

2015 Lincoln University of Missouri and University of Missouri Combined Research and Extension Annual Report of Accomplishments and Results

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I. Report Overview

1. Executive Summary

University of Missouri

University of Missouri Research and Extension had a very productive year in achieving its goals set out in the 2015 plan of work. Our program focused on food systems, natural resource management, and healthy people, families and communities. We continue to develop and deliver high priority programs to address needs identified by our stakeholders despite declining budgets. We continue to incorporate the use of technology in our delivery systems, contribute to programming efforts in eXtension and develop more comprehensive and accessible online resources for our stakeholders. We are also seeking alternative funding from grants, gifts, and fee generation to further leverage the resources that we receive from our state, federal, and county partners. Our goal is to be reliable, responsive and relevant. We accomplished that goal in 2015 by providing research-based knowledge to Missourians that was aligned with their priorities of jobs, health, and education.

Lincoln University

Missouri ranks second only to Texas in the number of farms. Of the 108,000 farms in Missouri, approximately 101,600 are small farms. This is based on farms with gross annual sales less than \$250,000 excluding government payments (National Agriculture Statistics Service NASS). These traditional farms represent a way-of-life that Missourians and other rural citizens have taken for granted over much of the nations' history. However, prime farmland in Missouri, as well as in the remaining states, is being lost rapidly due to urban sprawl. This loss of farmland across the United States occurs at a rate of 50 acres every hour, which is one-half million acres per year. A major reason for this loss is because our increasing population results in cities expanding into areas traditionally used by farmers. During encroachment, farmland becomes too valuable to farm and is purchased for commercial development. A major component of this modified land use is for housing developments.

Incorporation of an integrated agricultural/organic production system resulting in high dollar products that are produced in an environmentally friendly manner should be an ideal method for examining various agricultural practices at the rural/urban interface. This integrated system would be as self-contained as possible and would provide a location for numerous extension, research and community activities. Other potential areas that can be evaluated at this location include: impact of farming practices on human health, human and family interaction, the environment, student experimental learning, energy use, and labor requirements.

Agricultural teaching continues to be an important aspect of Cooperative Research Programs and we train both graduate and undergraduate students as they participate in hands-on activities performing research under the supervision of the research faculty in different areas. Lincoln University currently offers undergraduate degrees in Agri-business, Agriculture, and Environmental Science. The Agriculture curriculum provides a choice of emphasis between Animal Science, Plant/Soil Science and Natural Resources. There is also a Master's Degree program in Environmental Science. All of our researchers are involved in the teaching programs at the undergraduate and/or the graduate level.

Busby farm continues to be a focal point for this highly integrated research and extension unit at

Lincoln University. Results from the research conducted at the farm will be transmitted to limited resource producers and families throughout the state of Missouri. This farm complements our extension urban family and youth development programs in Jefferson City, Kansas City, St. Louis, Southwest Missouri, and the Bootheel. Families and/or youth can be brought to campus for summer camps (they will be accommodated in our youth development camp). Youth are exposed to agricultural practices at Busby and provided the opportunity to assist the manager. This is a unique farm opportunity in Missouri and it is being developed with input from private individuals, area high school students, numerous agricultural organizations, and the University of Missouri.

Individual research projects will continue at Carver and Freeman farms. These projects allow investigators to examine specific issues of concern that cannot be readily incorporated into the integrated farming system. Projects that will be supported for continuing studies in cooperative research will include animal science, plant science, human nutrition, and environmental science.

Global Food Security and Hunger

Animal science

Ruminants:

The primary emphasis in animal science continues to be with goat production systems, but also includes grazing studies with sheep and cattle. These studies are highly integrated between research and extension, and between Lincoln University and the University of Missouri.

Researchers have been testing various herbal treatments for the impact on internal parasite load. Another project involved real-time ultrasonographic examination of pregnant does throughout gestation in order to discover how much embryonic and fetal loss occurs in goats and when these losses occur. Researchers continue to evaluate the feasibility of developing a real-time biosensor for LH using nanotechnology derived components.

New projects include studying goats controlling invasive vegetation at Busby Farm. In concert with the NRCS goats are being studied to control bush honeysuckle. In cooperation with Langston University, goats are being studied in the control of red cedar.

The University of Missouri has no plans for expanding extension efforts into goat production and the above projects will allow Missouri residents to receive assistance without duplication of effort by the land-grant universities.

Aquaculture

This has become a prominent research area at Lincoln University where information from ongoing and future studies will be made available for use by extension personnel at Lincoln University and at the University of Missouri. This program was initiated based upon strong support for starting aquaculture research for Missouri producers. Areas of research include genetic improvement of bluegill and crappie for use as food-fish, sunfish nutrition, and culture methods suitable for small scale/entry level producers. Research is needed that is specific to Missouri because the state has such wide climatic variation. There are no current plans at the University of Missouri to conduct research in production aquaculture systems and we will continue to fill this niche.

Plant Science

This program is highly integrated with the Extension Small Farm Program. Studies continue to examine profitable and value added products and the marketing of new crops and other plants with particular interest in the needs of underserved farmers with limited resources. Additionally, horticulture is a profitable enterprise on many small farm operations.

The Sustainable Hydroponic Production Program (SHRP) is an integral component of horticulture. It provides research based information on profitable resource and environmentally sustainable techniques of commercial hydroponic production of high value vegetable and herb crop species. Hydroponic growers continue to be educated on profitable crop and plant nutrient management strategies to ensure higher crop yields and marketable quality. Outreach audiences include current and prospective hydroponic growers, hobbyists, extension educators, K-12 teachers and students, and international visitors. The agricultural audience and the public were engaged through frequent educational tours of the controlled environment hydroponic greenhouses (CEHGs), field day, onsite one-on-one training of hydroponic producers on the operation of the various hydroponic systems at Carver Research Farm, conference presentations, publication.

The Native Plants Program (NPP) is increasing awareness about native plants for their potential for human consumption and use as raw material to create value-added products. The Sprouts and Roots Program promotes gardening among youth and seniors. A new project, called FINCA (Families Integrating Nature, Conservation, and Agriculture) will focus on growing native edible plants. The NPP is collaborating with the Center for Rural Affairs, located in Nebraska, to promote sustainable agriculture and organic practices. The NPP became a partner with a University of Missouri project in 2014 to conduct surveys in Southeast Missouri regarding climate change resilience and adaptation for lower income communities. The NPP also has a cooperative agreement with the U.S. Forest Service to grow native plant seed and nursery stock with an emphasis on species of concern, rare, Ozark endemics, and those important to pollinators.

The Integrated Pest Management Program (IPM), aims to develop and promote affordable alternative insect pest management strategies to combat pests of vegetables and fruits. The IPM Program provided research based information on effective and environmentally friendly tactics. Interaction includes one-on-one discussions, workshops, presentations, publications, and demonstration trials with an emphasis on increasing profits, decreasing expenses, and lessening the amount of pesticide use.

Climate Change

Environmental Science

Integrated Risk Management of Impaired Environments in Missouri for Improving Quality of Life and Natural Resources Sustainability. A systematic study of our environment requires investigation of intersections of many disciplines. Studies in environmental science will focus on minimizing the impacts of agriculture on soil, water and air quality. Studies also included developing new technologies for water-quality monitoring and management.

Childhood Obesity

Human Nutrition

Basic, as well as applied, studies continue in this area examining the causes and impacts of obesity and other related health issues in minority populations. A particular focus in this area are the causes and prevention of obesity, in both youth and adults.

Food Safety

Detection and identification of bacteria and food pathogen is an essential step in food safety inspection. One project in the area of food safety is developing a novel 3-dimensional (3-D) interdigitated microelectrode array (IDE) based impedance biosensor. This biosensor will be capable of rapid detection and selectively identifying E. coli O157:H7. This design is unique in the use of a 3-D IDE which increases the surface area compared to a single (2-D) IDE sensor. The increased surface area will enhance the sensitivity of impedance detection. Efforts are currently underway to hire an additional person in food safety that will have a split research and extension appointment.

Fresh and fresh-cut produce, including fruits and vegetables, is increasingly associated with food borne disease outbreaks. Research is being carried out to develop new methods to reduce contamination by human pathogens

Sustainable Energy

Studies are being undertaken to develop alternative fuel sources that are feasible, economical, efficient, and environmentally friendly. Microalgae studies are designed to evaluate the mass cultivation of microalgal biomass as an alternative fuel source. Leaves are being studied to evaluate their potential use as a secondary fuel source, particularly in power plants, in lieu of or in conjunction with coal.

The application of biochar to soil is a novel approach to establish a long-term sink for atmospheric carbon dioxide in the terrestrial ecosystem. The application of biochar to soil has the potential to improve soil fertility and increase crop production. This study, started late in the fiscal year, will examine potential hazards associated with biochar applications.

Programs without strong research counterparts

Extension efforts to improve the educational and economic opportunities for under-represented populations in Kansas City, St. Louis, Jefferson City, Southwest Missouri, and the Bootheel will continue. Expansion of programs in Southeast Missouri will occur through acquisition of property and construction of a facility. Programs in all these areas will assist families, youth and the elderly, as well as entire communities that have under served and under-represented populations.

Programs of this type include: 1) Family and Youth Development, 2) Community Development, and 3) Minority Health and Aging, 4) Expanded Food and Nutrition, 5) Urban Gardening, and 6) Childhood Obesity.

A grant from the Missouri Department of Senior and Health Services funded the Abstinence Program, which is designed to reduce teen pregnancy and out of wedlock births.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	214.0	36.5	66.0	44.5
Actual	266.0	30.0	0.0	42.2

II. Merit Review Process

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

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

2. Brief Explanation

University of Missouri

University of Missouri Research and Extension faculty continue to engage stakeholders from all 114 counties to review our program needs assessment process and the outcomes report for research and extension programs. Regional and state faculty surveyed current literature and relevant national databases to identify state-wide demographics, national and state trends, and discipline specific research related to program needs and effectiveness. Based on this review, state-wide priorities were identified and programs implemented to address those priorities. The program priorities and outcomes models were reviewed by the appropriate state program leaders and research faculty to assure that the programs are both relevant and of high quality. County program plans were developed, implemented and their impact evaluated with engaged county extension councils.

Lincoln University

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

Combined External and Internal University Panel

Combined External and Internal University External Non-University Panel

Expert Peer Review

2. Brief Explanation

Research proposals submitted by investigators for Evans-Allen funding are reviewed within each program area, then submitted to the Associate Research Director. The Associate Director evaluates them on feasibility and adherence to the Plan-of-work and complement/integrate with the extension programs. Proposals are then submitted to scientists to evaluate their scientific merit and then returned to the Associate Director. The names of reviewers are removed and the Associate Director returns the comments to the investigator(s) for their response. If the response is satisfactory and/or if satisfactory modifications are made to the proposal it is then submitted by the Director to NIFA. Programs within extension and research will be evaluated for overall direction, progress, and cohesiveness by a panel of program leaders, directors, and non-university stakeholders. Family, youth and community programs will also solicit input from stakeholders located near the satellite offices maintained by Lincoln University in St. Louis, Kansas City, Southwest Missouri, and the Bootheel region.

III. Stakeholder Input

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

- Targeted invitation to traditional stakeholder groups
- Targeted invitation to non-traditional stakeholder groups
- Targeted invitation to traditional stakeholder individuals
- Targeted invitation to non-traditional stakeholder individuals

- Survey of traditional stakeholder groups
- Survey of traditional stakeholder individuals
- Survey specifically with non-traditional groups
- Survey specifically with non-traditional individuals

Brief explanation.

