2011 Lincoln University of Missouri Combined Research and Extension Plan of Work

I. Plan Overview

1. Brief Summary about Plan Of Work

Missouri ranks second only to Texas in the number of farms. Of the almost 108,000 farms, in Missouri, approximately 82,000 are considered small farms. 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 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.

Busby farm will be the 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 will complement 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 will be exposed to agricultural practices at Busby and will be provided the opportunity to assist the manager. This will be 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 farm. These projects will 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

<u>Animal science</u>

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

Ruminant research at Lincoln University is currently in three primary areas: First, researchers are testing various herbal treatments for the impact on internal parasite load. Second, embryonic and fetal mortality are large sources of economic loss in the livestock industry. Although average ovulation rates are sufficient, a significant economic loss results from a large percentage of those oocytes not resulting in live offspring. A recently approved project will involve 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. Third, Lincoln is evaluating the feasibility of developing a real-time biosensor for LH using nanotechnology derived components.

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. It is planned that an

investigator with training in pasture and forage production will be added with a split research and teaching component.

Mosquitoes are responsible for transmitting the causative agents of some of the most widespread and prevalent infections of humans, including malaria, lymphatic filariasis, yellow fever, dengue fever, and the encephalitis. The significance of mosquito-borne disease transported internationally was observed in United States during the outbreak of the West Nile virus in New York City and surrounding areas in 1999. In order to control populations of disease vectors and, in turn, control the disease agents they transmit, an extensive and thorough knowledge of the life cycle and ecology of these arthropods must exist. A recently approved project will examine the biology of mosquitoes from the viewpoint of interactions between mosquito populations and their ecosystems. Through this project we can gain a better understanding of the role that environmental factors play in larval development, adult mosquito production and fitness, and population dynamics.

Aquaculture:
This is a relatively new research area at Lincoln University, and information from ongoing and future studies will be made available for use by extension personnel at Lincoln University and at the University of Missouri. 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. This program was initiated based upon strong support for starting aquaculture research for Missouri producers. Research is needed that is specific to Missouri because the state has such wide climatic variation.

<ins>Plant Science</ins>

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.

Climate Change

<ins>Environmental Science</ins>

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.

Childhood Obesity, Food Safety

<ins>Human Nutrition and Food Safety</ins>

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

Detection and identification of bacteria and food pathogen is an essential step in food safety inspection. A recently approved project in the area of food safety will develop 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.

Sustainable Energy

<ins>Sustainable Energy</ins>

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.

Leaves and other sources as power sources will be evaluated. Leaves from yards typically go to the landfill, however, these provide a substantial source of energy that is not utilized. We will evaluate there practical use for heating systems.

<u>Programs without strong research counterparts</u>

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 Kansas City will occur through acquisition of property and construction of a facility near the downtown area. Property has been purchased and an architectural firm chosen. Programs in all these areas will assist families, youth and the elderly, as well as, entire communities that have underserved 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.

Estimated Number of Professional FTEs/SYs total in the State.

Year	Extension		Research	
	1862	**1890**	**1862**	**1890**
2011	0.0	35.0	0.0	33.5
2012	0.0	35.0	0.0	33.5
2013	0.0	36.0	0.0	34.0
2014	0.0	36.5	0.0	34.0
2015	0.0	36.5	0.0	34.0

II. Merit Review Process

1. The Merit Review Process that will be Employed during the 5-Year POW Cycle

- 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 CSREES. 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. Evaluation of Multis & Joint Activities

1. How will the planned programs address the critical issues of strategic importance, including those identified by the stakeholders?

Multi-state programming -The Change Agent States project is a catalytic step in beginning the transformation of the Land Grant system. It is a consortium of land grant institutions in fourteen states bringing the needed technical skills and training to each of the member states. Through this multistate approach, the consortium is developing successful models and systemic change strategies to support greater diversity and welcoming climates throughout the system.

Numerous joint activities with the University of Missouri include: coordination of agricultural research and extension needs as determined by stakeholder input as described in detail in a memorandum of understanding between the two universities. Lincoln University will expand efforts in aquaculture, small ruminants, horticulture (vegetable production) and small farms program.   Plans are underway to develop nanotechnology capabilities to assist in programs such as animal science and environmental science. In this collaboration LU will provide salary support for research and teaching activities for two physics faculty and UMC and Lincoln will provide facilities and equipment for conducting the research projects.

