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

Status: Accepted

Date Accepted: 06/21/2018

I. Report Overview

1. Executive Summary

K-State Research and Extension (KSRE) is a statewide network of educators sharing unbiased, research-based information and expertise on issues important to Kansas. The KSRE network includes offices in all 105 counties, along with four regional extension offices, five agricultural research centers distributed throughout the state to encompass variability in climate and soils, four satellite units, four agronomy experiment fields and five horticulture centers and experiment fields. In addition, KSRE funds research projects in 20 departments across five colleges.

We are effectively using our statewide network of offices to share research-based information related to our five grand challenges: global food systems, water, health, developing tomorrow's leaders, and community vitality. The new ideas and knowledge developed through research and disseminated by extension to address the five grand challenges will provide direction and closely align with the university's plan to be a Top 50 research institution by 2025.

In addition to traditional one-on-one methods of communication, our faculty and staff use technology to deliver research-based programs to clients across the state and beyond, including web- based smart phone applications that help our audiences to have the information needed to make management decisions

These five grand challenges directly or indirectly affect all Kansans and we are not going to solve these challenges alone. By developing partnerships within Kansas, across the United States, and internationally, we are educating and working with the next generation of students, scientists, and extension educators. KSRE's statewide presence lends itself to collaborative efforts with organizations, private business and industry, local groups, state and federal organizations, and colleagues in other states. Quality faculty draw businesses and funding to K-State and to Kansas including:

- Several high-profile projects are under way in the Biosecurity Research Institute, and infrastructure development for the National Bio and Agro-Defense Facility is in progress.
- A new partnership created in 2015 with the Dane Hansen Foundation provided funding to hire a Community Vitality Specialist to focus on specific issues and needs of communities in Northwest Kansas.
- Family and Consumer Sciences is a partner of the Kansas Department for Aging and Disability Services to provide health insurance education to Medicare eligible Kansans. Approximately 1/3 of the contacts are vulnerable beneficiaries with incomes below 150% of the poverty level.
- The Kansas 4-H Foundation, the Department of 4-H Youth Development and KSRE partnered to provide expansion grants to increase 4-H membership and recruit volunteers with a particular focus on reaching new and underserved audiences.

We continually evaluate our programs to ensure we are making the best use of our resources. We have many more tools because of technology, but the purpose has not changed to serve the wants, desires, needs, and dreams of Kansas' citizens to improve lives, livelihoods and communities. We accomplish our goals when we have positive impact on individuals, but our ultimate goal is achieved when we also provide

social impact. We view new discoveries and engaging people we serve as benefiting both individuals and society.

Published, peer-reviewed studies containing estimates of return on research and development investment that are specific for Kansas have shown a long-term benefit-cost ratio of 33.6:1 for agricultural research and outreach education, yielding a 10.2 percent average annual return to productivity that can be directly correlated with a long term benefit of $5.5 billion to the state of Kansas.

Food and agriculture research continues to be a priority for Kansas State University. Dollars expended for research from scientists funded through the Kansas Agricultural Experiment Station (KAES) topped $100 million again this past year and continue to be the greatest single entity contributing to the total research expenditures at Kansas State University. KAES expenditures represented 53% ($103 million/$193 Million) of the University total.

The demographics of Kansas continue to change. KSRE is successfully reaching out to both underserved and traditional audiences through new venues. To increase multicultural competency and sensitivity among our workforce, the College of Agriculture/KSRE Diversity Programs Office provides frequent and regular Navigating Difference training for new Extension professionals. A new component of this training is the addition of the Intercultural Development Inventory for each participant. This program brings systemic change and diversity to the KSRE team and provides cultural competency awareness and skills that they can practically apply in their day to day work.

An emerging and growing effort within K-State Research and Extension is the Multicultural Undergraduate and Graduate Summer Research Fellowship program. This program specifically targets under-represented populations of students to establish networking relationships back to their respective home institutions, as well as K-State faculty. Although the undergraduate institutions of these students have not exclusively been from 1890 Land Grants, those institutions have heavily dominated the applicant pool to date. The K-State Research and Extension fellow program places these students in a laboratory or field setting with a K-State Research and Extension scientist to work on a focused set of research goals that can be accomplished in the eight-week program. This program has a specific goal of growing the minority populations of students within graduate programs in the College of Agriculture and across other partner Colleges represented within K-State Research and Extension.

Last year, Kansas 4-H developed new partnerships to reach new and underserved youth. A partnership with Boys and Girls Club in Northeast Kansas resulted in the development of a summer program that included weekly activities in science, technology, engineering and math for Native American youth in the Iowa Tribe of Kansas and Nebraska and the Kickapoo Tribe in Kansas. Another partnership with the College of Education resulted in a two-day residential camp for middle school students to promote college access for first-generation youth from underrepresented populations.

KAES researchers continue to have impact. The wheat variety Everest, developed by KAES researchers, continued to be the number 1 wheat variety planted in Kansas. Resistant starch technology developed by KAES cereal chemist remained the most productively commercialized technology license by the Kansas State University Research Foundation. K-State wheat geneticists successfully used gene editing technology to increase the kernel size in wheat. Swine Immunobiologist from K-State in collaboration with scientists at the University of Missouri genetically modified pigs to be resistant to the Porcine Reproductive and Respiratory Syndrome (PRRS) virus.

KSRE has a long tradition of training leaders for the future. Since 2011, more than 700 members from 135 communities have participated in a Community Board Leadership Series to build skills, increase participation in public processes and address critical issue within communities. The 4-H Citizenship in Action program encourages teenagers to learn more about how government functions and how to actively

participate in the legislative process. Also, the 4-H SET program focuses on preparing more youth who are proficient in science, engineering, and technology. Youth are learning skills in such areas as global positioning systems and computer interface. Ninety-five percent of youth in 4-H have reported being comfortable with making their own decisions, and ninety-one percent have a plan for reaching their goals.

Environmental stewardship remains a critical focus. Several years ago, KSRE partnered with Kansas Farm Bureau, Kansas Department of Health and Environment, Kansas Department of Agriculture, Kansas Department of Commerce, USDA Natural Resources Conservation Service to identify best management practices for the storage and utilization of poultry litter to protect the air and water quality of Kansas. Several years later, the research findings were proven extremely valuable when state and local decision makers discussed possible legislation related to bringing a poultry production facility to the state.

The Great Plains Grazing Project is a coordinated effort by a regional network of researchers and extension specialists working to safeguard and promote regional beef production while mitigating its environmental footprint. More than 60 collaborators are currently affiliated with the project including Kansas State University, Oklahoma State University, the University of Oklahoma, Tarleton State University, the Samuel R. Noble Foundation and the U.S. Department of Agriculture Research laboratories.

K-State Research and Extension professionals worked to develop the tools and educational focus to support Kansas agriculture producers, lenders and other agricultural stakeholders dealing with the pressures of low commodity prices and high input costs, including high loads of debt from land and equipment purchases. These educational programs and training efforts were begun in 2016, and will continue for the next 2 to 3 years. Evaluation of the impacts will be evident in 2018 and 2019.

FTEs have been adjusted with reduced numbers in extension positions. This occurs through elimination of positions through vacancies and realignment of specializations through formation of districts. Over the past decade, faculty positions supported through state and federal appropriations have declined by approximately 10% forcing our system to focus its priorities. At this time, 49 counties have formed 17 districts.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	385.0	0.0	292.0	0.0
Actual	388.8	0.0	285.9	0.0

II. Merit Review Process

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

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

2. Brief Explanation

At the local level, extension agents work with Program Development Committee (PDC) members - local volunteers - who provide input in determining the local and statewide efforts needed to address social, economic, and environmental concerns. Information is then shared with the appropriate Program Focus Team (PFT) - a team of agents and specialists that work together to develop a series of educational program activities that agents can use in their community. Educational action plans are submitted to the local extension council and KSRE for approval.

Research that is proposed by scientists supported by the KAES is reviewed internally by a process overseen by the KAES director. The review process may include disciplinary colleagues, academic department heads and the associate director. In general, capacity projects describe areas of work to be investigated and these areas are reviewed for scientific merit and for their relevance to the priorities of Kansas and USDA/NIFA. Priorities for the state are verified by the relationship of areas of investigation for their relevance to the Kansas agricultural and rural economy, or the potential for the area of investigation to become a relevant factor in the state's food and agricultural economy or to improve the lives of citizens of Kansas. Part of the review process includes confirmation of the audience of interest and consistency of the knowledge areas defined by NIFA with the priorities of the state.

For multistate projects with contributions from KAES scientists, project objectives and approaches are identified by the membership of the committee. Renewing and new projects are first reviewed by the administrative advisor to the multistate research committee and then by the regional multistate review committee. The chair of the regional committee provides feedback to the project writing team. The writing team, in turn, considers the input and makes changes to the proposal as appropriate for improvement and clarity.

III. Stakeholder Input

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

- Survey of traditional stakeholder groups
- Survey of selected individuals from the general public
- Other (Survey of underserved, minority groups)

Brief explanation.

K-State Research and Extension is rich with advisory panels, teams, councils, and committees through every discipline of research and extension work. In Kansas, local Cooperative Extension is organized with elected Program Development Committees (PDCs). Individuals throughout the community are targeted to seek election for their experience and interest broadly in needs and issues of agriculture, family, youth, and community. Six individuals are elected to each of the four committees in all counties across the state. This equates to roughly 2500 private citizens taking an active role as stakeholders in setting priorities for extension programming at the local level. Each year, the individuals involved in leadership activities of these local councils are invited to a one-day training and dialog event at four locations across Kansas. This all day meeting includes updates on their roles and responsibilities as stakeholders for the extension program as well as an opportunity to provide input.

Two years ago, a comprehensive effort was undertaken to provide resources for agents and program development committee members to increase effectiveness in recruiting new members, assessing community needs, and developing and evaluating a comprehensive educational program.

