma). Eleven (11) 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 # 32

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: 2017	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	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

2017	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: 2017

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	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
2017	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
2017	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 2017.

Results

No activity occurred in 2017.

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
2017	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 2017.

Results

No activity occurred in 2017.

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
2017	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 2017.

Results

No activity occurred in 2017.

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 # 33

1. Name of the Planned Program

Fish Marketing (Aquaculture) (Langston University)

- Reporting on this Program
 - Reason for not reporting
 - No activities occurred in 2017

V(B). Program Knowledge Area(s)

- 1. Program Knowledge Areas and Percentage

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.4	0.0	0.2
Actual Paid	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
Actual Volunteer	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
1862 Matching	1890 Matching	1862 Matching	1890 Matching
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
1862 All Other	1890 All Other	1862 All Other	1890 All Other
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}

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?

{No Data Entered}

V(E). Planned Program (Outputs)

1. Standard output measures

2017	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: 2017

Actual: {No Data Entered}

Patents listed

{No Data Entered}

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	{No Data Entered}	{No Data Entered}	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of Research Projects completed on Fish Marketing.

Year	Actual
2017	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
2017	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
{No Data}	null

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 Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	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
{No Data}	null

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
2017	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
{No Data}	null

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 34

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: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.2	0.0	1.3
Actual Paid	0.0	1.1	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	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

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	350	100	400	100

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

Patent Applications Submitted

Year: 2017

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	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
2017	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
2017	0

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

With the changes made in 2017, this DHI program continues to provide more accurate data with faster turn-around times with dairy goat breeds along with correct sex identification and expected delivery dates for pregnant does. Several workshops and one-on-one demonstrations were conducted to demonstrate benefits of DHIA records and how to collect raw data and milk samples for DHI labs in order to enhance the enrollment of dairy goat producers in the DHI program. More than 15 tours and demonstrations were conducted for goat producers, high school and college students.

Results

In year 2017 we served more than 145 goat producers from 35 states. Goat operation and profitability depend on accurate milk analysis and herd management. A more complete record of all goats in lactation helped goat producers produce higher milk quantity and quality, manage the goat health more efficiently with reduced cost in drugs and animal loss. 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 make their operation more profitable.

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
2017	0

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

With the changes made in 2017, this DHI program continues to provide more accurate data with faster turn-around times with dairy goat breeds along with correct sex identification and expected delivery dates for pregnant does. Several workshops and one-on-one demonstrations were conducted to demonstrate benefits of DHIA records and how to collect raw data and milk samples for DHI labs in order to enhance the enrollment of dairy goat producers in the DHI program. More than 15 tours and demonstrations were conducted for goat producers, high school and college students.

Results

In year 2017 we served more than 145 goat producers from 35 states. Goat operation and profitability depend on accurate milk analysis and herd management. A more complete record of all goats in lactation helped goat producers produce higher milk quantity and quality, manage the goat health more efficiently with reduced cost in drugs and animal loss. 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 make their operation more profitable.

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
2017	0

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

With the changes made in 2017, this DHI program continues to provide more accurate data with faster turn-around times with dairy goat breeds along with correct sex identification and expected delivery dates for pregnant does. Several workshops and one-on-one demonstrations were conducted to demonstrate benefits of DHIA records and how to collect raw data and milk samples for DHI labs in order to enhance the enrollment of dairy goat producers in the DHI program. More than 15 tours and demonstrations were conducted for goat producers, high school and college students.

Results

In year 2017 we served more than 145 goat producers from 35 states. Goat operation and profitability depend on accurate milk analysis and herd management. A more complete record of all goats in lactation helped goat producers produce higher milk quantity and quality, manage the goat health more efficiently with reduced cost in drugs and animal loss. 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 make their operation more profitable.

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.

V(A). Planned Program (Summary)

Program # 35

1. Name of the Planned Program

Water, Weather, and Climate

Reporting on this Program

Reason for not reporting

This subject matter is reported under Planned Program #5, Ecosystem and Environmental Quality and Management including Weather and Climate.

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	4.0	0.0	2.0	0.0
Actual Paid	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
Actual Volunteer	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
1862 Matching	1890 Matching	1862 Matching	1890 Matching
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
1862 All Other	1890 All Other	1862 All Other	1890 All Other
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}

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 and management.