Research, extension and teaching personnel that are implementing these programs at LU interact with UMC field staff for assistance with activities and disseminating information throughout the state. Information obtained at LU will be disseminated both electronically and in print to UMC staff. Community development, 4-H and Youth development components of our programs utilize the infrastructure provided by UMC for assistance.

2. How will the planned programs address the needs of under-served and under-represented populations of the

Collaborative efforts with 4-H, Youth and community development allow Lincoln University to provide UMC greater access to minority and underserved populations in regions such as the bootheel, St. Louis and Kansas City, and Southwest Missouri. Lincoln University also benefits through the infrastructure support that UMC provides.

One of the targets of the goat program will be with Hispanic populations in the state since one of the main products from Hispanics in the southern portions of Missouri is goats. Collaboration with UMC and Missouri State University will enhance our ability to target this population.

3. How will the planned programs describe the expected outcomes and impacts?

The primary outcomes anticipated by efforts at Lincoln University are to improve the quality of life and/or assist under-represented and under-served individuals in living with a sustainable income in an environment of their choosing.This environment could be in urban regions, at the rural/urban interface, or in isolated rural areas.

4. How will the planned programs result in improved program effectiveness and/or efficiency?

These programs will result in greater integration of activities within LU and between LU and other Universities within Missouri. The MOU between Lincoln and UMC will also assist in sharing knowledge and activities to a greater degree and will allow LU to concentrate efforts on fewer research programs for meeting the needs of clientiele throughout the state.

IV. Stakeholder Input

1. Actions taken to seek stakeholder input that encourages 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.

The listed actions do not occur in each program. Most programs do not use all the methods listed above to seek stakeholder input. All programs, however, use at least two of the above actions, and multiple programs use four of the above methods.

In general, stakeholders are invited to events and provided with information using mail lists, newletters, association publications, presentations at stakeholder meetings, workshops and personal interactions. New releases inform and invite the general public. Efforts are evaluated and the results are used to modify and/or redirect formats as needed.

2(A). A brief statement of the process that will be 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 External Focus Groups
- Needs Assessments
- Use Surveys

Brief explanation.

Targeted tools include a needs analysis, and surveys. Surveys are conducted at Lincoln University for selected programs. The University of Missouri also shares their statewide survey results database.

2(B). A brief statement of the process that will be 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
- Meeting specifically with non-traditional individuals
- Meeting with invited selected individuals from the general public

Brief explanation.

Some of the non-traditional and traditional groups includes vegetable producers organizations, aquaculture organizations, organic farmers, as well as with sheep and goat association members. Also included are students, teachers, engineers, other scientists, and community leaders.

3. A statement of how the input will be considered

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

Brief explanation.

Advisory groups with indidivuals targeted from specific populations of stakeholders will receive an invitation once each year to hear research/extension activities and they will be asked to make recommendations for the coming years priorities.

V. Planned Program Table of Content

S. No.	PROGRAM NAME
1	Global Food Security and Hunger
2	Community and Leadership Development
3	Family and Youth Development
4	Climate Change
5	Food Safety
6	Sustainable Energy
7	Childhood Obesity

V(A). Planned Program (Summary)

<u>**Program # 1**</u>

1. Name of the Planned Program

Global Food Security and Hunger

2. Brief summary about Planned Program

<u>Animal Science</u>

Lincoln University, Cooperative Research and Extension Animal Sciences Program (ASP) investigates production practices for economically important livestock species and risks to human and animal health. The species chosen are of value to farmers with limited resources. Stakeholder input is based on local livestock associations (North Central Regional Aquaculture Center, Missouri Aquaculture Association, Missouri Sheep and Goat Producers, and Missouri Cattleman's Association), market trends and direct requests.

Livestock production addresses improving approaches to internal parasite control and disease prevention, and improving animal production management systems through enhancing reproductive efficiency, genetic advancement, and nutrition. The target audience, limited resource farmers and their families, will be informed of methods to employ, which will enhance thier farming operation's profitability and sustainability through workshops and programs. Examples of workshops and programs include: shearing and fitting schools, pasture management, artificial insemination, and herd and flock health management.

The animal science program includes food-fish production research in the areas of: nutrition (bluegill and crappie), genetics (sunfishes), production dynamics (sunfishes), pest management, and fish health.