In 2012-2013, the KSRE Program Prioritization Project was completed to determine how the public

prioritized current, ongoing, and potential KSRE program topics and to inform action plans over the next five years. A task force representing each of the 11 Program Focus Teams was convened to develop a survey process. With the assistance of local PDCs, the survey was completed by more than 3,200 local residents.

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 Surveys

Brief explanation.

Following are three examples of processes used to select advisories. First, the Director of K-State Research and Extension and Dean of the College of Agriculture has an advisory that is carefully selected through a nomination process. The individuals invited to serve are selected based upon the target audience represented, gender, race, ethnicity, and leadership. This group meets three times annually to review programs and provide advice to the Dean and Director on key initiatives to strengthen the programs in research, extension, and teaching. A second example is with the State Extension Advisory Council. This group is elected through their leadership on local Extension Boards. Individuals are approached and encouraged to accept nomination to the process. Then their peers go through an election process to identify the representatives they wish to serve on this advisory. This advisory meets twice annually with the Extension director and the administrative team to identify priorities and opportunities to fulfill the mission. Additionally, the Associate Director for Research actively participates on stakeholder boards with direct contact to commodity groups within the state. For example, the Associate Director participates in the Kansas Wheat Alliance and the Kansas Wheat Research Foundation boards. This connection provides guidance to researchers developing varieties and studying problems key to Kansas' wheat production.

The Southwest Kansas Research and Extension Center (SWREC) located in Garden City, Kansas holds a meeting annually with their research advisory committee. The SWREC Advisory Committee is made up of one producer from each county in the Southwest Extension Area (essentially the SW quarter of Kansas) for a total of 24 members. This group is selected by their county extension committees. They serve 3 year terms which can be renewed as long as they are interested. This means one-third of the committee is up for reappointment each year. Besides the core committee, the following are invited to participate: each county agent; three commercial crop consultants; and any members of the corn, wheat, sorghum, soybean or sunflower commissions who reside within the southwest extension area.

The SWREC Advisory Committee meets one day annually, usually the first Thursday in January. In general, the morning session consists of brief presentations by station scientists, while the late morning and afternoon sessions consists of a series of breakout sessions where attendees can interact with station scientists in a small group session to ask questions and share production challenges. The day concludes with attendees using a voting process to identify the highest priority targets for research. Without exception, the advisory attendees and station scientists reach consensus around ongoing production challenges. This process helps ensure that work at this branch station appropriately serves its local clientele.

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 individuals
- Survey specifically with non-traditional individuals
- Survey of selected individuals from the general public

Brief explanation.

Stakeholder input is a continuous process across the breadth of programming for research and extension educational programs in an effective grass-roots organization like K-State Research and Extension. Stakeholder input happens through local, regional, state, multi-state, and national input processes. The stakeholder input process is a comprehensive effort to seek focus on critical issues and problems needing research and answers that fit well within our defined mission priorities. This input continues throughout planning, project implementation, and program delivery. Specifically, face-to-face meetings that include strategic planning, small group process, and reporting back to the recipient institution are commonly used. Nominal group processes are employed to assure hearing of all voices.

With the State Extension Advisory Council, that group is given the task to seek input from others outside of the face-to-face meeting, and to bring that knowledge and experience to the meetings through their sharing of such input. In seeking specific input, we have employed telephone random survey processes to help us understand how well we market our information, education, and programs as an organization. This information goes into a strategic market planning process to help us to reach a broader clientele, especially minority and under-served audiences.

We have stakeholder groups who focus on our non-traditional audiences and programming. Specifically, the Kansas Center for Sustainable Agriculture and Alternative Crops operates with an advisory council for the expressed purpose of providing input on projects and ideas across both research and extension. This group assists in identifying opportunities for directing seed grant funds to research and extension faculty to better reach nontraditional needs and audiences.

The breadth of advisory groups giving input and sharing needs and ideas range from the traditional Dean's advisory council to advisories working through every academic department and research/extension center to every local Extension office. Within program areas, we have advisors made up of stakeholders in areas of family nutrition, meat science, food science, crop commodity groups, livestock commodity groups, agricultural bankers, and the list goes on. We estimate that at any given time K-State Research and Extension has formal relationships with more than 200 advisory stakeholder groups who provide continuous input and feedback on research and extension initiatives, priorities, and direction. No new processes were employed in 2017.

3. A statement of how the input will be considered

- To Identify Emerging Issues
- Redirect Extension Programs
- Redirect Research Programs
- In the Action Plans
- To Set Priorities

Brief explanation.

One example of how input shapes our research and extension programs is exemplified in our wheat breeding program. We maintain wheat variety development on both our main campus and at our Agriculture Research Center in Hays. Both of our faculty breeders have close contact and relationships with the Kansas Wheat Commission, the Kansas Association of Wheat Growers, seedsmen, milling and baking companies, etc. They continually receive input as to the direction of their breeding programs and the breeders listen and adjust accordingly. Moreover, wheat breeders continually are forward looking for the next disease or other challenge and seeking to genetic solutions to those unending challenges.

Budget priorities are established through input on creating or redirecting funds to a new position or program direction based in part upon discussions with stakeholder groups as we identify priorities they have that match with our funding opportunities.

In 2013, KSRE developed a strategic action and alignment plan as part of an overall strategic initiative, K-State 2025--to be recognized as one of the nation's Top 50 Public Research Universities. The Cooperative Extension plan contributes to the overall plan by setting a direction to result in becoming a national leader and model of excellence in engagement through the vision and tradition of a land-grant University mission to serve the people of Kansas with honor, integrity and commitment.

A key initiative is to continually engage our Program Development Committees, volunteers, stakeholders and citizens to determine the educational needs related to the Grand Challenges. This initiative led to the creation of the PDC Task Force and the development of web-based resources and tools to help extension agents and PDCs for needs assessment and program development.

While significant budget reductions have resulted in loss of faculty and staff positions, we continue to use the priorities set forth in that strategic plan to provide guidance on communication, professional development, and structural reorganization to meet those goals, along with budget realities. No changes in 2017.

Brief Explanation of what you learned from your Stakeholders

Industry trends, entrepreneurial interests, gaps in knowledge and understanding, problems and pitfalls in adaptations of knowledge and technology, lack of information within a given commodity production or processing system are all common learning experiences for faculty and administration in our listening relationship with key stakeholders.

In times of budgetary strain, stakeholders continue to emphasize the importance of local presence, attention to the long-term issues and problems of Kansas, and finding ways to improve our efficiency without sacrificing the effectiveness. The result has been in deeper discussions and development of multi-county Extension units, greater use of technology to deliver training, updates, and public education. We are dramatically increasing the use of computer-based educational delivery, while still finding ways to maintain the desires of interaction and connectedness to our clientele.

Research undertaken by KAES scientists frequently flows from challenges with crop or livestock production that emerge from within the state. Plant diseases discovered in prior years are great examples of how stakeholder (growers) challenges drive the direction of research priorities. A significant portion of the KAES research portfolio is funded by Kansas commodity groups. Decisions regarding funding of proposals is determined by farmer/producer review committees. In addition,

academic department heads from the College of Agriculture serve as liaisons to the research committees of every major commodity group. Moreover, departmental and college level advisory groups are populated by producer representatives or employees of various agribusiness. These individuals provide guidance to us regarding priorities for research on a regular basis.

Another more indirect process that is used to check the relevance and application of our research is to annually compare our research expenditures with knowledge areas to Kansas agricultural statistics published rankings of economic activity with various commodity areas. For example, if Kansas agricultural statistics ranks beef cattle as a very important economic driver in the state, we verify that beef cattle research is among our highest areas for research expenditures.

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. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	5300000	0	4348081	0
Actual Matching	20757788	0	34258668	0
Actual All Other	11958841	0	7148969	0
Total Actual Expended	38016629	0	45755718	0

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

V. Planned Program Table of Content

S. No.	PROGRAM NAME
1	Global Food Security and Hunger
2	Food Safety
3	Natural Resources and Environmental Management
4	Childhood Obesity
5	Healthy Communities: Youth, Adults and Families

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Global Food Security and Hunger

☑ 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	5%		10%	
205	Plant Management Systems	28%		14%	
216	Integrated Pest Management Systems	5%		10%	
307	Animal Management Systems	36%		19%	
311	Animal Diseases	0%		24%	
501	New and Improved Food Processing Technologies	2%		2%	
502	New and Improved Food Products	0%		1%	
511	New and Improved Non-Food Products and Processes	2%		1%	
601	Economics of Agricultural Production and Farm Management	19%		14%	
603	Market Economics	1%		0%	
606	International Trade and Development	0%		5%	
703	Nutrition Education and Behavior	1%		0%	
704	Nutrition and Hunger in the Population	1%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	89.0	0.0	129.0	0.0
Actual Paid	155.5	0.0	150.3	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**
1583724	0	2285381	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
6854221	0	18006962	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
5632883	0	3757613	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Sustain Profitable Agricultural Production Systems--

- Develop animal and crop production systems that thrive in the variable conditions of the Great Plains.
- Develop horticulture, forestry, and alternative green enterprises that thrive in the variable conditions of the Great Plains.
- Advance new and improved systems of agricultural production to meet the need of producers and consumers.
- Enhance the value of agricultural products.

Ensure an Abundant Food Supply for All--

- Improve access to high quality foods, especially for consumers with limited resources.
- Increase food variety and value by developing new and enhanced food products.

2. Brief description of the target audience

Farm and ranch managers; agricultural producers and agribusinesses throughout the food industry supply chain with emphasis on producers who want to help themselves; people who influence producers and producer decisions, including educators (veterinarians, media, industry organizations, packers/purchasers); government agencies/ regulators; the lending industry; and policy makers.

3. How was eXtension used?

The eXtension program was utilized in many program areas as a resource for producers. This was especially important for sheep and goat producers, equine owners and beef producers. This information resource will continue to be important for many livestock producers and specialists to assess information.