University of Missouri

University of Missouri Research and Extension faculty engage stakeholders in all 114 counties through a variety of methods. Extension faculty and county extension councils lead an annual program review process engaging a variety of community leaders targeting diverse populations in the county. Our goals in developing the methodologies for the stakeholder input process were to: diversify the audiences in order to gain a better perspective on the reach and effectiveness of our programs; to diversify the gathering process so that we could utilize the feedback for both program prioritization and to gain knowledge as to preferred delivery methods as well as general awareness of our programs; and, finally, to gather some program specific information and diversity needs information in a more substantive way in order to gain a better understanding of the issues underlying the needs in order for us to be more effective in our programming response.

The methods used in our stakeholder input gathering include: community conversations, diversity discussions, web-based survey, county and regional needs assessments, advisory groups and meetings with state agencies.

Lincoln University

Targeted invitation to traditional stakeholder groups
Invitation to non-traditional stakeholder groups
Targeted invitation to traditional stakeholder individuals
Targeted invitation to non-traditional stakeholder individuals
Survey of traditional stakeholder groups
Survey of traditional stakeholder individuals
Survey specifically with non-traditional groups
Survey specifically with non-traditional individuals

Brief explanation.

Invitations and announcements were sent to radio stations, newspapers and to stakeholders by mail, telephone, and e-mail. Word of mouth was also used to extend invitations to non-traditional stakeholders. Special invitations were sent to minority stakeholders. When English was not their first language, invitations were sent in their native language. Invitations specified that the learning experience would be presented bi-lingual (English and Spanish).

Trainings and other events for traditional and non-traditional stakeholders were offered to the stakeholders.

For seminars targeting minorities: personal invitations were sent, churches were visited, advertisements were played on appropriate radio stations, bilingual newspapers were utilized, and community leaders were contacted. This provided an opportunity to arrange for discussions to address their specific needs at a date, time, and location that was convenient for them and their organizations.

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

1. Method to identify individuals and groups

- Use Advisory Committees
- Use Internal Focus Groups
- Use External Focus Groups
- Needs Assessments
- Use Surveys

Brief explanation.

University of Missouri

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Lincoln University

1. Method to identify individuals and groups

Use Advisory Committees
Use External Focus Groups
Needs Assessments
Use Surveys

Brief explanation

Not all of the identified methods were used in every discipline. All of the programs used a combination of multiple methods, employing those that would more accurately identify interested individuals and groups.

All major programs have Advisory committees/boards. Stakeholders serving on the boards are surveyed for input at least once a year and programming is adjusted.

Participants were identified by the program specialist during face-to-face conversations, interviews, and telephone conversations; responses to e-mail questions from individuals and referrals from other Extension staff, minority stakeholders, and collaborators.

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

1. Methods for collecting Stakeholder Input

- Meeting with traditional Stakeholder groups
- Survey of traditional Stakeholder groups
- Meeting with traditional Stakeholder individuals
- Survey of traditional Stakeholder individuals
- Meeting specifically with non-traditional groups
- Survey specifically with non-traditional groups
- Meeting specifically with non-traditional individuals
- Survey specifically with non-traditional individuals
- Meeting with invited selected individuals from the general public

Brief explanation.

University of Missouri

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Lincoln University

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- Survey of traditional Stakeholder groups
- Meeting with traditional Stakeholder individuals
- Survey of traditional Stakeholder individuals
- Meeting specifically with non-traditional groups
- Meeting specifically with non-traditional individuals
- Meeting with invited selected individuals from the general public

Brief explanation

Individual opinions were solicited and received on issues affecting stakeholders.

Surveys and meetings were used to collect information from larger groups of people.

3. A statement of how the input will be considered

- In the Budget Process
- To Identify Emerging Issues
- Redirect Extension Programs
- Redirect Research Programs
- In the Staff Hiring Process
- In the Action Plans
- To Set Priorities

Brief explanation.

University of Missouri

University of Missouri Research and Extension faculty will use the information gathered from the needs assessment and environmental scanning of national databases as a foundation of the program development process to set program priorities for the coming years. Fiscal and personnel resources are continually adjusted to meet the demands of developing, implementing and evaluating the highest priority programs.

Lincoln University of Missouri

Redirect Extension Programs
Redirect Research Programs
In the Staff Hiring Process
To Set Priorities

Brief explanation.

The input was used to strengthen and focus efforts in needed areas. The input was also used to adjust Extension activities and the content of presentations. Recommendations were made to the administrator regarding new positions needed to address expressed needs. The core staff of Extension will be expanded in response to information gathered.

Organized additional workshops to cover additional training. Requested information was used to submit a 2501 grant proposal. Passed information on to other agencies if they could not be helped.

Brief Explanation of what you learned from your Stakeholders

University of Missouri

University of Missouri Research and Extension stakeholders continue to support and value our research and programming priorities while articulating the need for more programming from us at a time of diminishing budget. We continue to incorporate the use of technology in our delivery systems, increase distance learning tools and to leverage the human capacity through community partnerships. MU is contributing to programming efforts in eXtension and has developed a more comprehensive and accessible website for our stakeholders. We are also seeking alternative funding from grants, gifts, and fee generation to further leverage the resources that we receive from our state, federal, and county partners.

Lincoln University of Missouri

There was a high interest and strong desire for continuous learning in composting, health,

dieting, landscaping, environmental improvement, edible native plants, and learning about the importance of native plants as pollinators..

Many times minority stakeholders are difficult to reach and sometimes were not willing to be identified. In general, they are interested in learning more about native plants to improve their way of life by improving biodiversity and providing an alternative source of income (direct or indirect). Minorities, whose language is not English, have a hard time understanding the opportunities available from USDA. More time and effort is needed to reach out to Hispanics, for example.

There is a huge desire to engage, network, connect, and share resources, information, services, and programs. The stakeholders were able (and willing) to readily identify areas of concern and needs in their respective communities and their perspective of the causal agents. Getting their buy-in to their own community and providing a platform for change, increased a more of a vested interest in the success of the programs.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
9100006	3314669	6191777	3680208

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	9100006	1965315	6274323	3490470
Actual Matching	9100006	2889303	10029006	3407504
Actual All Other	0	0	14374747	0
Total Actual Expended	18200012	4854618	30678076	6897974

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	Sustainable Food Production/Security and Environment/Natural Resource Management
2	Personal, Family and Community Wellbeing
3	Global Food Security and Hunger
4	Community and Leadership Development
5	Family and Youth Development
6	Climate Change
7	Food Safety
8	Sustainable Energy
9	Childhood Obesity

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Sustainable Food Production/Security and Environment/Natural Resource 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	4%	0%	4%	0%
111	Conservation and Efficient Use of Water	2%	0%	2%	0%
112	Watershed Protection and Management	2%	0%	2%	0%
123	Management and Sustainability of Forest Resources	6%	0%	6%	0%
135	Aquatic and Terrestrial Wildlife	10%	0%	10%	0%
201	Plant Genome, Genetics, and Genetic Mechanisms	12%	0%	12%	0%
205	Plant Management Systems	8%	0%	8%	0%
206	Basic Plant Biology	8%	0%	8%	0%
216	Integrated Pest Management Systems	2%	0%	2%	0%
301	Reproductive Performance of Animals	12%	0%	12%	0%
302	Nutrient Utilization in Animals	7%	0%	7%	0%
303	Genetic Improvement of Animals	10%	0%	10%	0%
307	Animal Management Systems	2%	0%	2%	0%
402	Engineering Systems and Equipment	4%	0%	4%	0%
502	New and Improved Food Products	3%	0%	3%	0%
605	Natural Resource and Environmental Economics	8%	0%	8%	0%
Total		100%	0%	100%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	86.0	0.0	65.0	0.0
Actual Paid	95.0	0.0	0.0	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
3719131	0	6274323	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
3376931	0	10029006	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	14374747	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

University of Missouri is actively programming in agriculture, plant and animal sciences and scientists will conduct basic and applied research necessary to develop crop varieties and production strategies that can maintain high productivity in the face of increased climate variability and change.

Research will be conducted to address underlying principles related to natural resources and to assist in the implementation of efficient, effective management actions to conserve natural resources and ensure the sustainable use of those resources.

Research results will be disseminated via scientific publications, scientific meetings, web publications, workshops, and conferences.

On-farm research and demonstrations used to evaluate production and economic efficiencies.

Campus-based and region-based faculty members, in partnership with commodity groups, conservation partners, general public, and private industry, will:

Conduct focused management schools for crop, livestock and natural resources; artificial insemination course; livestock facilities management short course; Beef and Pork Quality Assurance Program; Computer models/PDA record keeping programs; education about niche production markets and specialization opportunities; farm visits; on-farm research trials; educational workshops; meetings and consultations.

Conduct workshops and seminars, host field days, assist with planning sessions, establish watershed committees, use mass media (printed, radio, television coverage), to increase awareness and knowledge of Missourians to implement practices and programs that will preserve, protect and sustain the state's natural resource base.

Develop curriculum-based natural resource management programs, including assessment and evaluation tools, marketing strategies and promotional materials.

Conduct training workshops for local natural resource teams (University of Missouri Extension, Missouri Department of Conservation, and USDANRCS) and potential local partners (e.g., Missouri Tree Farm, Conservation Federation of Missouri, Quail Unlimited, Wild Turkey Federation, Ducks Unlimited, Isaac Walton League, and Walnut Council).

Produce up-to-date, science-based information and deliver through guide sheets, newsletters, and websites.

2. Brief description of the target audience

MU programs target farmers, landowners, and agribusinesses as the primary audience for this work. This will include all farmers regardless of scale, land managers, bankers, agricultural consultants and agribusiness professionals who provide products and services to farmers. The program's research and

education efforts will also provide research based information for state and local policy makers, federal partners, and state agencies as they make decisions regarding Missouri natural resources and environmental issues.

3. How was eXtension used?

97 Missouri experts answered 818 questions from Missouri citizens and 507 out of state questions during 2015. MU Extension faculty are engaged in 50 of the 68 communities of practice.

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	69443	112864	13456	8906

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

Patent Applications Submitted

Year: 2015

Actual: 11

Patents listed

Mustapha, Azlin (patent)
 Mustapha, A. and P. Singh. Multiplex assay for detection of 8 shiga toxin producing E. coli. UM Invention Disclosure No. 14UMC073, US Patent Serial No. 61/999,642. Filed August, 2014
 Prather, Randall (GenBank submission)
 Deep- Sequencing submission. Sus scrofa in vitro and in vivo matured oocyte transcriptomes. 2014. 2640035-2640040.
 Prather, Randall (GenBank submission)
 NM_001130735.1 Lorson MA, Spate LD, Prather RS and Lorson CL.2014 Identification and characterization of the porcine (Sus scrofa) survival motor neuron (SMN1) gene: an animal model for therapeutic studies.
 Prather, Randall (patent)
 Kim, J.H., D.N. Kwon, J.Y. Park, K. Lee, R.S. Prather, J.H. Kim, M.J. Kang, M.J. "Transgenic animals for CMP-Neu5Ac hydroxylase and strategy of producing the animals utilizing a targeting vector", Provisional Patent filed April 30, '13. PCT/KR2013/007592
 Prather, Randall (patent)
 Prather, R.S., B.N. Day & R. Hawley. ?Knockout swine and methods for making the same? Canada #2,471,035
 Prather, Randall (patent)
 Prather, R.S., B.N. Day & R. Hawley. ?Knockout swine and methods for making the same? Canada #2,471,035 (issued May 13, ?14).
 Rivera, Rocio (GenBank submission)
 Bovine day 105 control and large offspring syndrome concepti transcriptome (liver, muscle, brain, kidney) Gene Expression Omnibus (GEO)accession no. GSE63509).
 Schnabel, Robert (patent)
 Compositions and methods for diagnosis of genetic susceptibility, resistance, or tolerance to infection by mycobacteria and bovine paratuberculosis using promoter variants of EDN2. Ricardo Zanella, Erik Scraggs, Zeping Wang, Jeremy Taylor, Robert Schnabel, Holly Neibergs and Stephen White. Application No. 13/838,877
 Hsieh, Fu Hung (patent)
 Hsieh, F. and Huff, H.E. 2011. Meat analog compositions and process. International Patent Application Number PCT/US11/56170, Oct. 13.
 Hsieh, Fu Hung (patent)
 Hsieh, F. and Huff, H. E. 2011. Meat analog compositions and process. US Patent Application Number 13/272,825. Oct. 13.
 Zhang, Zhanyuan (patent) principal author
 Zhang Z, Wu C, Yin X (2014) Genetic insulator minimizing interactions between adjacent transgenes. Patent disclosure. Patent disclosure.