The insect and pest management program will address factors related to insect-borne diseases of humans and animals. Understanding the environmental, ecological, and genetic factors related to insect vector disease transmission will enable development of more effective vector management strategies and lower rates of insect transmitted disease in humans and animals.

Outcomes are to improve production efficiency and increase opportunities with new strategies regarding livestock and fish production.These results are essential to enable sustainability of diversified production for small and limited resource farmers.

<u>Plant Science</u>

The Small Farm Research and Extension program has the objectives of supporting the 1890 Mission through research on crop production problems, aimed at improving the economic and social wellbeing of underserved rural and urban residents with limited resources.

The program also emphaasizes a collaborative team effort in areas of small fruits and vegetables crops as well as herbs and spices. It will continue to strive for reaching more limited resource farmers and ranchers and deliver appropriate research-based information and education that will eventually lead to overall wellbeing of their family.

3. Program existence : Intermediate (One to five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships		5%		8%
111	Conservation and Efficient Use of Water		5%		5%
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants		2%		2%
204	Plant Product Quality and Utility (Preharvest)		5%		5%
205	Plant Management Systems		5%		7%
212	Pathogens and Nematodes Affecting Plants		2%		2%
216	Integrated Pest Management Systems		5%		5%
301	Reproductive Performance of Animals		5%		5%
302	Nutrient Utilization in Animals		5%		5%
303	Genetic Improvement of Animals		10%		10%
307	Animal Management Systems		15%		15%
311	Animal Diseases		6%		6%
313	Internal Parasites in Animals		5%		5%
405	Drainage and Irrigation Systems and Facilities		2%		2%
503	Quality Maintenance in Storing and Marketing Food Products		5%		0%
601	Economics of Agricultural Production and Farm Management		8%		8%
604	Marketing and Distribution Practices		5%		5%
721	Insects and Other Pests Affecting Humans		5%		5%
	Total		100%		100%

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Situation

Lincoln University's target audience is limited resource producers participating in agricultural enterprises on small acreages. Missouri has 82,000 small farms, which accounts for almost 80% of the total number of farms in the state. The heads of households in the majority of small farm families are employed outside the home. These families need research based alternative options to sustain their way of life. The state's diverse climate, geology, geography provide unique opportunities and challenges to Missouri farmers. Missouri is the third largest cow-calf producer in the United States and improved efficiency of production is needed to maintain this status. Alternatives to cattle for small farm operators include sheep and goats, which are easy to handle and can browse and consume forbs, which are not preferred by cattle. Missouri is a top sheep and goat producing state.

Missouri is the second largest aquaculture producing state in the Midwest. It is an important industry to support since it is second only to oil in contributing to the U.S. trade deficit. Fishery harvests are in decline, yet demand for fishery products

is increasing. There is a need for increased seafood production and aquaculture can provide an alternative supply for seafood products. Sunfishes, native to Missouri, are highly regarded as food fishes and have been identified as potential aquaculture taxa for the North Central region. However, there are critical factors limiting their economic and sustainable production.   Other potential species may become important and will offer the same type of research opportunities.

Mosquitoes are responsible for transmitting the causative agents of some of the most widespread and prevalent infections of humans and animals. A variety of environmental factors contribute to the growth and development of larval mosquitoes and to the consequent production of adults. By examining the biology of mosquitoes from the viewpoint of interactions between mosquito populations and their ecosystems, we can gain a better understanding of the role that environmental factors play in larval development, adult mosquito production and fitness, and population dynamics all of which contribute to their ability to transmit diseases.

Priorities

Livestock:
1). Develop improved approaches to internal parasite control and disease prevention.
2). Develop improved animal production management systems through enhancing reproduction, genetics, and nutrition.

Aquaculture:
1). Define nutritional requirements for sunfish.
2). Development of fast growing and pure cultigens.
3). Improve production dynamics.
4). Resolve sunfish health issues.

Insects and other pests:
1). Determine cooperation and competition in mosquito populations.
2). Determine how factor modification affects developmental responses in larval mosquitoes.
3). Collect and maintain mosquito strains from various geographic locales having phenotypic plasticity.
4). Perform phenotypic and genetic variation analysis among strains from different geographic locales.
5). Determine genetic loci associated wtih variation.

