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 Economics	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: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	98.0	0.0	131.0	0.0
Actual Paid	89.0	0.0	129.0	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
1339372	0	2831662	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
6116243	0	16147752	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
5647053	0	3623821	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?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	39000	0	2300	0

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

Patent Applications Submitted

Year:	2014
Actual:	13

Patents listed

Gene Encoding Rhb1 Resistance to Fusarium Head Blight Disease and Uses Thereof; Oakley CL, Wheat; Hemostasis Agent from Self-Assembly Peptides; Detection of Proteases and Lipases from Psychrotropic Bacteria in Milk and Milk Products; Detection of Early (Subclinical) Mastitis in Dairy Cows Through Technology Transfer from Early Cancer Detection; Multifunctional Gold Nanoparticle-Peptide Bilayer Complexes; Swine Influenza Virus Vaccine and Vaccine Platform; The Use of Medium Chain Fatty Acids and Essential Oils as a Way to Mitigate Salmonella and Porcine Epidemic Diarrhea Virus (PEDV) in Animal Feed and Ingredients; Attenuated Vaccines to Protect Bertebrate Animals and People Against Tick-Borne Ehrlichia Species Infections and the Discovery of a Novel Genomic Region Involved in Pathogenesis with Potential to Develop New Class of Drugs; Early Lactation Administration of Non-Steroidal Anti-Inflammatory Drugs to Increase Whole-Lactation Milk Yield and Decrease Culling in Dairy Cattle; E. Coli/Heat Stable Toxoid as the Adjuvant-Delivery System for Vaccine Development; Gelatin Based Gummy Dog Treat

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	30	70	100

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of individuals participating in programs

Year	Actual
2014	30000

Output #2

Output Measure

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

Year	Actual
2014	1

Output #3

Output Measure

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

Year	Actual
2014	900

Output #4

Output Measure

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

Year	Actual
2014	2979

Output #5

Output Measure

- Number of presentations at national and international conferences

Year	Actual
2014	250

Output #6

Output Measure

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

Year	Actual
2014	300

Output #7

Output Measure

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

Year	Actual
2014	35

Output #8

Output Measure

- Number of soil samples evaluated on Kansas crop acreage
  Not reporting on this Output for this Annual Report

Output #9

Output Measure

- Number of hours reported annually by Master Gardener volunteers

Year	Actual
2014	101000

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	Kansas farmers increase crop acres using soil testing as a basis for nutrient applications (measured by reported crop acres)
5	Cow/calf producers lower cow feed supplement costs through use of BRaNDS software to make informed, cost-effective purchase decisions (measured by number of participating producers)
6	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)
7	Public value communicated by Master Gardener volunteers (measured by number of hours and activities reported annually)
8	Increase food variety and value by developing new and enhanced food products (Measured by number of new products developed)
9	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
2014	1340

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Much of Kansas finally found relief from the extended drought that had plagued the state for the last few years. During the drought, questions focused on stretching feed supplies and decreasing livestock numbers. As the eastern half of the state emerged from drought first, rangeland recovery and potential expansion of the cow herd and other livestock numbers became topics of interest. The drought recovery is not full in Western KS, but livestock producers are in better financial condition than past years due to high market prices and some moisture relief. High market prices for all livestock industries provided producers with opportunities to consider changes to their operations while decreasing long-term debt. The specialized nature of beef, dairy, and swine production has increased producer?s reliance on experts to handle their specific and urgent questions. For example, the swine industry was greatly impacted by PEDv in early 2014 with huge losses of baby pigs.

What has been done
Early in the year when it appeared that drought relief was going to be a reality, the K-State Research and Extension Livestock Focus Team met to plan programming for rangeland recovery and growth of the beef herd. Meetings, news releases, and extension materials were developed and disseminated to educate producers on topics, such as proper heifer development, genetic programs, how to monitor rangeland for adequate recover, repairing ponds, and calving management. A myth-busting series was assembled to help educate producers at meetings and through newsletters on high impact areas to implement in their businesses. Swine and diary specialists also developed educational materials to increase profitability of producers in those

industries. For PEDv, a series of experiments were conducted to understand the role of feed in transmitting the virus and recommendations were developed for producers and feed manufacturers to minimize risk of introducing PEDv through feed.

Results

As a result of educational programming, beef producers in the state saved money and feed resources through the use of balanced, least cost ration development, forage testing, use of cover crops for grazing, improved hay feeding methods and use of ionophores. Given the high prices for feedstuffs and in some areas, limited forage availability due to drought recovery, producers used knowledge gained through extension to decrease supplemental feed costs. Rapid adoption of beef cattle body condition scoring guides and management practices allowed producers to more closely monitor and manage cows for optimal production and reduced supplemental feed and increase productivity. Beef producers improved the reproductive and production efficiencies of their cow herds through more effective replacement heifer selection, breeding and management by adopting skills learned from extension programs. Further improvement in production efficiencies were gained as beef producers implement structured cross breeding systems to leverage the value of heterosis and select for genetics that best fit their production and marketing scenarios. Beef producers in Kansas continued to face reproductive loses due to the spread of trichomoniasis (venereal disease caused by protozoa). These losses are reduced by adoption of testing, monitoring and management strategies recommend by extension specialists and agents. ? As an example of the impact of targeted meetings, 87% calving school attendees expected to change when or how they provided assistance at calving. After a calving cycle, 43% reported they had changed when they provided assistance at calving, which increased their calf crop.