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	50	634	684

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of peer reviewed journal articles. Number of other peer reviewed publications book chapters, proceedings, abstracts, etc). Number of invited papers and invited presentations. Number of graduate degrees awarded. Number of in-service training session(s) for regional Extension specialists on an annual basis. Print and electronic newsletters developed and distributed to regional specialists and other clientele. Provide in-service training session(s) for regional Extension specialists on an annual basis. Develop or revise guide sheets annually for regional Extension specialists to use in producer meetings. Develop or revise manuals on an annual basis for regional Extension specialists to use in producer meetings. Provide training sessions for Extension specialists and/or state/federal natural resource professionals. Coordinate delivery of natural resource/watershed management education via 'live' short courses, field days, and workshops. Assist groups and individuals to develop and implement forest, wildlife, and watershed plans.
Not reporting on this Output for this Annual Report

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Missouri's crop and livestock producers and its agribusiness sector will improve their knowledge resulting in increased productivity, economic viability, regulatory compliance and profitability through the adoption of research based integrated management practices/systems and information provided by CAFNR and MU Extension.
2	Missouri farmers, business, communities and homeowners will increase their knowledge and skills and adopt new research based best management practices that will improve and protect the state's water, environment and natural resources.
3	Basic and applied research efforts will result in new knowledge that will improve our understanding of animal physiology, genetics, reproduction, nutrition, growth, and animal well-being. This knowledge will be translated into improved animal production practices that will be disseminated through the integrated livestock extension program.

Outcome #1

1. Outcome Measures

Missouri's crop and livestock producers and its agribusiness sector will improve their knowledge resulting in increased productivity, economic viability, regulatory compliance and profitability through the adoption of research based integrated management practices/systems and information provided by CAFNR and MU Extension.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	168299

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The Ivanhoe neighborhood provides a classic example of a food desert. Located in Kansas City's urban core, crime, drug houses, vacant homes and trash plague this community. Thirty seven percent of residents live below the poverty line and do not have the economic means to obtain, or perhaps more importantly, transport fresh foods from the nearest grocery store. As a result, residents do not have access to the foods most often recommended by nutritionists for healthy diets.

What has been done

Master Gardener volunteers trained by MU Extension built a demonstration vegetable garden in a lot next to the Ivanhoe Community Center. This garden shows local residents how to grow their own produce with minimal expense. MU Extension faculty and volunteers organized training classes to teach residents about planting times and methods, plant varieties, watering practices, and harvesting. Volunteers and community members built a cool-storage facility and a neighborhood farmer's market.

Results

The demonstration garden routinely produces over 500 Kg of vegetables per season. This allows residents to hold a weekly neighborhood farmer's market during the harvest season. More than 6,000 inner-city residents now have access to fresh produce. Further, a grassroots community initiative, Grown in Ivanhoe, provides education and resources for new growers. The Grown in Ivanhoe organization coordinates community garden locations, facilitating a network of residents selling foods through farm stands, and providing funding and administrative support of the farmers market. Working together, MU Extension and its Master Gardner volunteers offer the

Ivanhoe community more than access to nutritious, fresh produce. They provide community members the path to self-sufficiency and urban renewal.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
201	Plant Genome, Genetics, and Genetic Mechanisms
205	Plant Management Systems
206	Basic Plant Biology
216	Integrated Pest Management Systems
402	Engineering Systems and Equipment
502	New and Improved Food Products

Outcome #2

1. Outcome Measures

Missouri farmers, business, communities and homeowners will increase their knowledge and skills and adopt new research based best management practices that will improve and protect the state's water, environment and natural resources.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	8983

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Missouri farms use 15 million acres to produce corn, soybean, sorghum and small grain crops. These crops provide the foundational income for more than 50,000 farm families. Increasingly, these farms must contend with the issues of soil erosion, water quality, soil health, mixed views regarding pesticide and herbicide use, variable input costs, fluctuating commodity prices, and climate change.

What has been done

Research shows that cover crops reduce soil erosion, improve soil health, protect water quality, and can suppress weeds and insect populations. Long-term trials were staged to gather data for

use in making recommendations for Missouri's climate, soils and cropping production systems. These data drove an inter-agency curricula development process which in turn led to cooperative education events offered in nearly all of Missouri's 114 counties.

Results

In 2015, Missouri producers seeded a record 373,582 acres to cover crops to reduce erosion, retain nutrients, suppress winter weeds and begin the process of improving soil health. Compared to our baseline data from 2009, this is an increase of more than 200,000 acres. On-farm data collection shows that well-managed cover crops partially mitigate the impacts of climate variability and change.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
135	Aquatic and Terrestrial Wildlife
402	Engineering Systems and Equipment
605	Natural Resource and Environmental Economics

Outcome #3

1. Outcome Measures

Basic and applied research efforts will result in new knowledge that will improve our understanding of animal physiology, genetics, reproduction, nutrition, growth, and animal well-being. This knowledge will be translated into improved animal production practices that will be disseminated through the integrated livestock extension program.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	27387

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Missouri's forage-livestock industry is the state's largest agricultural endeavor. Forage producers manage 9 million acres of private lands and contribute more than \$12 Billion annually to Missouri's economy. Management-intensive grazing provides a practical tool to improve farm income while protecting the environment. Its practices typically increase livestock carrying capacity by 30%, improve nutrient distribution, and reduce non-point source pollution.

What has been done

MU Extension and its agency partners develop and teach Regional Grazing Schools. Over the past 20 years, the program has held more than 600 schools, teaching over 15,000 producers. These multi-day workshops follow a multi-disciplinary curriculum developed and refined by MU Extension and its agency partners. The curriculum effectively blends class-room style presentations, hands-on grazing exercises, on-farm demonstrations, and farmer-to-farmer learning models.

Results

Survey results show that producers use the grazing system taught at these schools on 1.65 million acres in Missouri. When asked what has been their greatest benefit from attending a grazing school, producers report several benefits. The most often cited benefits are: greater carrying capacity (more grazing days), less feed and hay used, improved quality of grass/forage, less time and labor, better soil fertility and soil health, increased health and conception rates of cattle, and ease in handling cattle. Conservative economic estimates show that this educational program adds at least \$83.6 million to Missouri's economy each year.

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals
307	Animal Management Systems
402	Engineering Systems and Equipment

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

Statewide floods in the spring and early summer of 2015 prevented planting on millions of crop acres in Missouri. Our MU Agriculture and Natural Resources Extension team coordinated with USDA-NRCS, USDA Farm Services agencies, the Missouri Department of

Agriculture, the Missouri Department of Natural Resources and several other state agencies to respond to producer needs.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Agriculture and Natural Resources programs at the University of Missouri are all expected to evaluate impact. Many of those results are listed in the preceding narratives. Broadly, our ANR programs provide more than \$1 Billion in economic impact to Missouri each year.

Key Items of Evaluation

Declining state and federal funds cloud the future for our programs. Without this base funding, continuity and "programmatic risk-taking" is hard. While our faculty have done well in generating new revenue, in real-terms, our programs in the future will undoubtedly be smaller.

MU Extension continues to actively participate in the Excellence in Extension/Land-Grant Impacts databases. More program impact statements are available online.
<https://landgrantimpacts.tamu.edu/extension/extension-impacts>

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Personal, Family and Community Wellbeing

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
607	Consumer Economics	3%	0%	0%	0%
608	Community Resource Planning and Development	7%	0%	0%	0%
610	Domestic Policy Analysis	1%	0%	0%	0%
703	Nutrition Education and Behavior	13%	0%	0%	0%
724	Healthy Lifestyle	13%	0%	0%	0%
801	Individual and Family Resource Management	9%	0%	0%	0%
802	Human Development and Family Well-Being	6%	0%	0%	0%
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	4%	0%	0%	0%
805	Community Institutions, Health, and Social Services	2%	0%	0%	0%
806	Youth Development	42%	0%	0%	0%
	Total	100%	0%	0%	0%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	128.0	0.0	1.0	0.0
Actual Paid	171.0	0.0	0.0	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
5380875	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
5723075	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

University of Missouri faculty will conduct workshops, multi-session programs and meetings, intensive courses, conferences; develop curriculum and resources; provide training and consultation; and use various media to share state of the art knowledge and research to meet development needs for families, youth and communities.

We will engage with eXtension, partner with other organizations, leaders, agencies, and other states for training and delivery, and develop collaborative partnerships with local, state and national organizations for programming and funding (including the regional rural development center). Faculty will work collaboratively and across disciplines to develop and deliver programs that are based on research and best practice while engaging with the community for its development and to inform research and teaching on campus.

In addition, we will establish and assist COAD (Community Organizations Active in Disasters) and provide disaster educational materials and workshops to communities, organizations and families. We will support establishment and viability for 4-H clubs and programs, local leadership development for youth and adults.

We will form planning committees/advisory panels, facilitate participatory visioning and planning workshops, moderate local dialogues about key issues, hold community meetings and conduct presentations, gather data and use decision support tools to analyze alternatives for the community, organizations, or interest groups with citizens and decision makers, and work with communities to address a specific need or issue. We will also work with communities and regions to develop models of excellent entrepreneurial community practice, community economic development and regional economic development strategies.

2. Brief description of the target audience

MU programs are designed for families and individuals of all ages. From young children, teens, adults and older adults, we provide educational programs and technical assistance to individuals and in group settings, with special focus on underserved populations. Our faculty work closely with other agencies within their communities, the state, and Extension faculty across the country.

Targeted audiences are all social groups in the community, including low-income and minorities, non-English-speaking, community leaders and organizations, local government, professionals working in community and economic development, local businesses and potential business owners, home builders, and agencies that assist in disaster.

We place no limitation on gender, ethnic or religious diversity, lifestyle choice, etc. We also will make a concerted effort to reach military and veterans and their families.

3. How was eXtension used?

Overall, state and regional faculty were engaged in 19 Communities of Practice related to this program. They also answered questions and participated as experts as well as contributed to the overall knowledge base and development of new materials. Faculty regularly participated in professional development offered via eXtension. Faculty regularly drew upon CoPs to answer questions and find resources not available in Missouri as we responded to the complexities of programming. Faculty also contributed to the various eXtension learning communities and material development.

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	135452	681184	996436	115783

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

Patent Applications Submitted

Year: 2015
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	32	6	38

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of youth engaged in science learning experience. Number of adults engaged in leading science experiences for youth. Number of in-depth training programs conducted. Number of other conferences, courses, and workshops held. Percent of participants in workshops and training indicating they would recommend the program to others. Number of views on program-related social media sites. Number of unique website visits. Number of guide sheets distributed. Number of in-service opportunities offered.

Year

Actual

2015

2578

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of participants adopting research based practices as result of increasing their knowledge of family resource management, healthy food and nutrition practices, and healthy lifestyles.
2	No. of youth who pursue study in science career path as the result of participating in programming with direct access to the technological and research advances in agriculture, life sciences, human development, social sciences and engineering, young people in MU Extension's 4-H Youth Development programs that build problem-solving skills and increase their interest in STEM.
3	Communities, community organizations, and local governments will be resilient and socially and economically viable as a result of learning and increased citizen participation occurring from resource planning; business development, community, economic and entrepreneurial development and engagement, community emergency management, and community leadership and nonprofit development programming.