V(E). Planned Program (Outputs)

1. Standard output measures

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	176547	0	200	0

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

Patent Applications Submitted

Year: 2017

Actual: 17

Patents listed

Plant Transcriptome Engineering Using CRISPR-C2c2 for Enhanced Agronomic Defense and Performance;Insertion of Proline-arginine at Amino Acid Position xxxx of Porcine CD163 Domain 5 Peptide Sequence Confers Resistance to Porcine Reproductive and Respiratory Syndrome Virus (PRRSV); Targeted Mutagenesis Methods to Disrupt and Restore Gene Activities in Obligate Intracellular Bacterium, Ehrlichia Chaffeensis with Applications to Other Obligate Intracellular Bacteria to Enable Structure-function Analyses and in Developing Methods; Nicotinamide Riboside Chloride Increases Broiler Chicken Growth and Myogenesis When Injected in Ovo; Rocky Mountain Spotted Fever (RMSF) Vaccine ;Near Infrared Spectroscopic Method to Optimize Product Purification from the Processing of Wheat; A Naturally Occurring Recombinant Enterovirus (EVG) Expresses a Torovirus (ToV) Deubiquitinase; Sorghum-legume Based Fortified Blended Food (FBF); Programmed Modulation of CRISPR Gene Drives in Budding Yeast; Genomic and cDNA Sequence of the Hessian Fly Resistance Gene H13 in Wheat Germplasm; Wheat-Barley Translocation Lines Confering High Levels of Beta-glucan; Mapping Biophysical Features of Vegetation; Torrington (KS4506) Winter Canola; Larry (KS060143K-2) Wheat Variety; Zenda (KS060106M-11) Wheat Variety; Tatanka (KS12H56-6-4) Wheat Variety; Improved Enzymes for the Synthesis of Acetyl-Triacylglycerols

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2017	Extension	Research	Total
Actual	13	49	62

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of individuals participating in programs

Year	Actual
2017	7400

Output #2

Output Measure

- Number of new/improved varieties, inbreds, germplasm developed and released

Year	Actual
2017	4

Output #3

Output Measure

- Number of educational events (e.g., meetings, demonstrations, field days, press releases, and distributed publications) delivered

Year	Actual
2017	9211

Output #4

Output Measure

- Number of producers engaged in one-on-one consultations through Kansas Farm Management Association or Farm Analyst programs

Year	Actual
2017	2575

Output #5

Output Measure

- Number of presentations at national and international conferences

Year	Actual
2017	108

Output #6

Output Measure

- Number of research papers cited above a threshold (10)--indicative of high impact

Year	Actual
2017	16

Output #7

Output Measure

- Number of research grants received in excess of $50,000.

Year	Actual

2017	24

Output #8

Output Measure

- Number of hours reported annually by Master Gardener volunteers

Year	Actual
2017	100620

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Livestock producers demonstrate best management practices (BMPs) in regard to management and production, including genetic selection, reproduction, nutrition, health, animal care and well-being, livestock safety and quality, environmental management, and optimal marketing strategies (Measured by number of producers adopting BMPs)
2	Kansas farmers and ranchers increase awareness of financial performance (based on number members reported by farm management association)
3	Kansas farmers experience higher yields, more stable yields and/or a higher value of their crop as a result of plant breeders development of new varieties or germplasm (Measured by number of acres planted to KAES-developed materials or materials derived from KSU varieties, inbreds, or germplasm)
4	Improved sustainability of Kansas farms and ranches through membership in the Kansas Farm Management Association program and through assistance received through the K-State Farm Analyst program (Measured by number of members and number receiving assistance through KFMA and Farm Analyst program)
5	Public value communicated by Master Gardener volunteers (measured by number of hours and activities reported annually)
6	Increase food variety and value by developing new and enhanced food products (Measured by number of new products developed)
7	Improve access to high quality food, especially for consumers with limited resources (measured by improvement in food budgeting)

Outcome #1

1. Outcome Measures

Livestock producers demonstrate best management practices (BMPs) in regard to management and production, including genetic selection, reproduction, nutrition, health, animal care and well-being, livestock safety and quality, environmental management, and optimal marketing strategies (Measured by number of producers adopting BMPs)

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	4000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Kansas livestock producers faced volatility in input and market prices in 2017 with lower beef, pork and milk prices. Thus livestock producers of all sectors must continue to improve production efficiency to help meet global food demand in an economically and environmentally sustainable fashion. Efforts to reduce input cost, particular feed cost, continues to be of emphasis. Additionally, producers are seeking information to improve reproductive success and improve live ability of offspring to help improve whole-herd profitability.

What has been done
The overall livestock extension/outreach program primarily focused on optimizing feed cost, pasture management, reproduction strategies, and animal health. These messages were delivered through multiple sources such as extension publications, newsletters, popular press articles, one-on-one consultations, and public meetings.
* Programs on the Veterinary Feed Directive, calving management schools, heifer development and feed resource management were delivered across Kansas to beef producers.
* Swine producers were delivered information on improving dietary nutrient levels and reducing antibiotic use through improved management and health status.
*Numerous dairy producers are involved with a records data base to provide them with timely production indicators to help them make educated decisions about their operations.

KSRE team members developed programs to address grazing management, pasture weeds, controlled burns, insurance and use of cover crops for grazing. Throughout the course of the year, agents routinely shared information about best management practices in their newsletters, newspaper columns, radio reports and social media. Extensive support material is available in

the Feed and water segment of KSUBeef.org. Field days and field trials were conducted to collect data needed by producers to adapt new practices and allow producers to see concepts in actions in their neighborhood.

Results
Veterinary Feed Directive: Website statistics show online materials targeting specific industry segments reached 1,662 producers, 1408 veterinarians, 612 feed mills, and 474 feed distributors. Producers learned the basics of Veterinary Feed Directives and were given an opportunity to ask questions about implementation of the regulations in their individual operations. Producers gained understanding of the proper and judicious use of antibiotics as a result of these educational sessions. Survey data from a subset of meeting participants indicated 65 percent moderately to significantly increased their understanding of regulations associated with the Veterinary Feed Directive and 51 percent noted a significant change in their understanding of a valid patient-client relationship.

Pasture Management: More than 70 percent of participants indicated their knowledge, awareness, or ability to manage forage and pasture increased as the result of what they learned at one of these meetings. In addition, 84 percent indicated they were likely to make management changes.

Swine Production: Implementation of new amino acid levels for late finishing pigs, improved understanding of feed additives in nursery diets, and updated ingredient economics to improve productivity on Kansas swine farms was completed.

Dairy Production: The dairy Extension program to benchmark key performance indicators of dairy herds continued to gain visibility and adoption. Using this tool (www.drinkdairy.com), producers can rank their herd(s) with others in the following areas: reproduction, production, and postpartum cow health. Currently, the program is benchmarking 26 herds from KS, NE and OK, accounting for a total of 107,000 dairy cows. Approximately 70% of dairy cows from KS are enrolled in this program.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Kansas farmers and ranchers increase awareness of financial performance (based on number members reported by farm management association)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	1952

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The state of the economy, along with volatile commodity and input prices, make business planning in agriculture increasingly difficult and raises the stakes of each decision a producer must make. Having good information on which to base decisions is critical for producers to remain profitable and sustainable for the future. Education, training and assistance in keeping good records and in the appropriate methods to analyze and use those records will provide the needed knowledge to make informed decisions.

What has been done
The goal of the KFMA program is to provide each member with farm business and family financial information for improved farm business organization and decision making so that Kansas farms can minimize risk while they increase sustainability and profitability. Making the information available publicly can help to accomplish the same for many involved in agriculture in Kansas and around the country in addition to the KFMA membership. Activities in 2017 included: 6,900 face to face meetings with 2,449 producers; 68 presentations to 1,550 individuals; 2,328 farm business analyses; 2,964 individual crop and livestock enterprise analyses; 6 radio interviews; numerous newsletter and newspaper articles; presentation to over 200 students in classes at KSU and FHSU; a large number of hits to the KFMA Newsletter on website; and over 126 cash flow analyses with Finpack.

Results
Through one-on-one consultations, 2,575 Kansas producers have increased awareness of their current financial position and their financial performance during the past year. Of these producers 2,328 have opportunity to benchmark their performance against other farms in their region; farms of similar type; as well as, the most economically profitable farms. This allows these producers to identify strengths and weakness in their operation and to take action to build on the strengths, and address the weaknesses, vastly increasing the operation?s sustainability and profitability for the future. Through enterprise analysis these operations have also identified those enterprises that are the most profitable and they clearly understand their cost of production for each enterprise allowing them the opportunity to make informed marketing decisions when selling the products they have produced. Additionally, at least 126 producers in poor financial condition, or with family conflict, gained an improved understanding of how to address their situation in a sustainable manner.

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

Kansas farmers experience higher yields, more stable yields and/or a higher value of their crop as a result of plant breeders development of new varieties or germplasm (Measured by number of acres planted to KAES-developed materials or materials derived from KSU varieties, inbreds, or germplasm)

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	3544000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
According to the Kansas Department of Agriculture, agriculture is the largest economic driver in Kansas, valued at nearly $67.5 billion, accounting for 44.5 percent of the state's total economy. In Kansas, there are 46,137,295 acres of farmland, which accounts for 88 percent of all Kansas land. More than 21 million acres in Kansas is harvested for crops.

In 2016, Kansas ranked first among all states in production of sorghum for grain, sorghum for silage, and all wheat.

Many challenges exist for southern Great Plains crop production including erratic rainfall, extreme temperatures, and significant evaporative demand. As a result, hard red winter wheat is the primary crop grown because it develops during cooler and wetter periods of the growing season. However, winter wheat is often grown in an unprofitable and unsustainable monoculture and wheat acres are declining rapidly in favor of other crops. Winter canola is a profitable, alternative oilseed that can enhance wheat yield and grain quality through crop rotation.

What has been done
KAES supports breeding programs located in Manhattan and at our Hays station. Faculty with basic wheat genetic and genomic expertise support the breeding program with basic technologies including gene editing, genomic selection methods and field-based high throughput phenotyping platforms.