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- Partner with state and federal agencies to address pressing needs in water, weather, and climate.
- Produce scientific publications and disseminate information through print and on-line media outlets.
- Conduct workshops, field days, and other personal information exchanges to promote issues and alternatives in water, weather, and climate.
- Understand water use and quantify available water supplies in both surface water and groundwater resources throughout the state.
- Conduct research and extension programming on efficient use of water for agricultural and urban irrigation and water conservation practices;
- Understand mechanisms and best practices for controlling the fate and transport of sediment, nutrients, pesticides, and bacteria/viruses, and emerging contaminants in surface water and groundwater systems.
- Develop water use/demand, management, and water policy strategies to address the competing interests of rural and urban sectors, surface water and groundwater use and ownership, conservation, pollution control, and water supply development.
- Enhance ecosystem management through a better understanding of weather and climate impacts on the environment, landscape, and organisms.
- Provide agriculture and natural resource management technical expertise for weather and climate data and models maintained and operated by the Oklahoma Mesonet
- Conduct and deliver weather and climate information for the general public, agriculture, and natural resource sectors through OSU SUNUP TV, online video/audio tutorials, fact sheets, e-mail newsletters, educational programs, seminars and workshops

2. Brief description of the target audience

Water managers, state water agencies, federal water agencies, irrigation districts and irrigators, policy makers, urban homeowners, and K-12 students

3. How was eXtension used?

{No Data Entered}

V(E). Planned Program (Outputs)

1. Standard output measures

2017	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: 2017

Actual: {No Data Entered}

Patents listed

{No Data Entered}

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	{No Data Entered}	{No Data Entered}	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Grant proposals written and submitted

Year	Actual
2017	0

Output #2

Output Measure

- Conferences, workshops, and training sessions

Year	Actual
2017	0

Output #3

Output Measure

- Research reports

Year	Actual
2017	0

Output #4

Output Measure

- Extension fact sheets and other media

Year	Actual
2017	0

Output #5

Output Measure

- Water, climate, and weather-based agricultural decision support tools

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Year	Actual
2017	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of users assessing websites and social media designed to deliver information about water quantity, water quality, education, policy, conservation, and efficient use
2	Number of downloads of videos, Extension fact sheets, Extension highlights, and related educational materials
3	Access by users of the Oklahoma Mesonet computer and mobile device weather and climate data and tools
4	Determination of the energy and water efficiency of current irrigation systems in western Oklahoma
5	Determination of groundwater recharge rates throughout the state of Oklahoma using data from the Oklahoma Mesonet
6	Comparison of grain sorghum and corn productivity under limited irrigation with subsurface drip irrigation
7	Quantification and development of modeling tools for simulating sediment and phosphorus loading rates from streambanks to sensitive streams in Oklahoma and quantification of the benefit of riparian conservation practices
8	Development and pilot-testing of an onsite wastewater training curriculum and establishment of an onsite wastewater training and demonstration facility

Outcome #1

1. Outcome Measures

Number of users assessing websites and social media designed to deliver information about water quantity, water quality, education, policy, conservation, and efficient use

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	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
{No Data}	null

Outcome #2

1. Outcome Measures

Number of downloads of videos, Extension fact sheets, Extension highlights, and related educational materials

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	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

{No Data} null

Outcome #3

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	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
{No Data}	null

Outcome #4

1. Outcome Measures

Determination of the energy and water efficiency of current irrigation systems in western Oklahoma

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	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
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{No Data}	null
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Outcome #5

1. Outcome Measures

Determination of groundwater recharge rates throughout the state of Oklahoma using data from the Oklahoma Mesonet

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	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
{No Data}	null

Outcome #6

1. Outcome Measures

Comparison of grain sorghum and corn productivity under limited irrigation with subsurface drip irrigation

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	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
{No Data}	null

Outcome #7

1. Outcome Measures

Quantification and development of modeling tools for simulating sediment and phosphorus loading rates from streambanks to sensitive streams in Oklahoma and quantification of the benefit of riparian conservation practices

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	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
{No Data}	null

Outcome #8

1. Outcome Measures

Development and pilot-testing of an onsite wastewater training curriculum and establishment of an onsite wastewater training and demonstration facility

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	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

{No Data} null

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Public Policy changes
- Government Regulations

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

VI. National Outcomes and Indicators

1. NIFA Selected Outcomes and Indicators

Childhood Obesity (Outcome 1, Indicator 1.c)	
0	Number of children and youth who reported eating more of healthy foods.
Climate Change (Outcome 1, Indicator 4)	
3	Number of new crop varieties, animal breeds, and genotypes with climate adaptive traits.
Global Food Security and Hunger (Outcome 1, Indicator 4.a)	
0	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)	
0	Number of new or improved innovations developed for food enterprises.
Food Safety (Outcome 1, Indicator 1)	
0	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.