Outcome #1

1. Outcome Measures

Number of participants adopting research based practices as result of increasing their knowledge of family resource management, healthy food and nutrition practices, and healthy lifestyles.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	240497

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Missouri is a state with high levels of poverty and obesity, both of which are associated with poor nutritional status and poor health outcomes. These issues are a challenge in Missouri's two urban centers (St. Louis and Kansas City) as well as in the rural areas across the state. University of Missouri Extension provides a much-needed statewide service delivery system to meet the educational needs of residents across the state.

What has been done

University of Missouri Extension provides direct education on nutrition, resource management, housing, and positive family relationships. We leverage our strong partnerships with state and local agencies to enhance these efforts through coordination of services, referrals, and collaboration. Together these efforts reinforce individual and community changes to enhance the ability of Missourians to make healthy lifestyle choices.

Results

Missouri residents receive education on nutrition, food safety and physical activity for lifelong health and fitness. Education for adults also involves lessons on food resource management. Nutrition education for youths provides information in kid-friendly terms and lessons with hands-on activities. Activities include opportunities for taste-testing healthy foods and practicing skills that lead to good health. Evaluation data collected across the state reflect the positive impacts that occur in every county. Additionally, University of Missouri Extension has helped file 43,824 federal returns for low- to moderate-income individuals over the past ten years, with a total federal refund of more than \$39 million. Assuming that the average tax return costs \$200 dollars to prepare, this has saved Missouri residents roughly \$8.7 million in tax preparation costs.

4. Associated Knowledge Areas

KA Code	Knowledge Area
607	Consumer Economics
703	Nutrition Education and Behavior
724	Healthy Lifestyle
801	Individual and Family Resource Management
802	Human Development and Family Well-Being
803	Sociological and Technological Change Affecting Individuals, Families, and Communities
806	Youth Development

Outcome #2

1. Outcome Measures

No. of youth who pursue study in science career path as the result of participating in programming with direct access to the technological and research advances in agriculture, life sciences, human development, social sciences and engineering, young people in MU Extension's 4-H Youth Development programs that build problem-solving skills and increase their interest in STEM.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	6748

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Youth today must be prepared to live and work in a world that we can't completely envision - for jobs that do not yet exist, using technologies that have not yet been invented, solving problems that have not yet been identified. Changes in technology increases the demand for trained scientists and engineers and a broader understanding of technology and science by all citizens. The need for advanced technology abilities cuts across all types of communities, professions and skill levels.

What has been done

90 4-H field and campus faculty and staff engaged with 10,640 volunteers to reach 22,300 youth across Missouri with on-going science experiences. Missouri 4-H is positioned to enable 4-H youth to enter the workforce with the knowledge, skills, attitudes and health needed for the 21st

century workforce. 4-H faculty are trained to measure progress of youth gaining workforce skills using 4-H Common Measures.

Results

Missouri 4-H program links thousands of young people, parents, volunteers and professionals to MU. The large volunteer force (10,640) enables Missouri 4-H members to engage with more adult mentors than their non-4-H peers. Positive and sustained relationships between young people and adults are a predictor of the program's effectiveness in helping youth gain confidence, achieve competency and learn generosity. 8,700 plus youth from 108 different counties connected with MU faculty for 4-H educational events and camps. 6,748 High school and college freshmen 4-H'ers are studying science and considering careers in science. Underserved youth make college an achievable goal through 4-H Youth Futures. Campus experiences, coupled with a caring adult mentor, motivate young people and help them navigate the steps of attending and remaining in college. Recent data show 77% of eligible seniors pursue higher education. Another 14% enter the workforce.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #3

1. Outcome Measures

Communities, community organizations, and local governments will be resilient and socially and economically viable as a result of learning and increased citizen participation occurring from resource planning; business development, community, economic and entrepreneurial development and engagement, community emergency management, and community leadership and nonprofit development programming.

Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

Two of the most significant factors affecting outcomes include limitations of faculty time and pressures with flat federal and local funding and reduced access to state funds. Internal to the university, some resources have been redirected away from extension

affecting personnel as well as operating funds. We conducted re-staffing during the past two years after some areas remained with vacancies for extended periods of time, with half of those conducting local community programming having come into the position within that time frame. We re-configured community emergency management with more secure funding, reconstituted regional teams while primarily supporting disaster recovery in the transition.

Starting programs and collecting longer term impacts take a few years. Finally tracking communities for outcomes over longer periods of time is both difficult and expensive and the causation effect becomes problematic due to other factors that influence action in the community arena.

In addition, we experienced leadership changes in extension during this fiscal year, adding uncertainty. Funding from grants, contracts and fees is essential at a time when many rural areas continue to experience economic depression and state agencies are still experiencing funding limitations.

We are also working to bring into alignment our reporting system with the impact indicators and provide sufficient training for faculty and staff in evaluation and reporting. This has been a slow process but we continue to improve.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Results and impact reported by Community Development program participants during FY15 including long term results not previously reported: \$6.8 million grants and other resources acquired by communities and organizations; \$393,560 in volunteer hours generated to conduct programs; \$523,448 in volunteer hours generated by communities and organizations as result of programs; 77 community and organizational plans developed, 73 community/organizational programs and activities initiated or completed, 19 community and organizational policies/plans adopted/implemented; 16 businesses created; 83 jobs created; 29 new organizations created; 0.98 weighted average change in mean score of participants' self reporting learning from post-/pre-post survey using 5 pt. Likert scale; Missouri River corridor continued significant recovery over 50 COADs working statewide in disaster preparedness and recovery; 93% would recommend our programs to others and rated the value of the training at 4.42 on average on 5 pt. Likert scale (with 5=highest). The audience included rural and urban, all levels of the socio-economic spectrum, youth and adults, and 6.6% minority races and 10.9% Hispanic/Latinos.

Qualitative data indicated expanded citizen engagement and leadership, broader inclusion of community members, buy-in from the community, adoption of policies, implementation of plans, sound proposals put before voters, and increased economic activity. Communities benefit from wise use of public and private resources.

Key Items of Evaluation

Data collection on community impacts is consistent with the key outcome indicators developed in the North Central region for CRED programs. Most workshops and trainings use a similar survey at the end of the session to assess post-pre and post perceptions of learning and intent to apply learning. Protocols have been developed for collection of impact data regarding application of knowledge and changes effected for communities and organizations, such as implementation and results, leverage of resources, etc. The numbers reported rely on participant and key informant attribution. In addition, participants in in-depth community, youth and family trainings receive follow-up surveys after 3-12 months to determine application.

Our evaluation study of ExCEED (community economic development) and Stronger

Economies Together shows that formation of the human capital and the social capital is what underpins the empirical data collected about impact in terms of jobs created, businesses started, and resources leveraged and generated.

Documenting impact of the work with COADs, disaster recovery, and community resiliency is difficult, yet we are seeing these longer-term efforts yielding more prepared communities and their capacities to respond and recover. Without the work of extension, many communities in rural areas would not have systems in place to deal as well as they have with long-term disaster recovery. They are much better at advocating for themselves in the policy arena as well. Important to note is that the COAD Guidance Manual has proven to be a resource that should be of benefit to any state or locality in the US.

Community and organizational outcomes generally are accrued in the long term.

Over time other factors can intervene which can stop a community or cause it to change its plans. Often it takes a community some time to re-group. Measuring mid and long-term impact is not a precise science. Little research has been done that can be applied and transferred. Case studies and the ability to tell the story over time are important, as the results are contextual. Rarely are we able to prove causation. Communities and participants report that money was saved, but do not report an amount. We rely on attribution by participants and key leaders. Because of this and failing to ask about ongoing impact, the impact is likely much higher.

MU Extension continues to actively participate in the Excellence in Extension/Land-Grant Impacts databases. More program impact statements are available online.
<https://landgrantimpacts.tamu.edu/extension/extension-impacts>

V(A). Planned Program (Summary)

Program # 3

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
102	Soil, Plant, Water, Nutrient Relationships	0%	5%	0%	8%
111	Conservation and Efficient Use of Water	0%	5%	0%	5%
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%	2%	0%	2%
204	Plant Product Quality and Utility (Preharvest)	0%	5%	0%	5%
205	Plant Management Systems	0%	5%	0%	7%
212	Pathogens and Nematodes Affecting Plants	0%	2%	0%	2%
216	Integrated Pest Management Systems	0%	5%	0%	5%
301	Reproductive Performance of Animals	0%	5%	0%	5%
302	Nutrient Utilization in Animals	0%	5%	0%	5%
303	Genetic Improvement of Animals	0%	10%	0%	10%
307	Animal Management Systems	0%	15%	0%	15%
311	Animal Diseases	0%	6%	0%	6%
313	Internal Parasites in Animals	0%	5%	0%	5%
405	Drainage and Irrigation Systems and Facilities	0%	2%	0%	2%
503	Quality Maintenance in Storing and Marketing Food Products	0%	5%	0%	0%
601	Economics of Agricultural Production and Farm Management	0%	8%	0%	8%
604	Marketing and Distribution Practices	0%	5%	0%	5%
721	Insects and Other Pests Affecting Humans	0%	5%	0%	5%
	Total	0%	100%	0%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890

Plan	0.0	7.5	0.0	20.0
Actual Paid	0.0	7.0	0.0	31.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	1417869	0	934462
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	1468543	0	1614083
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- a. Conduct research to control internal parasites and prevent diseases in small ruminants.
- b. Practice the use of artificial insemination in large and small ruminants to improve the genetics of herds and flocks.
- c. Determine embryonic and fetal loss in goats throughout gestation, using real-time ultrasound.
- d. Research biosensors to facilitate artificial insemination.
- e. Develop sunfish cultigens for distribution to the industry.
- f. Determine nutritional requirements of sunfishes.
- g. Develop optimal production dynamics for sunfishes.
- h. Provide aquaculture fish health services for stakeholders.
- i. Develop technology to reduce mosquito populations responsible for transmitting the causative agents of some of the most widespread and prevalent infections of humans.
- j. Conferences, meetings, workshops, and training and educational opportunities for small farmers.
- k. Introduction and evaluation of new crops (especially native crops) and improved cultural practices.
- l. Abstracts, publications, grant proposals, and guide sheets.
- m. Promotion of backyard and community gardening.
- n. Conduct analysis of the challenges of rural entrepreneurship and their impact on the prospects of community development.
- o. Develop effective and environmentally and grower friendly IPM approaches to manage key insects of small fruits and vegetables.

2. Brief description of the target audience

Lincoln University's Cooperative Research and Extension programs focus on enhancing the quality of life for diverse, limited resources audiences. Low-income, limited resource farmers and ranchers, and underserved population in rural and urban communities.

3. How was eXtension used?

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	4215	6000	1025	0

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

Patent Applications Submitted

Year: 2015
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	8	9	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Projects completed, presentations and manuscripts. Enhanced profitability of small farms. Enhanced vitality and strengthening of rural communities.

Year	Actual
2015	152

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Livestock-Develop improved approaches to internal parasite control and disease prevention. Develop improved production management systems through enhancing reproduction, genetics, and nutrition. Aquaculture- Define sunfish nutritional requirements. Develop a fast growing sunfish cultigen. Identify viable production systems for sunfishes. Make available a fish health protocol. Insects and Pests-IPM: Improved knowledge and awareness of the environmental and economic benefits associated with IPM implementation by growers and Extension educators, increased awareness of pesticide and nutrient impacts on non-target organisms and habitats, increased protection and promotion of high-value agricultural products, reduced pesticide use by farmers, increased production of vegetables and small fruits grown with reduced-risk pesticides and with organic methods.
2	Transfer new technologies for sunfish, small and large ruminant production to farmers. Farmers will use learned technologies.
3	Farmers adopt new technologies for increased and sustainable production.
4	Create conditions for the minority, underserved farmers to be able to earn a reasonable income, continue to live on farms, and develop educational programs and opportunities that will encourage minority youth to get involved in farming. Increase or at least maintain the number of minority farms in the state. More farmers are adopting sustainable farming practices (profitable, environmentally friendly, and socially responsible). Increase the income level of the collaborating small farmers and ranchers on an average of \$5,000 per family.
5	Enhanced profitability of small farmers and ranchers, and enhanced viability of rural communities. Increase the average small farm gross income of the collaborating farmers by \$5,000. Increase retention rates of the collaborating farmers and ranchers through providing appropriate education and information.