We also continue to invest heavily in grain sorghum breeding where, like wheat, we support breeding programs in both Manhattan and in Hays. Although wheat is clearly the crop with the greatest investment and the deepest faculty expertise, we are striving to bring our grain sorghum program more in line with the investigative power and impact of our wheat program. To that end, we have invested in faculty expertise in basic genetics and genomics, and nutritional genetics targeted toward sorghum. To achieve greater impact of our investment in sorghum, we are in the early stages of evaluating arrangements with Kansas seed companies to directly license K-State sorghum hybrids for sale and distribution to Kansas growers. This will be a multi-year effort.

The canola program is developing conventional and Roundup Ready cultivars that are adapted to the southern Great Plains region. Winter hardiness is an important, complex trait that has been a significant focus and contribution by the program. Other traits under consideration are oil quality and quantity, and tolerance to the blackleg fungus.

Results

For the fifth consecutive year, a KAES developed wheat variety, Everest, was the number 1 planted wheat in Kansas. A total of 9.6% of the state?s 2017 wheat crop was planted to Everest. Blends of multiple varieties accounted for 14.3% of planted acres. Danby, a hard white winter wheat, also developed by Kansas State University, was the leading white wheat planted, accounting for 30% of the white wheat acres (2.9% of the total wheat acres in Kansas). The wheat industry has changed over the past 1.5 decades as there are now many more varieties spread across fewer wheat acres. For example, Jagger, a Kansas State University hard red winter wheat variety was the leading variety planted for the 2003 crop accounting for a staggering 45.2% of the state?s wheat. Jagger was the most popular variety in 2003 in seven of the state?s nine districts.

Kansas State University?s canola breeding program is impacting acreage growth in the region. For the first time in program history, seeds sales of cultivars with a university genetic component exceeded 50,000 acres in 2016. This number exceeded 60,000 acres in 2017, which is about 50% of the estimated planted acres. Since 2010, the program has released nine cultivars that are being marketed by seven licensees.

4. Associated Knowledge Areas

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

Outcome #4

1. Outcome Measures

Improved sustainability of Kansas farms and ranches through membership in the Kansas Farm Management Association program and through assistance received through the K-State Farm Analyst program (Measured by number of members and number receiving assistance through KFMA and Farm Analyst program)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	2575

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The state of the economy, along with volatile commodity and input prices, make business planning in agriculture increasingly difficult and raises the stakes of each decision a producer must make. Having good information on which to base decisions is critical for producers to remain profitable and sustainable for the future. Education, training and assistance in keeping good records and in the appropriate methods to analyze and use those records will provide the needed knowledge to make informed decisions.

What has been done
This improved sustainability was achieved through providing producers reliable and accurate information on which to base decisions, along with the necessary education, tools, training and assistance in keeping good records and the appropriate methods to analyze and use those records to acquire the needed knowledge to make the best decisions possible in each situation.

Results
Through one-on-one consultations, 2,575 Kansas producers have improved sustainability for the future due to their involvement with the KFMA and Farm Analyst programs during the past year. Of these producers, 2,328 have opportunity to benchmark their performance against other farms in their region; farms of similar type; as well as, the most economically profitable farms. This allows these producers to identify strengths and weakness in their operation and to take action to build on the strengths, and address the weaknesses, vastly increasing the operation's sustainability and profitability for the future. Through enterprise analysis these operations have also identified those enterprises that are the most profitable and they clearly understand their cost of production for each enterprise allowing them the opportunity to make informed marketing decisions when selling the products they have produced. This greatly increases the sustainability of each of these operations. Additionally, at least 126 producers in poor financial condition, or with family conflict, gained an improved understanding of how to address their situation in a sustainable manner.

4. Associated Knowledge Areas

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

Outcome #5

1. Outcome Measures

Public value communicated by Master Gardener volunteers (measured by number of hours and activities reported annually)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	109458

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Extension Master Gardeners are a vital part of K-State Research and Extension. Donating time in return for horticultural training, Extension Master Gardeners help Extension agents meet the need for horticultural information in their communities. The Master Gardener program is designed to provide trained volunteers to help meet that need at minimal cost.

What has been done
The means of providing this information is diverse including horticultural "hotlines," demonstration gardens, working garden shows, public presentations and providing tours. Extension Master Gardeners require continual education in best management practices, conservation of natural resources, waste management, integrated pest management, and identification and selection of proper plant materials for healthy people, plants, and the environment.

Results
Extension Master Gardeners (EMG) donated more than 100,000 hours with a value over $2.23 million in 2017. The level of enthusiasm and commitment not only impacts our volunteer projects but often results in our EMGs influencing family, friends and neighbors to use proven horticultural practices.

Homeowners sometimes over-fertilize and often misdiagnose problems in their landscape and garden resulting in overuse of unneeded or ineffective products. By providing timely, accurate information, our Master Gardeners influence our clientele to use less and more effective inputs resulting in better results and a savings of time and money. Using less fertilizers and pesticides also helps protect the environment.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems

Outcome #6

1. Outcome Measures

Increase food variety and value by developing new and enhanced food products (Measured by number of new products developed)

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	28

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Existing Kansas companies and entrepreneurs have to keep an edge on the market by continuously developing new and innovative products.

What has been done
The Extension Value-Added Foods Laboratory provided technical support for Kansas food companies in the development of a variety of new foods. The support provided included assistance in:
- formulating new foods and drinks
- testing the products for safety and shelf-life
- developing ingredients legends
- Nutrition Facts panels and allergen statements
- sensory evaluation.

Last year witnessed an abundance of new fermented products, especially Kombucha tea, cold brew coffee, numerous gluten-free baked goods, flavored popcorn and specialty sauces. Our laboratory assisted in the development of 27 such products for Kansas companies and entrepreneurs. In addition, a research project led to the development of a solid yogurt product which has been submitted for a patent application.

Results
Based on fees assessed by private consulting entities and common industry standards, a conservative estimate of the dollar value of the services provided to Kansas companies and entrepreneurs in 2017 is $750,000.

Additionally, numerous undergraduate and graduate students were involved in these activities either through research projects spanning from ingredient testing to finished product evaluations, or through class projects and summer internships sponsored by Kansas food companies. The impact of these experiences on successful job placement of recent graduates has been widely recognized by food science majors that there is currently a waiting list for students requesting to work in the Value-Added Foods laboratory.

4. Associated Knowledge Areas

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

Outcome #7

1. Outcome Measures

Improve access to high quality food, especially for consumers with limited resources (measured by improvement in food budgeting)

2. Associated Institution Types

- 1862 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 systems that provide healthful foods to Kansas communities, support and sustain healthy communities and strong local economies. The food system cycle from production to consumption to waste management has a profound affect on eating behaviors and, in turn, community health outcomes. To build and sustain a healthy food system, community partnerships are vital and should include stakeholders from public, private, and nonprofit sectors and represent a wide array of interests, including nutrition, health, agriculture, education, policy, community design, and commerce.

What has been done

K-State Research and Extension continues to work with local health and wellness coalitions, school wellness committees, food policy councils, and other entities to develop policy and systems changes that create healthy food environments in schools, communities, and public venues.

For example, K-State Research and Extension, Cherokee County personnel partnered with the Columbus Unified School District in order to improve access to fresh fruits and vegetables to both the elementary students and community members. Youth in the Summer Boost Program at Highland Elementary assisted in planting and harvesting a Growing Health Futures Garden.

Results
Produce from the garden was donated to the Columbus Summer Free Lunch program, utilized for snacks within the school, and students were able to take home fresh vegetables to their families.

4. Associated Knowledge Areas

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

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
- Other (Technological change)

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Short-Term Knowledge

- Producers will improve their knowledge of efficient use of inputs to improve efficiency of feed and water use, reproduction and animal health.
- Producers will improve their knowledge of business skills that relate to cost of production, employee management, legal and regulatory issues and marketing.

Medium-Term (Behavior)

- Producers will demonstrate improved efficiency of feed and water use, reproduction

and animal health.

• Producers will use alternative ingredients, improve forage use efficiency, adjust stocking rates, improve feeding accuracy, implement growth technologies, and strategically supplement.

• Producers will apply reproductive technologies, test and improve semen quality, maintain or improve percent calf crop, use genetic selection to improve reproduction, and alter heifer development strategies to lower costs and improve longevity.

• Producers will implement biosecurity plans, reduce pregnancy wastage and disease transmission, use value added health programs, follow BQA guidelines and improve animal welfare.

• Producers will improve costs of production, employee management, management of legal and regulatory issues, and marketing skills

• Producers will improve record keeping skills, use partial budget tools, improve risk management and utilize benchmarks.

• Producers will improve training and communication regarding expectations of employees and utilize labor saving practices.Producers will develop plans for leadership transitions and tax purposes, use stronger leases and improve environmental management. Producers will increase use of value added programs and non-traditional markets and increase communication and advocacy for agriculture and the beef industry.

Long-Term (Change in Condition)

• Kansas beef industry will be economically and environmentally sustainable to help feed people in Kansas, the US and throughout the world.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Food 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
702	Requirements and Function of Nutrients and Other Food Components	15%		15%	
703	Nutrition Education and Behavior	30%		20%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	15%		15%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	30%		30%	
723	Hazards to Human Health and Safety	0%		10%	
724	Healthy Lifestyle	10%		0%	
802	Human Development and Family Well-Being	0%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	55.0	0.0	48.0	0.0
Actual Paid	39.7	0.0	36.9	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**
396802	0	560461	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1729149	0	4415230	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
1448604	0	921357	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

• Develop new rapid methods for the surveillance, detection, isolation, and quantification of microbes and chemical residues in animals, plants, and food products.
• Develop risk monitoring techniques to detect potential hazards in the distribution chain.
• Validate the efficacy of techniques in controlling and eliminating microbial and chemical hazards.
• Disseminate food safety and bio-security information through extension and research seminars, workshops, and resident and distance education programs, using a variety of media options and communication tools.
• Offer safe food production, handling, and sanitation education to groups involved in all levels of food production and service.
• Identify best management practices to prevent foodborne illness and to enhance the security of the food supply throughout the food chain.
• Develop technology to reduce the hazards and improve the quality of animal food products, which will complement the development of HACCP programs by USDA.
• Develop, complement, and maintain an aggressive technology transfer system that effectively communicates work about Food Safety to consumers, students, industry, government, and other scientific investigations.