In other species, over 40,000 dairy cows were influenced by programs that improved reproductive performance, decreased disease risk, and improved calf management. Producers reported improved employee management as a result of extension programs helped lead these changes. Swine producers eliminated the use of porcine ingredients in their nursery diets to lower the risk of PEDv introduction. Since these changes were made, no new cases of PEDv have been found in Kansas farms that made the changes.

Outcome 5 is being reported with Outcome 3 in this and future years.

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 Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	2893

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 2014 included: 8,200 face to face meetings with 2,893 producers; 56 presentations to 2,400 individuals; 2,306 farm business analyses; 2,254 individual crop and livestock enterprise analyses; 10 radio interviews; numerous newsletter and newspaper articles; presentation to over 300 students in classes at KSU; a large number of hits to the KFMA Newsletter on website; and over 86 cash flow analyses with Finpack.

Results
Through one-on-one consultations 2,893 Kansas producers have increased awareness of their current financial position and their financial performance during the past year. Of these producers 2,306 are able 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 operations 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 86 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
2014	6000000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Kansas Agricultural Experiment Station (KAES) develops new varieties and releases improved germplasm of wheat, soybeans, grain sorghum and canola. New varieties can benefit Kansas farmers directly and new germplasm gives other breeders, and ultimately farmers the advantage of KAES research.

What has been done
One new wheat variety (Hot Rod) was released in the past year. New lines were increased to usable quantities in anticipation of release. Lines are screened for resistance to current and potential abiotic and biotic factors.

Results
KAES varieties and germplasm are used extensively by Kansas farmers either directly from a KAES developed variety or indirectly from enhanced germplasm in varieties or hybrids developed by other entities. A majority of the wheat acres in Kansas is planted with KAES varieties or varieties developed with KAES germplasm.

4. Associated Knowledge Areas

KA Code	Knowledge Area

201 Plant Genome, Genetics, and Genetic Mechanisms

Outcome #4

1. Outcome Measures

Kansas farmers increase crop acres using soil testing as a basis for nutrient applications (measured by reported crop acres)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	200000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Kansas ranks first in the nation in grain sorghum production for grain and second in sorghum silage production. Since 2010, grain sorghum acreage has increased 33%.
The 165.2 million bushels produced represent 42.4 percent of the U.S. total, according to Kansas Farm Facts data. The farm value of that production is nearly $680 million. Its importance to the rural Kansas economy and its role as a foundation for numerous food production enterprises underscores the need for educational activities to ensure that production is protected and profits enhanced.

What has been done
Programs at four in-depth sorghum schools across the state in February 2014 focused on the latest sorghum grain and forage production research and resulted in an eight-page extension publication, Kansas Sorghum Management 2014 (MF3046).

Results
Producers and other attendees learned focused information related to grain sorghum production, including updates on topics such as planting management, planting populations, herbicides and weed control, and soil fertility.
Eighty-two percent indicated the information they received would influence their management decisions.

4. Associated Knowledge Areas

KA Code	Knowledge Area

205 Plant Management Systems

Outcome #5

1. Outcome Measures

Cow/calf producers lower cow feed supplement costs through use of BRaNDS software to make informed, cost-effective purchase decisions (measured by number of participating producers)

Not Reporting on this Outcome Measure

Outcome #6

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
2014	2979

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 2,979 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 2,306 are able 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 operations 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 86 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 #7

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
2014	101000

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 donated more than 101,000 hours with a value over $2.1 million in 2014. 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 overfertilize 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 #8

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
2014	4

3c. Qualitative Outcome or Impact Statement

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

What has been done
Technical and educational support has been provided in the areas of product development, food labeling, food safety, and regulatory compliance.

Results
Hundreds of Kansas food products have been analyzed for safety and quality, with ingredient legends and Nutrition Facts panels produced. Four new food products were developed from concept to commercialization.

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 #9

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
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
From research and our community classes, we've found that consumer budgeting is not a major issue related to food access. The biggest issue, at least in this country, is related to policies, systems and environmental barriers, such as lack of stores, transportation and safe walking routes.

What has been done
We are working with several coalitions to improve access through environmental or system changes, such as increased access to farmers markets, encouraging grocery stores, or

increasing access in stores, including neighborhood stores. One area in the county now has a Walmart and Save A Lot as a result of our involvement with the Neighborhood Business Revitalization (NBR) organization and mobilization of citizens with city government incentives.

Results
These are collaborations in which Extension assists in the educational arm that aids in the success. We are working (as part of the Nutrition Committee of the Mayor's Healthy Wyandotte Initiative) to expand this model to other areas that suffer from lack of access.

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

We used pre-planned surveys that were developed in conjunction with the Office of Educational Innovation and Evaluation. The surveys were given at the end of each educational program to determine the knowledge gained by the participants. We also used case study approach to report results from individual producers.

Key Items of Evaluation