Outcome #1

1. Outcome Measures

Livestock-Develop improved approaches to internal parasite control and disease prevention. Develop improved production management systems through enhancing reproduction, genetics, and nutrition. Aquaculture- Define sunfish nutritional requirements. Develop a fast growing sunfish cultigen. Identify viable production systems for sunfishes. Make available a fish health protocol. Insects and Pests-IPM: Improved knowledge and awareness of the environmental and economic benefits associated with IPM implementation by growers and Extension educators, increased awareness of pesticide and nutrient impacts on non-target organisms and habitats, increased protection and promotion of high-value agricultural products, reduced pesticide use by farmers, increased production of vegetables and small fruits grown with reduced-risk pesticides and with organic methods.

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Transfer new technologies for sunfish, small and large ruminant production to farmers. Farmers will use learned technologies.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
{No Data Entered}

What has been done
{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals
307	Animal Management Systems
311	Animal Diseases
313	Internal Parasites in Animals

Outcome #3

1. Outcome Measures

Farmers adopt new technologies for increased and sustainable production.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
216	Integrated Pest Management Systems
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals
307	Animal Management Systems
311	Animal Diseases
313	Internal Parasites in Animals

Outcome #4

1. Outcome Measures

Create conditions for the minority, underserved farmers to be able to earn a reasonable income, continue to live on farms, and develop educational programs and opportunities that will encourage minority youth to get involved in farming. Increase or at least maintain the number of minority farms in the state. More farmers are adopting sustainable farming practices (profitable, environmentally friendly, and socially responsible). Increase the income level of the collaborating small farmers and ranchers on an average of \$5,000 per family.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
212	Pathogens and Nematodes Affecting Plants
216	Integrated Pest Management Systems
405	Drainage and Irrigation Systems and Facilities
503	Quality Maintenance in Storing and Marketing Food Products
601	Economics of Agricultural Production and Farm Management
604	Marketing and Distribution Practices

Outcome #5

1. Outcome Measures

Enhanced profitability of small farmers and ranchers, and enhanced viability of rural communities. Increase the average small farm gross income of the collaborating farmers by \$5,000. Increase retention rates of the collaborating farmers and ranchers through providing appropriate education and information.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

{No Data Entered}

What has been done

{No Data Entered}

Results

{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
212	Pathogens and Nematodes Affecting Plants
216	Integrated Pest Management Systems
405	Drainage and Irrigation Systems and Facilities
503	Quality Maintenance in Storing and Marketing Food Products
601	Economics of Agricultural Production and Farm Management

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Projects completed, presentations and manuscripts. Enhanced profitability of small farms.
Enhanced vitality and strengthening of rural communities.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Community and Leadership Development

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
608	Community Resource Planning and Development	0%	60%	0%	50%
802	Human Development and Family Well-Being	0%	10%	0%	0%
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	0%	20%	0%	50%
805	Community Institutions, Health, and Social Services	0%	10%	0%	0%
	Total	0%	100%	0%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	2.0	0.0	0.0
Actual Paid	0.0	2.0	0.0	1.0
Actual Volunteer	0.0	1.0	0.0	0.5

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	42255	0	93254
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	44493	0	91015
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Strengthening leadership and management skills for small towns, communities. and organizations

Workshops and training sessions covering critical skill areas and topics such as: leadership, community resource planning, negotiation skills, planning, communication skills, self-awareness, understanding and leading people, getting results, strategic thinking , basic leadership skills, work planning and goal setting, customer/resident relations, effective communication skills, budgeting, funding accounting and grant administrations, managing personnel issues, and negotiations.

2. Brief description of the target audience

Small towns, community organizations and agencies.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	325	38	145	40

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

Patent Applications Submitted

Year: 2015

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Informational sessions including, workshops, presentations and face-to-face meetings.

Year	Actual
2015	20

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Demonstrate increased knowledge and understanding of community development planning. Demonstrate increased partnerships and resources for the community. Demonstrate increased civic engagement in deliberating community issues.
2	Community decision makers will increase inclusivity when seeking stakeholder input. Stakeholders will be empowered and concerned about improving the quality of life in their community. Community decision makers will seek extramural funds to make improvements. Community decision makers will review, and update ordinances to make operation more efficient.
3	Evidence of community goal attainment * Increased capacity to deal with future issues *Change in community practice *Improved community fiscal and economic performance * Those participating in local government are more representative of the population of the community * Sustained capacity for informed local decision making

Outcome #1

1. Outcome Measures

Demonstrate increased knowledge and understanding of community development planning.
Demonstrate increased partnerships and resources for the community. Demonstrate increased civic engagement in deliberating community issues.

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Many small towns and community leaders find that their administrators, officers, supervisors and managers have not had any formal training in the responsibilities or expectations for these positions. Lack of skills results in the individual either replicating "what we've always done" or asking other supervisors, who also may not be trained, what to do. Unprepared supervisors, officers, and managers can result in lost time and production due to grievances and poor employee/membership relations. While it is essential to improve the efficiency and effectiveness of frontline supervisors, few small towns and community organizations are large enough or have the internal resources to provide training.

What has been done

CLD assisted over 100 individuals in dealing more effectively with problem employees, communicate with citizens and employees in a more professional manner.

Results

Training on Effective Communication Skills, Budgeting, Fund Accounting and Grant Administration, "Nuts and Bolts" of Personnel Management, Managing "Troubled" and "Problem" Employees, and Negotiations were provided in more than 5 towns and small cities.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development
802	Human Development and Family Well-Being
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

Outcome #2

1. Outcome Measures

Community decision makers will increase inclusivity when seeking stakeholder input. Stakeholders will be empowered and concerned about improving the quality of life in their community. Community decision makers will seek extramural funds to make improvements. Community decision makers will review, and update ordinances to make operation more efficient.

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Strengthening Leadership and Management Skills for Small Towns and Community Organizations. We emphasize leadership and management principles that improved the efficiency of small towns and community organizations. The additional training our participants received, assisted them in becoming effective within their organizations, ultimately enhancing the quality of life and standard of living within the communities they serve. Due to the rapid growth of small towns and community-based organizations the individuals that manage them and due to the numerous laws associated with managing these small towns, many of the individuals managing them increasingly find themselves confronted with growing pressure to demonstrate their skills in managing the resources of their organizations.

What has been done

The LUCCLD developed a series of workshops and training sessions to help city/town administrators (mayors, county council member, town chief administrator etc.) lead more effectively. Critical skill areas included:

Results

In total, 125 people participated and report having more success in their leadership roles, making improvements in their communities and made more attempts to seek extra-mural funding.

The LUCCLD developed a series of workshops and training sessions to help them administer effectively. Critical skill areas included: Leadership, Community Resource Planning, Negotiation Skills, Planning, Communication Skills, Youth Development, and General Community and Organizational Skills.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development
802	Human Development and Family Well-Being
803	Sociological and Technological Change Affecting Individuals, Families, and Communities
805	Community Institutions, Health, and Social Services

Outcome #3

1. Outcome Measures

Evidence of community goal attainment * Increased capacity to deal with future issues *Change in community practice *Improved community fiscal and economic performance * Those participating in local government are more representative of the population of the community * Sustained capacity for informed local decision making

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Community stakeholders lacked understanding of how to be effective when planning for the community's future. Issues of improving the quality of life for youth and future generations. The community stakeholders care and are very concerned about the quality of life in the community where they live.

What has been done

Training and workshops have been facilitated for strengthening leadership and management skills for small towns, communities, and organizations.

Results

Demonstrated an increased knowledge and understanding of community development planning. Demonstrated an increase in partnerships and resources for the community. Demonstrated an increase in civic engagement in deliberating community issues.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development
802	Human Development and Family Well-Being
803	Sociological and Technological Change Affecting Individuals, Families, and Communities
805	Community Institutions, Health, and Social Services

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

Extreme weather conditions in Southeast Missouri increased the joblessness situation in an already hard hit area. Overall, the economic situation has made it more difficult on families in underserved areas. State budget cuts have had a huge impact in some areas, resulting in more stress and tension in families and communities.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

A survey of statewide regions resulted in a response from over 3,000 stakeholders. These results were entered into a database for evaluation. That evaluation is currently in progress. We hope to compare the various regions on what programs were effective, what were some regions doing well, that did not work in other regions, and the overall status of programs throughout the state.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Family and Youth Development

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
607	Consumer Economics	0%	5%	0%	0%
724	Healthy Lifestyle	0%	10%	0%	0%
802	Human Development and Family Well-Being	0%	15%	0%	100%
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	0%	5%	0%	0%
805	Community Institutions, Health, and Social Services	0%	10%	0%	0%
806	Youth Development	0%	35%	0%	0%
901	Program and Project Design, and Statistics	0%	10%	0%	0%
903	Communication, Education, and Information Delivery	0%	10%	0%	0%
	Total	0%	100%	0%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	22.0	0.0	0.0
Actual Paid	0.0	20.0	0.0	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	18666	0	1028277
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	1046943	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The activities in the four Regions: Kansas City, St. Louis, Central, and Southeast regions have similarities and differences. However, all have been developed to design, implement, and evaluate educational programs for youth and families at-risk. Program implementation includes club member retention, workshops, camps, and after-school programs.

Specific examples of activities from the Kansas City area include:

- Mentoring Program that matches community volunteers who will spend time with interested youth. Delta Sigma Theta sorority and Phi Beta Sigma and Alpha Phi Alpha fraternities often assist with this program.
- ACT Preparation: Work with students to prepare for the English and Math portions of the ACT test.
- Fatherhood Programs: This includes youth and adults and these are meetings that address topics related to self-esteem, nutrition, fitness, computer skills, relationships and parenting.
- Afterschool Tutoring Program: Programs are to assist students K-8 with homework, tutoring, computer classes, reading and math labs, life skills, arts, and crafts and recreation. Collaboration with the National Book Bank provides donations of books to non-profit organizations.
- Fitness Program: LUCE currently offers the Division of Youth Service classes in their physical education component. The community also participates in exercising to increase their energy level and to improve their overall health.
- The Abstinence Program, for youth to learn the advantages of remaining abstinent.

Specific examples of activities from the St. Louis area include:

- Teen Drop In: This program has open enrollment for neighborhood youth and is to provide an after-school community safe haven. The teen drop in offers an array of opportunities for youth between the ages of 12 to 17. Activities and educational workshops include, but will not be limited to, homework assistance, open-microphones to develop their skills in public speaking/poetry, teen talk to discuss youth community issues and concerns, and educational games as well as activities that teach to enhance their life skills. Offered through the school year.
- North Side after School Neighborhood Initiative: This is a partnership between Lincoln University Urban Impact Center of St. Louis, community volunteers and two St. Louis Public grade schools. Our initiative is to provide a power-hour implementing homework assistance for youth after school, provide life skills activities that teach addressing communication skills, drug and alcohol prevention, conflict resolution etc., as well as health and nutrition via snacks and physical activity in the school gymnasiums. This program offers open enrollment to youth participants. This activity uses 10 community volunteers.
- Urban Garden Beautification Project is a collaborative effort with the St. Louis Neighborhood

Stabilization Office and community leaders to continue transforming a weed infested vacant lot into a neighborhood asset that will assist in stabilizing the neighborhood and revitalize community.