2. Brief description of the target audience

• Growers and processors of agricultural commodities, commercial and non-commercial food service personnel, market and home gardeners, other food handlers, retail markets, consumers, and educator;
• Families and individuals of all ages living in Kansas, including populations with limited resources; low literacy skills; varying ethnicities; disabilities, diseases, or impairments; and documented or identifiable health disparities;
• Economic stakeholders, and policy and funding agencies;
• Health care, education, and nutrition professionals;
• K-State Research & Extension faculty and staff with responsibilities for food and/or nutrition;
• Government; and
• Consumer groups (i.e., STOP).

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	83231	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 rapid methods developed for the surveillance, detection, isolation, and quantification of microbes and chemical residues in animals, plants, and food products
  Not reporting on this Output for this Annual Report

Output #2

Output Measure

- Number of therapeutic, chemical, and physical treatments developed for animals and plants and their products to eliminate or reduce contamination with potential hazards
  Not reporting on this Output for this Annual Report

Output #3

Output Measure

- Number of ServSafe certification workshops

Year	Actual
2017	47

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Increase knowledge level and improve attitude of clientele in safe food production, handling, and sanitation programs; best management practices to prevent foodborne illness; and social, economic, and communications issues related to food safety and agricultural bio-security (Measured by number of participants increasing knowledge)
2	Increase adoption of recommended safe food handling practices at the individual, family, community, production, and supply system levels (Measured by number of participants in food service manager certification class who successfully complete the exam)
3	Reduce incidence of foodborne illness (Measured by number of foodservice facilities with trained employees)
4	Increase number of viable technologies to improve food safety (Measured by number of viable technologies developed or modified for the detection and characterization of food supply contamination from foodborne threats)
5	Increase understanding of the ecology of threats to food safety from microbial and chemical sources (Measured by number of students enrolled in Food Safety and Defense graduate certification)

Outcome #1

1. Outcome Measures

Increase knowledge level and improve attitude of clientele in safe food production, handling, and sanitation programs; best management practices to prevent foodborne illness; and social, economic, and communications issues related to food safety and agricultural bio-security (Measured by number of participants increasing knowledge)

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Increase adoption of recommended safe food handling practices at the individual, family, community, production, and supply system levels (Measured by number of participants in food service manager certification class who successfully complete the exam)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	508

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Food safety is an important public health priority. Foodborne illness is a common, costly, yet preventable, public health problem. The U.S. Centers for Disease Control and Prevention estimate that roughly one in six people in the U.S. (about 48 million) get sick, 128,000 are hospitalized and 3,000 die of foodborne illness each year. Most cases of foodborne illness can be prevented through proper hygiene practices, including hand washing and following proper food handling and preparation recommendations.

What has been done
K-State Research and Extension (KSRE) Family and Consumer Sciences (FCS) professionals in partnership with the Kansas Restaurant and Hospitality Association (KRHA) provided food safety training to foodservice outlets and community organizations in Kansas. The ServSafe® Food Safety Education program is a nationally recognized certification and training program. This program targets foodservice managers, entry-level food handlers, and community organizations who provide food to the public. In 2017, our efforts resulted in over 250 contact hours of food

safety education. FCS extension agents and KRHA educators help deliver a wide variety of consumer, food handler and food service manager food safety education trainings. Whether instructing a restaurant owner, line cook, culinary arts student or church dinner volunteer, educators provide training and tools focusing on risk factors known to be the most important when it comes to preventing foodborne illness.

Results
In 2017, ServSafe® Food Safety Manager Classes reached 632 foodservice workers statewide. These 23 classes resulted in 508 foodservice employees receiving ServSafe Food Protection Manager Certification.

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

Reduce incidence of foodborne illness (Measured by number of foodservice facilities with trained employees)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	73

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Food safety is an important public health priority. Foodborne illness is a common, costly, yet preventable, public health problem. The U.S. Centers for Disease Control and Prevention estimate that roughly one in six people in the U.S. (about 48 million) get sick, 128,000 are hospitalized and 3,000 die of foodborne illness each year. Most cases of foodborne illness can be prevented through proper hygiene practices, including hand washing and following proper food handling and preparation recommendations.

What has been done
K-State Research and Extension (KSRE) Family and Consumer Sciences (FCS) professionals in partnership with the Kansas Restaurant and Hospitality Association (KRHA) provided food safety

training to foodservice outlets and community organizations in Kansas. The ServSafe® Food Safety Education program is a nationally recognized certification and training program. This program targets foodservice managers, entry-level food handlers, and community organizations who provide food to the public. In 2017, our efforts resulted in over 250 contact hours of food safety education. FCS extension agents and KRHA educators help deliver a wide variety of consumer, food handler and food service manager food safety education trainings. Whether instructing a restaurant owner, line cook, culinary arts student or church dinner volunteer, educators provide training and tools focusing on risk factors known to be the most important when it comes to preventing foodborne illness.

Results
In 2017, 28 Food Handler classes were held with 275 participants completing the ServSafe Food Handler class. Participants in 24 classes responding to a post-session survey indicated that they had increased knowledge and skills of best food safety practices. Of the participants completing the post survey in the ServSafe Food Handlers classes, 89% indicated they plan to use what they learned at work and/or at home. Participants reported they intend to wash their hands, check food temperatures and use food thermometers more often, and to be more cautious of cross contamination and food left out at room temperature.

A participant from a ServSafe Food Handlers class stated, "I never gave our old way of hand-washing much thought on how it can spread food-borne illnesses and cross-contaminate the food we were making. The participant indicated that they would implement a much safer and recommended hand-washing procedure in the future.

4. Associated Knowledge Areas

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

Outcome #4

1. Outcome Measures

Increase number of viable technologies to improve food safety (Measured by number of viable technologies developed or modified for the detection and characterization of food supply contamination from foodborne threats)

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

Increase understanding of the ecology of threats to food safety from microbial and chemical sources (Measured by number of students enrolled in Food Safety and Defense graduate certification)

Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Short-Term (Knowledge)

• Program participants improve their attitudes toward, and awareness of, issues related to food safety.
• Participating Extension agents, Master Food Volunteers, foodservice professionals, farmers market vendors, produce growers, and foodservice volunteers increase their knowledge and skills of safe food handling from production to consumption.
• Public program participants increase their knowledge of and skills in safe food handling practices, food safety regulations, hand washing, and home food preservation techniques.

Medium-Term (Behavior)

• Participating Extension agents, Master Food Volunteers, foodservice professionals, farmers market vendors, produce growers, and foodservice volunteers demonstrate increased safe food handling practices (including handwashing) from production to consumption.
• More venues serving food in Kansas have food-safety trained employees or volunteers.
• Program participants demonstrate increased use of safe food handling practices and home food preservation techniques.

Long-Term (Change in Condition)

• Fewer Kansans experience foodborne illness, resulting in reduced health care costs.
• Foodborne illnesses reported by the Kansas Department of Agriculture and KDHE Office of Epidemiology decrease.
• Kansas Department of Agriculture foodservice code violations in various kinds of food service operations decrease.
• Fewer incidences of foodborne illness from home food handling and preservation are reported.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Natural Resources and Environmental 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
102	Soil, Plant, Water, Nutrient Relationships	12%		12%	
104	Protect Soil from Harmful Effects of Natural Elements	13%		8%	
111	Conservation and Efficient Use of Water	19%		15%	
112	Watershed Protection and Management	10%		7%	
121	Management of Range Resources	5%		7%	
132	Weather and Climate	2%		7%	
141	Air Resource Protection and Management	3%		5%	
205	Plant Management Systems	8%		8%	
511	New and Improved Non-Food Products and Processes	15%		12%	
601	Economics of Agricultural Production and Farm Management	3%		3%	
603	Market Economics	7%		3%	
605	Natural Resource and Environmental Economics	3%		13%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	50.0	0.0	80.0	0.0
Actual Paid	72.9	0.0	68.7	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**
2408379	0	1044784	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
7712372	0	8232069	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	1717843	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

• Understand the sources, fate, and transport of important water contaminants (i.e., fecal coliform bacteria, nutrients, sediment, and pesticides [especially atrazine herbicide]), and develop and determine the environmental and economic effectiveness of best management practices for these potential contaminants.
• Quantify the environmental and economic effectiveness of best management practices for improving water quality at the watershed level.
• Disseminate science-based information through environmental education programs for both youth and adults, and deliver extension programs aimed at stakeholders that focuses on adoption of best management practices in targeted areas for water quality improvement.
• Develop and test new crop, livestock, bioenergy, and riparian forest systems that will reduce water use while optimizing productivity, environmental quality, and profitability, including water saving technologies for concentrated animal feeding operations (CAFOs) and industries that process agricultural commodities.
• Develop an information and education program for policy makers, producers, water professionals, and youth audiences with respect to the Ogallala Aquifer, including assessment of the potential impacts of climate change on this important water resource.
• Develop an understanding of air quality impacts of rangeland burning, including extent and timing of burn events, influence of fuel load on emissions, modeling the downwind transport of particulate matter, and developing a climatology of extreme events.
• Disseminate science-based information and transfer technologies to stakeholders, and implement youth education programs focused on air quality.
• Disseminate science-based information regarding the sustainability of biofuel production and processing.
• Develop new processes to modify agricultural-based materials into higher value products.
• Develop resources and pathways to increase climate literacy.
• Provide decision tools for adaptive best management practices that address the effects of climate change.

2. Brief description of the target audience

• Agricultural producers, youths, policymakers/regulators, crop and livestock consultants.
• Growing industry based on bioprocessing and bioconversion, including the existing ethanol and biofuels industry.

- International grain processors.
- Industrial products manufacturers: adhesives, composites, bio-based chemicals, solvents and lubricants.
- Entrepreneurs and investors seeking to enter this industry.
- Audiences whose production systems will be influenced by climate change, as well as those who consult or influence the decision-makers of these producers. Secondary audiences will be decision-makers and leaders responsible for preparing communities for change (e.g., state and local elected officials, environmental groups).

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	68933	0	102	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	20	15	35

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of educational programs delivered

Year	Actual
2017	636

Output #2

Output Measure

- Number participating in educational programs

Year	Actual
2017	11901

Output #3

Output Measure

- Number of refereed research publications

Year	Actual
2017	35

Output #4

Output Measure

- Number of presentations at national and international conferences

Year	Actual
2017	27

Output #5

Output Measure

- Number of workshops, web-based curricula, and field days/tours related to climate change

Year	Actual
2017	110

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Producers adopt BMPs that protect environmental quality (measured by number adopting BMPs)
2	Producers adopt BMPs for atrazine and soil erosion (measured by number of acres)
3	Measurable improvement in water quality (percent reduction atrazine) in Little Arkansas River Watershed
4	Improve utilization of biological raw materials as bioconversion substrates (measured by number of new processes developed).
5	Agricultural/natural resource producers, and/or business representatives modify existing practices or technologies and/or adopt new practices to protect/enhance natural resources and/or enhance biodiversity (Measured by # documented)
6	Development of new knowledge and technologies (Measured by percentage of participants who increase knowledge of management practices under climate variability and change)
7	Improve climate mitigation strategies and their adoption (Measured by number of farms and landowners reducing carbon and energy footprints)

Outcome #1

1. Outcome Measures

Producers adopt BMPs that protect environmental quality (measured by number adopting BMPs)

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	263

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The K-State Watershed Specialist program began in 2000, as a partnership with the Kansas Departments of Health and Environment and other agricultural groups. This partnership assigned specialists to high-priority watersheds. The specialists work closely with local Watershed Restoration and Protection Strategy (WRAPS) groups as service providers and coordinators to develop and implement plans to improve surface water quality and to meet state water quality standards.

What has been done
The Watershed Specialist team provided a broad array of educational services. They participated in and/or facilitated 522 educational events reaching more than 10,000 Kansans. The Specialists delivered 83 presentations in addition to several news articles (9) and radio/tv interviews (7) reaching an immeasurable amount of people. Mailings were also sent out in one watershed reaching thousands. Presentations included PowerPoint, posters, oral demonstrations, brochures and signage.

Results
The Watershed Specialist team provided technical assistance in the implementation of 263 BMPs. This includes 52 livestock BMPs, affecting over 4,300 animal units, 263 cropland BMPs affecting more than 27,500 acres and 3 streambank BMPs, affecting 1,635 linear feet of streambank.

4. Associated Knowledge Areas

KA Code	Knowledge Area

102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
121	Management of Range Resources
141	Air Resource Protection and Management

Outcome #2

1. Outcome Measures

Producers adopt BMPs for atrazine and soil erosion (measured by number of acres)

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	16226

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The project goal is to assist farmers to voluntarily implement atrazine herbicide best management practices (BMPs) to meet surface water quality standards of 3 micrograms per liter, with no seasonal spikes. A decision was made to target specific sub-watersheds within the Little Arkansas River watershed in order to document water quality improvements.

What has been done
Four watersheds within the LIttle Arkansas River watershed were targeted for implementation of BMP?s for atrazine herbicide. Atrazine runoff vulnerable fields outside of the four targeted watersheds were also made eligible for incentive payments. Corn and grain sorghum fields were targeted.

Results
Landowners/producers committed to implementing 113 atrazine BMPs on 16,226 of corn and grain sorghum. BMP implementation was predicted to reduce atrazine runoff by 54.5% on 16,226 acres and a total load reduction of 707.36 lbs.a.i. in targeted acres

4. Associated Knowledge Areas

KA Code	Knowledge Area

102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
121	Management of Range Resources
141	Air Resource Protection and Management

Outcome #3

1. Outcome Measures

Measurable improvement in water quality (percent reduction atrazine) in Little Arkansas River Watershed

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	55

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The project goal is to assist farmers to voluntarily implement atrazine herbicide best management practices (BMPs) to meet surface water quality standards of 3 micrograms per liter, with no seasonal spikes. A decision was made to target specific sub-watersheds within the Little Arkansas River watershed in order to document water quality improvements.

What has been done
Four watersheds within the Little Arkansas River watershed were targeted for implementation of BMPs for atrazine herbicide. Atrazine runoff vulnerable fields outside of the four targeted watersheds were also made eligible for incentive payments. Corn and grain sorghum fields were targeted.

Results
Landowners/producers committed to implementing 113 atrazine BMPs on 16,226 of corn and grain sorghum. Implementation of atrazine BMPs resulted in 11,112 lbs a.i. (or 42.8%) less atrazine being applied in the targeted areas. After including all BMPs implemented and using KSU BMP effectiveness data, BMP implementation was predicted to reduce atrazine runoff by 54.5% on 16,226 acres and a total load reduction of 707.36 lbs.a.i. in targeted acres.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management

Outcome #4

1. Outcome Measures

Improve utilization of biological raw materials as bioconversion substrates (measured by number of new processes developed).

2. Associated Institution Types

- 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)
The U.S. consumes more than 140 billion gallons of transportation fuels annually. Due to finite reserves, non-uniform distribution, and volatile prices of fossil fuels, renewable fuels from biomass could make a significant contribution toward a more sustainable future. Recent legislation has called for this nation to annually produce 36 billion gallons of renewable fuel by 2022 to help offset impending concerns over climate change and energy security. Such targets have implications of national security, economic development, and sustainable practices for the future

What has been done
Both fundamental and applied research has been conducted in the area of biofuel and biobased materials. Key projects include 1) cellulosic biomass as feedstock for for biofuels; 2) biobased materials from renewable resources; 3) development of pretreatment methods to increase biomass conversion efficiency; 4) biobased product development; 5) development of NIR models for quick analysis of biomass composition and physical properties.

Results
Our mean results include: 1) multi-seeded (msd) mutants sorghums have a great potential as an excellent feedstock for bioethanol production with high grain yield, high starch content, and high fermentation efficiency; 2) the potential of sorghum mutant stalks for biofuel production; 3) biobased adhesives developed using plant protein and lignin; 4) advanced biomass pretreatment

using metal oxides; and 5) developed NIR methods for quick analysis of biomass composition and physical properties.
As research results, we published 15 peer reviewed papers, 3 book chapters, 1 patent issued and presented 12 meeting papers and presentations.

4. Associated Knowledge Areas

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

Outcome #5

1. Outcome Measures

Agricultural/natural resource producers, and/or business representatives modify existing practices or technologies and/or adopt new practices to protect/enhance natural resources and/or enhance biodiversity (Measured by # documented)

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	11

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Rangeland stewardship was especially important in 2017 as wildfires burned numerous acres in southwest Kansas. Landowners need information on vegetation recovery and rangeland management.

Participants and the public gained knowledge about: the effects of burning rangeland on vegetation, animals and air quality; management practices that insure sustainable pastures while maintaining the environment through educational events.

What has been done
Kansas landowners, managers, extension agents and agency personnel gained knowledge regarding use of prescribed burning to control unwanted species and how to use available models to predict and reduce smoke management concerns. Individual throughout the state are gaining knowledge and implementing best management practices to sustain rangeland and pasture resources.

Activities included: 7 Prescribed Burning Workshops, 2 adult Range Management Schools, 4 training workshops on noxious weeds, 6 extension meetings on brush/weed control and grazing management, 4 presentations on drought management, six farm visits related to prescribed burning, brush/weed control and grazing system, Kansas Range Youth Camp, 1 field day and 5 radio spots, 1 YouTube Video, 40 tweets, and 12 eUpdates.

Results
97% of participants in the Prescribed Burning workshops indicated greater confidence in planning and conducting a prescribed burn. Burn workshop participants also appreciated learning how to access weather conditions and extended forecasts.

One participants said, "Planning and preparation should take place long before you plan to burn, There are different times to accomplish burning goals on your land."

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water

Outcome #6

1. Outcome Measures

Development of new knowledge and technologies (Measured by percentage of participants who increase knowledge of management practices under climate variability and change)

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	33

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Producers in the Southern Great Plains face a wide range of climate issues that are constantly in flux and climate change is projected to increase this variability in the future. This is certainly important to both the beef cattle industry and row crop agriculture in the region.

What has been done
Great Plains Grazing is a coordinated effort by a regional network of researchers and extension specialists in Kansas, Oklahoma and Texas to adapt grazing strategies to changing conditions.

One of the projects of the Great Plains Grazing Project is the development and coordination of a webinar series:

Grazing Cropping Systems in Oklahoma - 757 views
Prescribed Burning - 70 views
Building Better Soils with Cover Crops - 399 views
Calving and Breeding Season Management - 97 views
Grazing Cover Crops in Oklahoma: A Case Study - 197 views
New Insights into Flash Droughts across the United States - 51 views

Results
The monthly webinar series resulted in a total of 1,571 views. There were 461 subscribers added to the Great Plains Grazing mailing list in 2016 with an average open rate of 32.7%.

There were 537 subscribers to the Great Plains Grazing mailing list at the end of 2017 as compared to 461 at the end of 2016 (up 76) with an average open rate of 32%.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water

Outcome #7

1. Outcome Measures

Improve climate mitigation strategies and their adoption (Measured by number of farms and landowners reducing carbon and energy footprints)

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
- Other (Educational funding)

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Short Term (Knowledge)
Target audiences will become aware of both existing and emerging natural resource issues. Participants will gain an understanding of:

- Improved knowledge of environmental concepts and Kansas natural resources
- Increased knowledge and skill development in the area of interpretation and leadership
- Why environmental issues are of interest or concern
- Who/what is impacted by these environmental issues
- Which research-based methods could be employed to address and ultimately resolve the issues

Audiences will increase their knowledge base regarding economically and environmentally sustainable practices that will prevent future problems. Stakeholders will recognize and appreciate the importance of their role in the process of collaboration and resolution of natural resource issues.