Specific examples of activities in the Southeast Missouri Region include:

- Health and Fitness Classes.
- Health fair designed to educate youth on nutrition, fitness, and the dangers of alcohol, tobacco, and other drugs.
 - Field Day - a culmination of educational workshops on a variety of topics for all ages.
 - Fall into Fall, a back-to-school rally to prepare students for the upcoming school year.
 - HIV/AIDS/STD Awareness Day.
 - Summer Camp, a partnership with YMCA, Mission Missouri, Weed & Seed, and DAEOC to provide fitness and health, character development, arts and crafts, self-esteem building, recreation, and field trips for 5 weeks.
 - Women's Wellness Conference.
 - Teen Talk/Young Scholars, a weekly program that allows teenagers to express themselves freely on different topics.

Specific activities in the Central Region include:

- Underserved minorities and other disadvantaged older adults aged 50+ in the Cole Co. area will become more aware and knowledgeable about importance of adopting a healthy lifestyle.
 - Participants will become proactive in seeking health information.
 - Participants will become more aware of ways to manage their personal health.
 - Youth will develop increased communication skills, receive feedback, certificates of award and recognition for their efforts.
 - Provision of culturally specific parenting education classes.
 - Family and community empowerment experiences to assist parents helping their children close the educational achievement gap.
 - Leadership Retreat, for youth to develop good decision-making skills.
 - The Hip Hop Camp is designed to empower the youth to take an active role in becoming the leaders of tomorrow. Our program is also based on the belief that the youth themselves can become a potent force in combating social issues.

Activities that have been implemented in all four Regions include:

Black History Programs for youth (K-12) in the school districts. This is an educational program on the accomplishments and struggles of African-Americans.

Program to address childhood obesity for parents and youth.

Financial Management and Youth Program, which is designed to teach youth about basic financial management in order to help them make better economic and life decisions.

A Gathering of Kings Conference develops skills for making healthy choices when dealing with oppressive issues. By providing youth with positive mentors and role models, the issue of increased high school dropout rate is addressed and children are more likely to complete high school and attend college. By providing the youth with positive mentors and role models we are also aiding suicide prevention and combating to lower suicide attempts

2. Brief description of the target audience

Minority and other under-represented youth in urban St. Louis, Kansas City and selected locations in the bootheel region of the state (Primarily Sikeston, Lilbourn and Caruthersville). Minority and under-represented populations in Central Missouri, especially those living in housing developments.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	5125	4867	14523	6975

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

Patent Applications Submitted

Year: 2015
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	1	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Education classes, invited speeches, workshops, in-service education, consultations, media appearances, web sites, newsletters

Year	Actual
2015	301

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Short term: 1) Enhanced academic productivity, 2) Improved rate of community volunteerism 3) Development of leadership skills, 4) Increased knowledge and life skills.
2	Medium term: 1) Completion of current grade and promotion to the next, 2) Increased graduation rates from high school, 3) Reduced probability of acts of crime, 4) Increased self-esteem, and 5) Better life choices.
3	Long term: 1) Improved education levels, 2) Increased standard of living, 3) improved quality of life.

Outcome #1

1. Outcome Measures

Short term: 1) Enhanced academic productivity, 2) Improved rate of community volunteerism 3) Development of leadership skills, 4) Increased knowledge and life skills.

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Lack of availability of services and resources for underserved and minority populations to reduce health disparities and inequities in access to health-related care and literacy. Limited resource and underserved minority youth and families are in need of supplemental education to increase academic achievement and school success.

What has been done

Provide culturally and educationally appropriate information on health management and established collaborations with other health entities and interested health professionals; including conducting focus groups, educational workshops, afterschool programs, volunteer and leadership training.

Results

Many participants reported feeling that the educational presentations extended their knowledge of health issues, as well as resources available for adults, especially the older clientele. In particular, 98% of participants reported that the content of the Missouri Institute on Minority Aging provided helpful health/resource information to them professionally and personally. Increased knowledge and skills, and enhanced academic productivity. Youth participants in afterschool reading programs have increased their scores by two grade levels, as evidenced by test scores. Youth are more knowledgeable, make better life decisions, and show more leadership skills.

4. Associated Knowledge Areas

KA Code	Knowledge Area
607	Consumer Economics
724	Healthy Lifestyle
802	Human Development and Family Well-Being
803	Sociological and Technological Change Affecting Individuals, Families, and Communities
805	Community Institutions, Health, and Social Services
806	Youth Development
901	Program and Project Design, and Statistics
903	Communication, Education, and Information Delivery

Outcome #2

1. Outcome Measures

Medium term: 1) Completion of current grade and promotion to the next, 2) Increased graduation rates from high school, 3) Reduced probability of acts of crime, 4) Increased self-esteem, and 5) Better life choices.

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Lack of availability of services and resources for underserved and minority populations to reduce health disparities and inequities in access to health-related care and literacy. Limited resource and underserved minority youth and families are in need of supplemental education to increase academic achievement and school success.

What has been done

Information was compiled from monthly health educational sessions, health screenings, face-to-face interviews, and testimonies from program participants via in-person and/or small group settings.

Afterschool tutoring, summer enrichment, EFNEP, computer literacy program and college preparatory classes. Workshops and seminars focused on leadership skills, health education, making better choices, and nutrition.

Results

Participants indicated adopting one health behavior (decreased sodium and sugar consumption) that aided in better blood pressure and glucose monitoring of hypertension and diabetes, respectively.

Completion of current grade and promotion to next, increased graduation rate, increased self-esteem, better life decisions, and increased interest in attending college. Students who were identified as high risk youth were provided additional education, social, and emotional support. Those identified youth were able to achieve academic improvement and graduated to the next grade level. Teenage parents are making positive changes in the way they parent at home. Youth are learning to set goals with new aspirations.

4. Associated Knowledge Areas

KA Code	Knowledge Area
607	Consumer Economics
724	Healthy Lifestyle
802	Human Development and Family Well-Being
803	Sociological and Technological Change Affecting Individuals, Families, and Communities
805	Community Institutions, Health, and Social Services
806	Youth Development
901	Program and Project Design, and Statistics
903	Communication, Education, and Information Delivery

Outcome #3

1. Outcome Measures

Long term: 1) Improved education levels, 2) Increased standard of living, 3) improved quality of life.

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Lack of availability of services and resources to underserved and minority populations to reduce health disparities and inequities in access to health-related care and literacy. Limited resource and underserved minority youth and families are in need of supplemental education to increase academic achievement and school success.

What has been done

Survey results of participants indicated a change in better health management and knowledge based on health educational sessions. There was qualitative and quantitative analysis using pre-post test, testimonials and survey evaluations. Workshops on college prep, financial aid completion for college, volunteer and leadership training, summer enrichment programs, and EFNEP.

Results

Participants plan to have more health screenings, especially for blood pressure and diabetes. Expected outcomes and impacts were described through monthly, quarterly and annual reports.

Improved life decisions, healthier and more fit individuals, and improved quality of life. Students who were identified as not being able to complete grades 11 and 12 were given academic and emotional support, and completed grades 11 and 12, and subsequently graduated high school.

4. Associated Knowledge Areas

KA Code	Knowledge Area
607	Consumer Economics
724	Healthy Lifestyle
802	Human Development and Family Well-Being
803	Sociological and Technological Change Affecting Individuals, Families, and Communities
805	Community Institutions, Health, and Social Services
806	Youth Development
901	Program and Project Design, and Statistics
903	Communication, Education, and Information Delivery

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

Extreme weather conditions in Southeast Missouri increased the joblessness situation in an already hard hit area. Overall, the economic situation has made it more difficult on families in underserved areas. State budget cuts have had a huge impact in some areas, resulting in more stress and tension in families and communities.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Surveys were conducted within in regions resulting in input from stakeholders. This input allows staff to make necessary program adjustments.

Key Items of Evaluation

- It is important that varying degrees of flexibility and uniqueness be reasonably allowed for the maximization of program delivery and participation.
 - Some issues are still a concern: increased high school dropout rate in urban areas, the non-parental presence and support in the lives of urban youth, the increasing number of young African-Americans affected by HIV/AIDS, and a high teenage pregnancy rate in urban schools.

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Climate Change

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	0%	25%	0%	25%
112	Watershed Protection and Management	0%	20%	0%	10%
123	Management and Sustainability of Forest Resources	0%	5%	0%	10%
136	Conservation of Biological Diversity	0%	10%	0%	10%
141	Air Resource Protection and Management	0%	10%	0%	10%
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals	0%	10%	0%	10%
403	Waste Disposal, Recycling, and Reuse	0%	10%	0%	10%
502	New and Improved Food Products	0%	0%	0%	5%
723	Hazards to Human Health and Safety	0%	10%	0%	10%
	Total	0%	100%	0%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	2.0	0.0	16.0
Actual Paid	0.0	2.0	0.0	16.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	292427	0	609361
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	111074	0	814516
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Water Quality Studies:

Missouri region is one of several areas in the United States having confined animal feeding operations (CAFOs) under various animal units' classifications. Water quality of streams near CAFOs may deteriorate due to inputs of Escherichia Coli (E. coli), nitrogen (N), phosphorus (P), and antibiotic drugs from animal wastes. In addition, land use and management practices in various watersheds may also impact surface water quality. Also understanding the distribution and fate of pollutants from animal wastes in environmental media (soil, sediment, surface and groundwater) and the potential public health risks are necessary. Protection of water resources is important for human, aquatic and environmental health. The hypothesis to test is that there are significant contributions of N, P, E. coli, metals, pesticides and antibiotic drugs from runoffs/seepage from cattle and swine wastes and various land uses on water quality of selected Missouri streams. A recently approved project will explore ecological links between bioindicators of environmental health, i.e., the role of water quality, nutrient flow, and invasive species in determining species abundance of aquatic turtles and mussels.

Risk Reductions and Remediation of metal-Contaminated Mining Wastes in Missouri :

Characterize the physical/chemical properties of the tailings and determine the spatial variability of metal contamination in the areas. This objective will focus on the collection of soil and water samples within the study site, the analyses of metal concentration and metal species in samples, and the determination of the extent or degree of the contamination and spatial distribution of contaminants. This study will provide base information of the site for selecting in situ treatment.

Watershed Based Studies:

The specific objective of the geospatial studies is to create a geospatial digital database for the Lake of the Ozarks, Lamine, Lower Missouri-Moreau, and Osage watersheds. The primary task is to locate and assemble relevant geospatial data from the various state and federal agencies. The database will consist of various layers including digital elevation models, land use/land cover, geology, soil, hydrology, mine locations, wetlands, floodplains, and remote sensing data (satellite and air photo).

Air Quality Studies:

The atmospheric concentration of CO₂, CH₄ and N₂O is ever increasing and a good deal of research has been conducted to estimate emissions of these greenhouse gases from soils. Although numerous measurements have been made, emissions from soils still show variability based on a number of controlling factors. In fact, differences in soil type, moisture, temperature, season, crop type, fertilization, and other agricultural practices apparently all play a part in emissions from soils.

Enhanced In Situ Biodegradation of Pesticides Under Modified Soil Conditions

Priorities:

- 1) Determine optimum biofilter conditions for specific pesticide degradation.
- 2) Identify the microbial consortia that will evolve in the biofilter.
- 3) Construct a model in-situ biofilter for demonstration and conduct a workshop for extension personnel and other stakeholders on the potential application of this knowledge.

Behavior of Silver Nanoparticles in Soil: Interactions with Physicochemical and Microbiological Properties

It is anticipated that within ten years, each product sold in the marketplace will contain at least one nanomaterial for use in enhancing the efficiency or durability of the merchandise. Due to this unprecedented growth, the Earth will be exposed to a huge number of nanomaterials--on the order of several thousand tons. Therefore, it is important both to understand and prepare for the changes that are expected to occur in microbial surroundings upon such a large and pervasive exposure to nanomaterials. Soils are being continuously exposed to large amounts of Engineered Nanoparticles (ENPs), especially AgNPs. The influence of the nanomaterials in altering the ecological balance and the environmental risks associated with this exposure need to be understood very clearly. The overall goal of this project is to understand the effect of nanoparticulate silver in the soil environment. Specifically, we will investigate the effect of AgNPs upon interaction with soil physicochemical properties and study their effects on microbial population and diversity.