Addressing water quality and quantity issues are the focus of this year's plan, and evaluation tools are being developed to improve the reporting of program impacts in this area. This should lead to collaboration with other teams, such as Horticulture for landscape water management, and Crops for soil and water conservation.

Medium-Term (Behavior)
Stakeholders and participants will develop long-range strategic plans and implement best management practices as they relate to the sustainable management of grasslands, water, forestry, energy, wildlife, and air. Partnerships will be made among stakeholders to work collaboratively to alleviate and prevent environmental concerns throughout Kansas.

Long-Term (Change in Condition)

Target audiences will benefit from measurable improvements in existing natural resource concerns and mitigation of emerging threats. Kansas citizenry will be environmentally literate and will make sound decisions regarding natural resources. Participants and their associated interests will become economically viable and environmentally sustainable. KDHE water quality monitoring data will show measurable improvement, similar to what has been shown in Clarks Creek, Grouse-Silver Creek, and the Cheney reservoir. The water footprint for the production of crops and livestock, and the maintenance of home landscapes and gardens has been reduced.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Childhood Obesity

☑ 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
702	Requirements and Function of Nutrients and Other Food Components	5%		35%	
703	Nutrition Education and Behavior	70%		55%	
724	Healthy Lifestyle	20%		0%	
802	Human Development and Family Well-Being	5%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	45.0	0.0	15.0	0.0
Actual Paid	26.3	0.0	8.8	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**
53903	0	134033	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
581840	0	1056083	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
1292428	0	220380	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Educational programs about making healthy food choices and increasing physical activity

2. Brief description of the target audience

- Families and individuals of all ages living in Kansas, including populations with limited resources; low literacy skills; varying ethnicities; disabilities, diseases, or impairments; and documented or identifiable health disparities;
- Economic stakeholders, and policy and funding agencies;
- Health care, education, and nutrition professionals;
- KSRE faculty and staff with responsibilities for food and/or nutrition;
- Consumer groups (i.e., STOP)

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	83232	0	600	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 workshop series conducted

Year	Actual
2017	143

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Children and youth increase their physical activity and/or reduce sedentary time. (Measured by percentage of number reached)
2	Adolescents reporting healthier lifestyle habits (e.g., eating meals from a variety of food groups; increased frequency and/or time spent participating in physical activity per day) (Measured by increased percentage of those reached)
3	Children and youth increase consumption of foods such as fruits, vegetables, and whole grains, as recommended by the U.S. Dietary Guidelines for Americans (measured by percentage of those reached).
4	Families/caregivers adopt healthy eating patterns, such as eating breakfast, eating as a family, healthier snack choices (Measured by percentage of those reached)
5	Kansans of all ages engage in increased physical activity.

Outcome #1

1. **Outcome Measures**

Children and youth increase their physical activity and/or reduce sedentary time. (Measured by percentage of number reached)

Not Reporting on this Outcome Measure

Outcome #2

1. **Outcome Measures**

Adolescents reporting healthier lifestyle habits (e.g., eating meals from a variety of food groups; increased frequency and/or time spent participating in physical activity per day) (Measured by increased percentage of those reached)

Not Reporting on this Outcome Measure

Outcome #3

1. **Outcome Measures**

Children and youth increase consumption of foods such as fruits, vegetables, and whole grains, as recommended by the U.S. Dietary Guidelines for Americans (measured by percentage of those reached).

Not Reporting on this Outcome Measure

Outcome #4

1. **Outcome Measures**

Families/caregivers adopt healthy eating patterns, such as eating breakfast, eating as a family, healthier snack choices (Measured by percentage of those reached)

2. **Associated Institution Types**

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	5

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
One in 10 Kansans 18 and older has been diagnosed with diabetes (90-95 percent have the preventable Type 2 diabetes), which increases the risk of stroke, heart disease, kidney disease, blindness and lower-limb amputation.

What has been done
K-State Research and Extension offers Dining with Diabetes, a national extension program designed to boost the health and wellness of Kansans with Type 2 diabetes and help educate those challenged with diabetes, their family members, caregivers and others who support them.

Forty K-State Research and Extension family and consumer sciences agents are trained to offer the Dining with Diabetes program; 25 agents have implemented the program across the state with 58 participants.

The program offers two-hour weekly classes over four weeks. Lessons include:
- the best self-care methods for those who have the disease
- healthful food choices including familiar foods
- low-impact physical activity
- food sampling
- cooking techniques using herbs, spices, reduced-fat foods and artificial sweeteners

Results
Pre/Post test surveys indicated the following results:
* 72.4% indicated they gained knowledge
* 84.6% cooked more at home
* 96.5% ate smaller portions
* 73.6% used healthy recipes provided by the program

Participants also reported increasing the number of days doing the following activities:
* 31.6% exercised for 20 minutes or more
* 41.1% ate a variety of fruits and vegetables
* 44.6% considered portion sizes when making meal choices
* 52.7% reviewed the food labels before eating.

Participants also reported doing activities since participating in the program:
* 51.7% fit exercise into their daily routine
* 39.7% exercised continuously for at least 30 minutes at least 3 times per week
* 41.4% participated in physical activity on a daily basis

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
724	Healthy Lifestyle
802	Human Development and Family Well-Being

Outcome #5

1. Outcome Measures

Kansans of all ages engage in increased physical activity.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	11020

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The 2014 State Indicator Report on Physical Activity from the U.S. Centers for Disease Control and Prevention (CDC) indicates that people who are physically active generally live longer and have a lower risk for heart disease, stroke, type 2 diabetes, depression and some cancers. Physical activity can also help control weight.

However, only 46.8 percent of adults living in Kansas meet the minimum aerobic physical activity guidelines and just 16.5 percent meet strengthening guidelines. In Kansas, 65 percent of adults are overweight or obese and 75 percent have high blood pressure.

Despite compelling research about the benefits of muscle strengthening, the majority of older adults, particularly women, do not perform these exercises.

What has been done
K-State Research and Extension family and consumer sciences professionals worked to improve the health and vitality of individuals and communities. Extension professionals and local partners offered Stay Strong, Stay Healthy (SSSH) and Walk Kansas programs. These programs are evidence based and reflect current physical activity and healthful eating guidelines and have improved the health and fitness of adult Kansans.

Results
Stay Strong, Stay Healthy: A pre- and post-assessment was conducted on each participant which assessed agility, balance, upper and lower body flexibility, and strength. Program impacts from 467 participants indicated that they improved or maintained on the following skills:
- Chair stand (lower body strength)- 91.5 percent
- 8 foot up and go (agility and dynamic balance) - 92.7 percent

- Sit and reach (lower body flexibility) - 85.2 percent
- Back scratch (upper body flexibility) - 76.6 percent
- Balance tests - 76.9 percent

A three-month follow-up survey of SSSH participants indicated they continued to exercise one or two times a week.

Walk Kansas: Walk Kansas reached more than 10,000 adults and 600 youth in 2017. Evaluation surveys revealed the following outcomes as a result of this 8 - week program.
- 79% were motivated to do at least 30 minutes of physical activity 5+ days/week;
- 86% met program goals (150 minutes of mod/vigorous physical activity/week;
- 88% felt confident they would continue these habits for 6 months;
- 66% learned they should do strengthening exercises at least 2 times/week and 51% did strengthening exercises 2/wk;
- 70% increased awareness of healthy eating recommendations;
- 72% increased fruit/vegetable consumption and
- 88% felt confident they would continue this amount for the next 6 months.

As a result of this program, participants reported the following positive changes:
- 49% increased energy;
- 39% increased endurance;
- 25% increased muscle strength;
- 21% increased flexibility;
- 15% lowered blood pressure;
- 8% lowered cholesterol;
- 39% improved mood;
- 26% were better able to manage stress;
- 32% got more restful sleep;
- 25% lost weight.

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
- Government Regulations
- Competing Programmatic Challenges

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

At the conclusion of the workshop, the following indicators were measured:

- What awareness, knowledge or change in attitudes did program participants gain regarding healthy eating, meal planing, food preparation, budgeting for food, and physical activity?
- What awareness or knowledge did program participants gain regarding food assistance programs, gardening, home food preservation or other strategies that improve their access to high-quality and safe food?
- What awareness, knowledge or change in attitudes did program participants gain regarding breastfeeding?
- What awareness or knowledge did staff and volunteers gain regarding environments that support healthy food choices and physical activity?
- What awareness or knowledge did staff and volunteers gain regarding improving access to high-quality, safe food for limited-resource residents in their community (e.g., promoting private and community gardens, increasing local food production for food insecure persons, donations to food pantries, CSAs, electronic benefit transfer devices at Farmers Markets, SNAP outreach)?

Three to six months after a program:

- What changes do participants report regarding more healthful eating, meal planning, food preparation, budgeting for food and physical activity habits?
- What changes do participants report regarding use of food assistance programs, gardening, home food preservation, low-cost meal preparation and other strategies that increase their access to high-quality, abundant and safe food?
- Do participants who are new mothers report initiating breastfeeding, exclusively breastfeeding for a long time, and still breastfeeding at 6 months?
- What changes have staff and volunteers taken to support healthier food choices and physical activity in schools and public venues?
- What changes have staff and volunteers taken to support increased access to high-quality, abundant and safe food (e.g., promoting private and community gardens, increasing local food production for food insecure persons, donations to food pantries, CSAs, electronic benefit transfer devices at Farmers Markets, SNAP outreach)?

Long-Term

- Are more Kansans at a healthy weight and report consuming more vegetables and fruits and being physically active on most days?
- Do more Kansans have access to high quality, abundant and safe foods?
- Do more Kansans who qualify for SNAP participate in the program?
- Are the Healthy People 2020 Breastfeeding Goals met in Kansas?
- Do more Kansas schools and public venues plan and ensure environments for healthy eating and physical activity?
- Do more Kansas communities use strategies that increase their residents' access to high quality, abundant and safe foods?