Hydrologic Processes Controlling Stream Water Quality in Missourian Watersheds

Stream water contamination by soil applied herbicides and nutrients continues to be a major water quality problem in Missourian watersheds. The project is aimed at improving our understanding on the controls of stream water quality in Missouri. The research objectives are to understand the hydrologic pathways controlling stream flow under storm event and baseflow conditions at multiple catchment scales and the factors controlling nutrient and herbicide transport to stream water.

Bacterium Faecalibacterium for Tracking Agricultural Sources of Fecal Pollution in Water

The objective of this project was to use the anaerobic fecal bacterium *Faecalibacterium* as an alternative fecal indicator for the accurate determination of agricultural sources of fecal pollution in water. Genetic markers of the bacterium, which are unique to feces of cattle, swine, or poultry, will be identified and used to develop PCR-based methods for identification of the sources of fecal pollution in water.

A Comparative Study of Two Integrated Systems for The Production of Bioenergy and Biochar from Switchgrass

In this study, two integrated systems, for the production of biogas, biooil and biochar, are compared. The results of this study will provide the basic scientific knowledge for comparing and optimizing different technologies for the production of bioenergy and biochar. The ultimate goal of this project is to maximize the bioenergy (biomethane, and bio-oil) production from switchgrass with producing biochar as a valuable soil amendment.

Characteristics of Biochar Produced from Different Feedstocks and Effects on Soil Physicochemical and Biological Properties.

The focus of this study is to characterize biochar produced from various biomass feedstocks physically and chemically and to determine how biochar affects the activities of select soil enzymes.

Agriculture Economic/Business:

The primary goal of this project is to conduct an analysis of the challenges of rural entrepreneurship and their impact on the prospects of community economic development within the Southeast region of Missouri.

Natural Resource Diversity Studies:

Most tallgrass prairies of the central United States, dominated by warm season grasses and diverse forbs, have been lost to the plow and urban development, or degraded by introduced vegetation. Prairies are the most endangered ecosystem in North America. Birds and other taxa that depend on prairies have declined in response to loss of habitat. Key to conservation and management is restoration of warm season grassland vegetation either on wildlife refuges and nature preserves, or on Conservation Reserve Program (CRP) fields.

2. Brief description of the target audience

- (a) Farmers
- (b) Engineers
- (c) Policy makers
- (d) Students
- (e) Community leaders
- (f) Local citizens
- (g) Extension workers
- (h) Scientists & other Researchers
- (i) Regulatory Agencies

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	625	950	0	0

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

Patent Applications Submitted

Year: 2015
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	0	19	19

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Short term output measures are: Abstracts(16), Presentations (20), Training students (10),and Workshops (4). Intermediate output measures are publications. Long-term: After five years Not reporting on this Output for this Annual Report

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Chemical and biological characterization of the ecosystems.
2	Expected change in agricultural practices from farmers. Better management of agricultural and natural ecosystems complex.
3	Environmental sustainability; Improved quality of life
4	Contribution to understanding of interactions between human practices and natural ecosystems; Enhanced stakeholders knowledge and understanding of environmental issues; Better management of agricultural and natural ecosystems complex.

Outcome #1

1. Outcome Measures

Chemical and biological characterization of the ecosystems.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Lead contamination in soil, which is causing serious health problems for children. The chemical and toxic leachates, pathogens, biological organisms can negatively impact public health, ground water, and streams. Water runoff from CAFOs contaminating water quality of streams near CAFOs

What has been done

Started mapping and analyzing rock, mineral, and water samples from seven abandoned mines. Identified potential soil controlling factors for greenhouse emissions from soil. Increased knowledge of Pb behaviors and risks in soil ecosystem. Collected water samples near CAFOs, to evaluate levels of E. coli, nitrogen, phosphorous and antibiotic drugs from animal waste.

Results

Increased understanding of greenhouse gas emissions from agricultural fields. Preliminary results showed that the H3PO4 treatment effectively immobilized soil PB, thus lowering the risks to human health, however more studies are needed. Extensive education given to members of the target audience. Better management to improve water quality.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
136	Conservation of Biological Diversity

141	Air Resource Protection and Management
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals
403	Waste Disposal, Recycling, and Reuse
502	New and Improved Food Products
723	Hazards to Human Health and Safety

Outcome #2

1. Outcome Measures

Expected change in agricultural practices from farmers. Better management of agricultural and natural ecosystems complex.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Understanding greenhouse gas emissions from agricultural fields and devising strategies to mitigate these gases. Deterioration of water quality due to runoff from CAFOs. Conservation and protection of native plants and other natural resources help to protect watersheds, which results in cleaner water, air, soil, and healthier and safer environments

What has been done

Field collections from agricultural fields, pastures, and forests in Central Missouri to identify potential soil controlling factors for greenhouse gas emissions from soil. Water sample collections to determine level of E.coli, nitrogen, phosphorous, and antibiotic drugs. Through field days, conferences, seminars and other events, awareness has been increased about the importance of protecting natural resources.

Results

Better understanding of greenhouse gas emissions and a new approach to measure these emissions from fields, pastures, and forests. Education for stakeholders to alter agricultural practices to reduce emissions from agricultural fields. Better management practices to improve

water quality.

There are positive changes associated with the LU-Native Plants Program, Native Pollinator Program, and the restoration of warm season grasses, but they are too hard to measure at this time.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
136	Conservation of Biological Diversity
141	Air Resource Protection and Management
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals
403	Waste Disposal, Recycling, and Reuse
502	New and Improved Food Products
723	Hazards to Human Health and Safety

Outcome #3

1. Outcome Measures

Environmental sustainability; Improved quality of life

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Lead contaminated soil and contamination from runoff associated with abandoned mines and CAFOs. This is a health risk for those who live in and near contaminated sites.

Participants in field days, seminars, and workshops were introduced to conservation practices.

What has been done

Risk reduction of lead (Pb) contamination in soils and lands through in situ phosphate treatment of contaminated soil. This helps re-establish vegetation cover to protect human and environmental contamination. Water samples from streams near CAFOs.

Native Plant outdoor laboratories and demonstration gardens are under development for education and to provide a relaxing atmosphere to improve quality of life. Also these plants could provide a specialty crop for small farmers or producers.

Results

Reducing the health and ecological risks associated with Pb in soil ecosystem. Sustaining natural resources and improving environmental quality and quality of life. Better management practices.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
136	Conservation of Biological Diversity
141	Air Resource Protection and Management
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals
403	Waste Disposal, Recycling, and Reuse
502	New and Improved Food Products
723	Hazards to Human Health and Safety

Outcome #4

1. Outcome Measures

Contribution to understanding of interactions between human practices and natural ecosystems; Enhanced stakeholders knowledge and understanding of environmental issues; Better management of agricultural and natural ecosystems complex.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
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3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Reducing the health and ecological risks associated with Pb in soil ecosystem. Sustaining natural resources and improving environmental quality and quality of life. Better management practices.

What has been done

Numerous workshops and presentations were given to help educate the target audience. Tests were conducted to evaluate in situ phosphate treatment of contaminated soils. Samples were taken from abandoned mines and one stream for further analysis to help determine level of contamination and impacts to ground water.

Results

The overall results, so far, is a better understanding of the relationship between soil properties and greenhouse gas emissions. More of the target audience has been informed about environmental issues and the complex interaction between natural ecosystems and human practices. Better management practices and conservation practices.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
136	Conservation of Biological Diversity
141	Air Resource Protection and Management
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals
403	Waste Disposal, Recycling, and Reuse
502	New and Improved Food Products
723	Hazards to Human Health and Safety

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

These factors could have impacted outcomes, but in the past year there were few external factors that did hinder the projects. The economy is always an issue, as joblessness, in certain areas is more prevalent and creates anxiety and tension among families and communities.

There were some problems to reach out to Hispanic audiences because of immigration issues, as many people either do not have legal documents or have relatives who are illegal. There is a false idea that Universities are governmental organizations that will report illegal immigrants to authorities.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

These factors could have impacted outcomes, but in the past year there were few external factors that did hinder the projects. The economy is always an issue, as joblessness, in certain areas is more prevalent and creates anxiety and tension among families and communities.

There were some problems to reach out to Hispanic audiences because of immigration issues, as many people either do not have legal documents or have relatives who are illegal. There is a false idea that Universities are governmental organizations that will report illegal immigrants to authorities.

Key Items of Evaluation

Overall, the stakeholders were very receptive to the studies that are designed to provide healthier living conditions for their families. People are aware of the environment and understand the need to study and document runoff from abandoned mines and CAFOs. Participants were excited about the idea of using native plants for pollinators and a special crop subsidy.

V(A). Planned Program (Summary)

Program # 7

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
402	Engineering Systems and Equipment	0%	0%	0%	25%
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	0%	0%	0%	50%
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	0%	100%	0%	25%
Total		0%	100%	0%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	2.0	0.0	4.0
Actual Paid	0.0	2.0	0.0	4.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	194098	0	493364
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	191838	0	582550
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- 1) Perform experiments and publish results
- 2) Presentation of experimental results in scientific conference and seminars
- 3) Conduct workshops
- 4) Distribution of information on nutrition and physical activity to clientele

2. Brief description of the target audience

African-Americans, low-income families and other under-represented groups in St. Louis, Kansas City, Bootheel and Jefferson City areas in the State of Missouri.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

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

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

Patent Applications Submitted

Year: 2015
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	0	0	5

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of publication, presentations, workshops and contacts.

Year	Actual
2015	31

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Measurable improvements in public health and reduction in health care costs for specific population such as African-Americans, low-income families and other under-represented groups. Expect 80% positive response of those contacted.
2	Children and adults make short-term and long-term decisions on healthier choices and increased physical activities.

Outcome #1

1. Outcome Measures

Measurable improvements in public health and reduction in health care costs for specific population such as African-Americans, low-income families and other under-represented groups. Expect 80% positive response of those contacted.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

All families who prepare food want to know that the food they purchase and prepare is free of bacteria and other pathogens.

What has been done

Workshops and presentations to community groups, schools, and students to stress the importance of nutritious, fully cooked food.

Results

Expect an 80% positive response of those contacted.

4. Associated Knowledge Areas

KA Code	Knowledge Area
402	Engineering Systems and Equipment
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #2

1. Outcome Measures

Children and adults make short-term and long-term decisions on healthier choices and increased physical activities.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Health officials, food processors and handlers. Low-income and under served populations. Safe, clean food is necessary to help prevent illnesses, and lower health care costs.

What has been done

Early testing of sensor to more readily identify bacteria and other food pathogens. Early experiments indicate that the testing device is very sensitive with positive results so far.

Results

Early elimination of contaminated food to prevent human illnesses and costly market recalls. Experiments are still being conducted.

4. Associated Knowledge Areas

KA Code	Knowledge Area
402	Engineering Systems and Equipment
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes

Brief Explanation

Changes in any of these external factors could ultimately impact funding dollars that are necessary to continue with the project.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

To be determined.

Key Items of Evaluation

Project will decrease the evaluation time to detect E. coli and other bacteria and food pathogen. This detection and evaluation method will reduce the detection time and provide timely identification prior to the food being sold to consumers. An early determination of contamination will prevent the food from being sold, will prevent people from becoming ill, and will prevent costly food recalls.

Positive response from those contacted in regards to keeping food clean of bacteria and proper cooking methods.

V(A). Planned Program (Summary)

Program # 8

1. Name of the Planned Program

Sustainable Energy

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	0%	0%	0%	10%
111	Conservation and Efficient Use of Water	0%	0%	0%	10%
131	Alternative Uses of Land	0%	0%	0%	5%
132	Weather and Climate	0%	20%	0%	5%
133	Pollution Prevention and Mitigation	0%	20%	0%	10%
141	Air Resource Protection and Management	0%	10%	0%	0%
402	Engineering Systems and Equipment	0%	20%	0%	0%
403	Waste Disposal, Recycling, and Reuse	0%	20%	0%	5%
404	Instrumentation and Control Systems	0%	10%	0%	0%
511	New and Improved Non-Food Products and Processes	0%	0%	0%	55%
	Total	0%	100%	0%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	1.0	0.0	2.0
Actual Paid	0.0	1.0	0.0	2.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	0	209681
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	0	209681
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Proposed studies are designed to fully develop, evaluate, and demonstrate the capabilities of the innovative technology for economical and efficient production of algae-derived oils for use as the source of biofuel. To achieve the overall goal, the proposed work will be performed in two major areas: 1) Microalgae cultivation and harvest, and 2) Algae oil extraction and transesterification.

The ultimate goal of another project is to maximize the bioenergy (biomethane, and bio-oil) production from switchgrass with producing biochar as a valuable soil amendment. To achieve this goal, experiments along with energy and mass balance models will be combined to optimize the net energy production from two conversion systems including integrated biochemical and thermochemical conversion processes. Microalgae will be used as an amendment to adjust the C: N ratio and moisture content of switchgrass prior to the biochemical conversion processes.

A third study will evaluate the application of biochar to soil as a novel approach to establish a long-term sink for atmospheric carbon dioxide in the terrestrial ecosystem. The application of biochar to soil has the potential to improve soil fertility and increase crop production. This project will address whether carcinogenic polycyclic aromatic hydrocarbons (PAHs) are formed in the process of slow pyrolysis of air-dried biomass, and if so, how the process could be modified and standardized to reduce or eliminate the possibility of PAHs formation. A "Biochar Thermal Index" will be developed based on thermochemical decomposition of lignin constituent of biomass.

2. Brief description of the target audience

- Undergraduate/graduate students
- Small Farmers
- Local Electric Cooperatives
- Scientists and other Researchers
- Extension workers
- Policy makers/ Regulatory Agencies
- Local Citizens/Community Leaders
- Engineers

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

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

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

Patent Applications Submitted

Year: 2015

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	0	5	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Short term output measures are: Abstracts, presentations, training students, and workshops. Intermediate output measures are publications

Year	Actual
2015	15

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Identify high yielding, hardy pest resistant microalgae strains.
2	Develop commercial cultivation system for mass production of algal biomass
3	Educate stakeholders on research status for environmental solutions
4	Educate farmers, scientists, and engineers about the economic feasibility of biomass production.
5	A "Biochar Thermal Index" will be developed based on thermochemical decomposition of lignin constituent of biomass.

Outcome #1

1. Outcome Measures

Identify high yielding, hardy pest resistant microalgae strains.

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Small farmers, electric cooperatives, community leaders, citizens all have a vested interest in evaluating alternative fuel sources.

What has been done

Collection of many micro-algal species, specifically native species that adapt well, has been established

Results

Two private companies have already shown an interest in the test evaluations of their proprietary processes using selected algae species. The project has been expanded to develop a microalgae cultivation system that can utilize carbon dioxide in the flue gas from the fossil-fuel power plant.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
131	Alternative Uses of Land
132	Weather and Climate
133	Pollution Prevention and Mitigation
141	Air Resource Protection and Management

402	Engineering Systems and Equipment
403	Waste Disposal, Recycling, and Reuse
404	Instrumentation and Control Systems
511	New and Improved Non-Food Products and Processes

Outcome #2

1. Outcome Measures

Develop commercial cultivation system for mass production of algal biomass

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Small farmers, electric cooperatives, community leaders, citizens all have a vested interest in evaluating alternative fuel sources.

What has been done

Collection of many micro-algal species, specifically native species that adapt well, has been established

Results

Two private companies have already shown an interest in the test evaluations of their proprietary processes using selected algae species. The project has been expanded to develop a microalgae cultivation system that can utilize carbon dioxide in the flue gas from the fossil-fuel power plant.

4. Associated Knowledge Areas

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

132	Weather and Climate
133	Pollution Prevention and Mitigation
141	Air Resource Protection and Management
402	Engineering Systems and Equipment
403	Waste Disposal, Recycling, and Reuse
404	Instrumentation and Control Systems
511	New and Improved Non-Food Products and Processes

Outcome #3

1. Outcome Measures

Educate stakeholders on research status for environmental solutions

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Small farmers, Community leaders, Electric cooperatives.

What has been done

Working on the new transesterification method for the economical production of biodiesel from oil-bearing crops, including microalgae.

Results

Two private companies have shown an interest in the test evaluations.

4. Associated Knowledge Areas

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

131	Alternative Uses of Land
132	Weather and Climate
133	Pollution Prevention and Mitigation
141	Air Resource Protection and Management
402	Engineering Systems and Equipment
403	Waste Disposal, Recycling, and Reuse
404	Instrumentation and Control Systems
511	New and Improved Non-Food Products and Processes

Outcome #4

1. Outcome Measures

Educate farmers, scientists, and engineers about the economic feasibility of biomass production.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

All stakeholders have an interest in finding viable environmental solutions.

What has been done

Numerous presentations, publications, and workshops have informed all targeted audiences about the present research status.

Results

A more informed and interested stakeholder audience.

4. Associated Knowledge Areas

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

111	Conservation and Efficient Use of Water
131	Alternative Uses of Land
132	Weather and Climate
133	Pollution Prevention and Mitigation
141	Air Resource Protection and Management
402	Engineering Systems and Equipment
403	Waste Disposal, Recycling, and Reuse
404	Instrumentation and Control Systems
511	New and Improved Non-Food Products and Processes

Outcome #5

1. Outcome Measures

A "Biochar Thermal Index" will be developed based on thermochemical decomposition of lignin constituent of biomass.

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

All stakeholders have an interest in finding viable environmental solutions.

What has been done

Numerous presentations, publications, and workshops have informed all targeted audiences about the present research status

Results

A more informed and interested stakeholder audience.

4. Associated Knowledge Areas

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

131	Alternative Uses of Land
511	New and Improved Non-Food Products and Processes

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

Changes to any or all of these external factors could have a substantive impact on continued research. Research is dependent upon funding, which is a product of the economy, government regulations, and changes in public policy and appropriations.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

More testing is still needed with the micro-algal studies. Private companies do show an interest, but more information needs to be evaluated to determine the economic feasibility of both projects. Biochar studies have just been started and more information is needed to present an in-depth evaluation.

Key Items of Evaluation

There is real interest from stakeholders in the future potential of alternative fuel sources. Stakeholders are willing to look to the future and maintain an open mind with regards to potential energy sources that are economically useable.

V(A). Planned Program (Summary)

Program # 9

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
607	Consumer Economics	0%	0%	0%	25%
701	Nutrient Composition of Food	0%	10%	0%	25%
702	Requirements and Function of Nutrients and Other Food Components	0%	15%	0%	25%
703	Nutrition Education and Behavior	0%	50%	0%	0%
704	Nutrition and Hunger in the Population	0%	10%	0%	0%
724	Healthy Lifestyle	0%	15%	0%	25%
	Total	0%	100%	0%	100%

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	1.0	0.0	2.0
Actual Paid	0.0	1.0	0.0	2.0
Actual Volunteer	0.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	0	122071
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	26412	0	95659
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Perform experiments and publish results.
- Presentation of experimental results in scientific conference and seminars.
- Conduct workshops.
- Distribution of nutritional information and physical activities.
- Missouri Childhood Obesity Prevention and Double Dutch Program.
- Double Dutch Obesity Reduction Program

2. Brief description of the target audience

African-Americans, low-income families and other under-represented groups in St. Louis, Kansas City, the Bootheel, and Jefferson City areas in the State of Missouri.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

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

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

Patent Applications Submitted

Year: 2015

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of publications, presentations, workshops, and contacts.

Year	Actual
2015	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Increase knowledge of good nutrition measured by surveys pre- and post-nutrition education. Increased awareness about relationship between nutrition and physical activity and chronic diseases measured by periodic surveys. increase nutrition knowledge, awareness, and importance of nutrition for prevention of chronic diseases.
2	Number of citations of publications by other scientists in scientific papers. -Use of research results by nutrition extension and health care specialists. Improvement of eating behavior and physical activities. -Decrease in percentage of overweight and obesity in research and extension participants. Medium-term: 2010 - measurable weight reduction (1-5%) in overweight and obese subjects and clientele. Utilization of research outcomes by the extension specialist (2-3 good nutrition guides). measurable weight reduction (1-5%) in overweight and obese subjects and clientele 2011 - Utilization of research outcomes by the extension specialist (2-3 good nutrition guides). 2012 - Same as 2011. 2013 - Same as 2012 and number of citations of publications = 10 2014 - Same as 2013 and number of citations of publications = 15

Outcome #1

1. Outcome Measures

Increase knowledge of good nutrition measured by surveys pre- and post-nutrition education. Increased awareness about relationship between nutrition and physical activity and chronic diseases measured by periodic surveys. Increase nutrition knowledge, awareness, and importance of nutrition for prevention of chronic diseases.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The prevalence of high blood pressure, diabetes, and obesity in the minority and limited resource audiences (both children and adults) served by LU Extension.

What has been done

Classes were provided for children and parents. Creative methods to increase activity for children were provided. Double Dutch Jumping competitions were held. All competitors were involved in health and nutrition classes.

Results

Over a majority of the people surveyed indicated that they have made at least one positive change in their eating or exercise experience.

4. Associated Knowledge Areas

KA Code	Knowledge Area
607	Consumer Economics
701	Nutrient Composition of Food
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior

704 Nutrition and Hunger in the Population
724 Healthy Lifestyle

Outcome #2

1. Outcome Measures

Number of citations of publications by other scientists in scientific papers. -Use of research results by nutrition extension and health care specialists. Improvement of eating behavior and physical activities. -Decrease in percentage of overweight and obesity in research and extension participants. Medium-term: 2010 - measurable weight reduction (1-5%) in overweight and obese subjects and clientele. Utilization of research outcomes by the extension specialist (2-3 good nutrition guides). measurable weight reduction (1-5%) in overweight and obese subjects and clientele 2011 - Utilization of research outcomes by the extension specialist (2-3 good nutrition guides). 2012 - Same as 2011. 2013 - Same as 2012 and number of citations of publications = 10 2014 - Same as 2013 and number of citations of publications = 15

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Obesity is a serious nutritional problem in the United States. The prevalence of obesity is currently estimated at over 20% of the population.

What has been done

Numerous workshops and presentations were given to school age children and adults.

Results

The vast majority of the participants recognized the need to live healthier and to eat healthier and to get regular exercise. People are generally very receptive to new ideas on food and exercise.

4. Associated Knowledge Areas

KA Code	Knowledge Area
607	Consumer Economics
701	Nutrient Composition of Food
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
724	Healthy Lifestyle

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes

Brief Explanation

Extreme weather conditions in Southeast Missouri increased the joblessness situation in an already hard hit area. Overall, the economic situation has made it more difficult on families in underserved areas. State budget cuts have had a huge impact in some areas, resulting in more stress and tension in families and communities.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Pre and post program surveys will be utilized to measure educational and change results.

Key Items of Evaluation

Consistency with participants in following through with program events, goals, and plans.

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 with climate adaptive traits.
Global Food Security and Hunger (Outcome 1, Indicator 4.a)	
0	Number of participants adopting best practices and technologies resulting in increased yield, reduced inputs, increased efficiency, increased economic return, and/or conservation of resources.
Global Food Security and Hunger (Outcome 2, Indicator 1)	
0	Number of new or improved innovations developed for food enterprises.
Food Safety (Outcome 1, Indicator 1)	
0	Number of viable technologies developed or modified for the detection and
Sustainable Energy (Outcome 3, Indicator 2)	
0	Number of farmers who adopted a dedicated bioenergy crop
Sustainable Energy (Outcome 3, Indicator 4)	
0	Tons of feedstocks delivered.