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Healthy Communities: Youth, Adults and Families

☑ 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
724	Healthy Lifestyle	20%		10%	
801	Individual and Family Resource Management	10%		15%	
802	Human Development and Family Well-Being	15%		20%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	15%		15%	
806	Youth Development	40%		10%	
903	Communication, Education, and Information Delivery	0%		30%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	146.0	0.0	20.0	0.0
Actual Paid	94.4	0.0	21.3	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**
857192	0	323422	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
3880206	0	2548324	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
3584926	0	531776	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

• Develop/identify theory- and evidence-based educational programs to promote healthy communities: youth, adults, and families.
• Disseminate, implement, and evaluate effectiveness of programs to promote healthy communities: youth, adults, and families
• Strengthen collaborative capacity within K-State Research and Extension and among communities/ organizations to promote healthy communities: youth, adults, and families.
• Provide technical assistance and educational programs to citizens seeking to make their communities healthy and sustainable places for meeting human needs.
• Establish links between community development researchers and practitioners for cooperative efforts that result in healthy, sustainable communities.
• Provide experiential learning opportunities for children and youth to address key and emerging issues that affect their growth and development.
• Deliver and evaluate evidence-based community-development strategies for positive youth development in structured out-of-school settings (e.g., after-school programs, youth-serving organizations, clubs).
• Strengthen the support for a volunteer development system through training and education on the experiential learning model, 4-H essential elements, ISOTURE model, age appropriate learning experiences and emerging aspects of youth development.
• Provide imaginative, motivational, and experiential learning experiences to help youth build competencies and master life skills.

2. Brief description of the target audience

• Families and individuals of all ages living in Kansas, including populations with limited resources; low literacy skills; varying ethnicities; disabilities, diseases, or impairments; and documented or identifiable health disparities
• Economic stakeholders, and policy and funding agencies
• Health care and education professionals
• K-State Research & Extension faculty and staff with responsibilities for healthy communities: youth, adults, and families

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	364195	0	17796	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 educational programs delivered to increase knowledge of healthy communities: youth, adults, and families

Year	Actual
2017	4790

Output #2

Output Measure

- Number of program participants

Year	Actual
2017	75377

Output #3

Output Measure

- Number of educational programs to increase knowledge of volunteer development, experiential learning, and youth development competencies

Year	Actual
2017	1200

Output #4

Output Measure

- Number of communities that participate in community capacity building trainings and activities led through Extension.

Year	Actual
2017	33

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Community projects engage participants in process to address community goals (Measured by number of substantial community projects that reflect shared participation in addressing community goals)
2	Community members are engaged in community improvement programs (measured by number of volunteer hours)
3	Volunteers, faculty, and staff understand and demonstrate effective youth development principles in service to youth (e.g., 5 Cs of positive youth outcomes, essential elements to positive learning environments)(Measured by number demonstrating competency)
4	Youths improve competence, confidence, connection, and character and caring (measured by number of youths who improve: (a) Competence - believe they are capable and successful; that they have mastery. (b) Confidence - know they influence the world around them (i.e., people and events); that they have independence. (c) Connection - know they are cared about; that they belong. (d) Character and Caring - Youths practice helping others; they are generous.)

Outcome #1

1. Outcome Measures

Community projects engage participants in process to address community goals (Measured by number of substantial community projects that reflect shared participation in addressing community goals)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	872

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Kansas PRIDE (not an acronym) supports community development efforts by providing a structure to mobilize local organizations and governments as they address quality of life issues. Communities are encouraged to assess their needs, set goals, implement plans, evaluate the impact and celebrate.

What has been done
The PRIDE program adopted the community capitals model as a framework for the current program. This framework reveals the interactions between different parts of a community.

Results
In 2017, PRIDE communities were involved in 872 projects at the local level. PRIDE communities reported that 269 of these projects engaged youth.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Community members are engaged in community improvement programs (measured by number of volunteer hours)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	72956

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The philosophy of community development that Kansas PRIDE encourages is based on the fundamental valuing of volunteer hours.

What has been done
In 2017, PRIDE communities were involved in 872 projects at the local level. PRIDE communities reported that 266 of these projects engaged youth

Results
In 2017, 79 PRIDE communities reported 72,956 hours of volunteerism. This conservatively calculates to a dollar value of more than $1,615,245.80. Kansas PRIDE communities reported raising $580,345.33 for reinvestment in their communities during 2017.

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being
803	Sociological and Technological Change Affecting Individuals, Families, and Communities
806	Youth Development

Outcome #3

1. Outcome Measures

Volunteers, faculty, and staff understand and demonstrate effective youth development principles in service to youth (e.g., 5 Cs of positive youth outcomes, essential elements to positive learning environments)(Measured by number demonstrating competency)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	11217

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
More than 74,837 youth participate in the Kansas 4-H Youth Development program annually. 4-H learning experiences are based on principles and practices to enhance young people's ability to grow into tomorrow's leaders and communicators. Kansas 4-H plays a vital role in helping youth achieve future success because of a structured learning environment that includes encouragement and mentoring.

What has been done
Kansas 4-H conducted a study to determine the program's effectiveness in fostering positive connections, encouraging responsible decisions, and developing communication and citizenship skills. More than 2,600 Kansas youth ages 8 to 18 year old from rural and urban areas participated in the study.

Using a subset of Common Measures, an evaluation tool used nationally by 4-H, K-State Research and Extension professionals administered a survey to Kansas youth during the spring and summer of 2016. The goal of the study was to gather data on the potential benefits of a young person's participation in 4-H. The outcomes measured in this study were:
* Positive connections with others;
* Responsible decision making;
* Communication skills; and
* Citizenship and contributions to their communities.

Results
Among the youth who responded to the survey:

Positive Connection with Others: 96 percent reporting working successfully with adults and having caring friends. 93 percent are connected to adults who are not their parents.

Making Responsible Decisions: 95 percent reported being comfortable with making their own decisions and 91 percent have a plan for reaching their goals.

Growth in Citizenship Skills: 94 percent reported they gained important skills by serving their communities and 97 percent reported a strong desire to help others.

Leadership: 95 percent reported an increased effort to allow everyone to have a voice. 95 percent reported they treat everyone fairly and equally when they are in charge of a group.

Communication: 4-H participants in their third year or more reported a 60 percent increase in their confidence in public speaking compared to newer participants.

The results of the survey of Kansas 4-H youth demonstrate the vital role 4-H youth development programs play in helping Kansas youth achieve future successes and becoming tomorrow's leaders.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #4

1. Outcome Measures

Youths improve competence, confidence, connection, and character and caring (measured by number of youths who improve: (a) Competence - believe they are capable and successful; that they have mastery. (b) Confidence - know they influence the world around them (i.e., people and events); that they have independence. (c) Connection - know they are cared about; that they belong. (d) Character and Caring - Youths practice helping others; they are generous.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2017	1402

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Youth Development research indicates that youth involved in 4-H Youth development experiences are more 2.5 more likely to be involved in their communities. The ethic of community involvement help youth to feel they are capable and successful, helps youth build mastery and teamwork, demonstrates in a visible way how they are able to participate in the world around them and connect with others, and learn and practice a sense of generosity. Involvement in a local community service day is a way to engage youth, adults and the community at large in projects that improve the health and vitality of communities.

What has been done

For the fourth year, the Kansas 4-H Youth Leadership Council has provided leadership for a two-day service event that involves local 4-H groups, alumni and friends across the state to participate in 48 Hours of 4-H. As a finale for National 4-H Week, the statewide community service project required careful planning by youth and adults working together and coordinated communication plans. This 48-hour service project was a collaborative effort among the Kansas 4-H Youth Leadership Council, 4-H Youth Development and the local Extension units and 4-H youth and volunteers across the state.

Results

The 48 Hours of 4-H project took place October 7-8, 2017 and was promoted as a weekend of service - a lifetime of impact. The project resulted in 61+ community service projects across Kansas. The type of projects primarily included collections and donations; benefits; educational events; clean up and beautification projects. There were a total of 1633 participants of which 231 were 4-H alumni. Results: $2,093 was raised for charities; 8307 items collected (primarily nonperishable food); 36 new youth joined 4-H; and 501 hours of planning and completing projects. 34 Kansas Extension Units (Counties and Districts) were represented.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Appropriations changes
- Public Policy changes
- Competing Public priorities
- Competing Programmatic Challenges

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Short-Term (Knowledge)

Youth increase their awareness and knowledge of positive youth development, adopt new

or different attitudes; develop opinions, new aspirations and/or new motivation related to:

- Competence- ability to act effectively in school, in social situations and at work;
- Confidence- an internal sense of overall self-worth and efficacy;
- Connection- positive bonds with people and social institutions;
- Character- respect for society and cultural rules, an inner moral compass; and
- Caring- a sense of sympathy and empathy for others and a commitment to social justice.

Indicators

- Percentage of youth who increased their knowledge about mastery of skills
- Percentage of youth who increased their knowledge, awareness and skills about self-awareness
- Percentage of youth who learned how to build healthy interpersonal relationships
- Percentage of youth who increased their awareness and attitude for developing positive interpersonal skills
- Percentage of youth who increased their awareness and knowledge of serving others

Medium-Term (Behavior)
Youth use and act on their skills attributed to positive youth development, i.e., practice new behaviors or demonstrate new positive youth development abilities.

Indicators

- Percentage of youth participating in opportunities to demonstrate competence such as project groups, competitions, academic achievements, etc.
- Percentage of youth practicing an internal sense of self worth
- Percentage of youth consistently participating in clubs, teams, groups
- Percentage of youth consistently demonstrating ethical behavior in society
- Percentage of youth consistently leading and participating in meaningful service-learning opportunities

Long-Term (Change in Condition)
All youth will grow up fully prepared for and fully engaged in life by having the ability to participate effectively by caring for themselves and by giving of themselves at home, in the community and in civic life.
Indicators

- Youth are effective participants socially, at work and in school
- Youth are independent and self-confident
- Youth identify with people, social settings and everyday life
- Youth are law abiding citizens and contribute positively to society
- Youth are sympathetic and empathic to others
- Youth are generous with their time, resources and compassion toward community and other people

Key Items of Evaluation

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)	
0	Number of new crop varieties, animal breeds, and genotypes whit 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.