Plant Science:
1). Identify the needs and expectations of small farmers in Missouri. Continue to update the information gathered from the small farms survey conducted in 2001, and gather information periodically from several sources, including the USDA Agriculture Census data.
2). Keep the County-based Small Farm Program staff (Farm Outreach Workers) infomed of the latest farming-related innovations and developments so that they can share the infomation wit the collaborating farmers and ranchers.
3). Increase the capability for controlled environmental research at the University (high tunnel, hydroponics, etc.). Continue to conduct small-fruit and vegetable variety trials.
4). Promote production of value--added products, and assist small farmers and ranchers to explore and utilize new marketing techniques.

2. Scope of the Program

- In-State Extension

- In-State Research

- Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

Assumptions:

1). Funding--Program funding levels will increase at rate of 3% per year through the five-year period of this plan. There will be continuity in the funding of the program objectives over the stated time period

2). Facilities and Equipment--Adequate facilities (research, education, and land) are available or will be acquired as required to support research and extension efforts in this program.

3). Personnel--Skilled researchers, educators. and support staff having the appropriate knowledge bases are available or will be hired to support the efforts of this plan.

4). Adminstrative Support--Skilled administrative support staff are available to provide required oversight, accounting, and periodic reporting tasks to enable researchers to remain focused on achieving program results. There will be stability n the administration, faculty, and staff over the stated period.

5). Partnerships--Lincoln University will establish partnerships to promote achievement and dissemination of the results of this program. The program will continue to have sustained and continued stakeholder participation.

6). Relevance fo Program--Program is relevant to our targeted audience and stakeholders.

7). Adoption of Techniques--Targeted audiences will accept and adopt the results of the research program.

8). The objectives of the program are consistent with the University Mission.

2. Ultimate goal(s) of this Program

 Goals:

1). To provide research and extension products that enables limited resource farmers in Missouri to improve profitability and sustainability fo their agricultural enterprises resulting in an improved quality of life for the farm family.

2). To reduce the threat to Missouri residents from insect vector-borne diseases.

3). To build a strong farm economy and a satisfying family life. Promote sustainable farming practices (meaning those that are profitable, environmentally friendly, and socially responsible).

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	**1890**	**1862**	**1890**
2011	0.0	6.0	0.0	17.0
2012	0.0	6.0	0.0	17.0
2013	0.0	7.0	0.0	17.5
2014	0.0	7.5	0.0	17.5
2015	0.0	7.5	0.0	17.5

V(F). Planned Program (Activity)

1. Activity for the Program

a. Conduct research to control internal parasites and prevent diseases in small ruminants.
. 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 reducemosquito 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, publicatons, grant proposals, and guide sheets.
m. Promotion of backyard and community gardening.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
● Workshop	● Public Service Announcement
● Group Discussion	● Newsletters
● One-on-One Intervention	● TV Media Programs
● Demonstrations	● Web sites
● Other 1 (Field Days)	● Other 1 (Festivals and Fairs)
● Other 2 (Undergraduate Research)	

3. Description of targeted 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.

V(G). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons(contacts) to be reached through direct and indirect contact methods

Year	Direct Contact Adults Target	Indirect Contacts Adults Target	Direct Contacts Youth Target	Indirect Contacts Youth Target
2011	3400	83000	500	2300
2012	3900	83000	500	2300
2013	3900	83500	500	2300
2014	3900	83500	500	2300

	Direct Contact Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2015	4400	83500	500	2300

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

2011:0   **2012:**0   **2013:**0   **2014:**0   **2015:**0

3. Expected Peer Review Publications

Year	Research Target	Extension Target	Total
2011	5	4	9
2012	6	5	11
2013	7	7	14
2014	8	7	15
2015	8	7	15

V(H). State Defined Outputs

1. Output Target

- Projects completed, presentations and manuscripts.
  Enhanced profitability of small farms.
  Enhanced vitality and strengthening of rural communities.
  2011:21   **2012:**16   **2013:**24   **2014:**26   **2015:**28

V(I). State Defined Outcome

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-Develop better understanding of environmental factors which contribute to the mosquito's ability to transmit disease to humans and animals. To develop mosquito population management strategies focused on manipulation of environmental factors to influence the mosquito's ability to transmit disease.
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.
6	Enhanced profitability of small farms. Increase farm growth income by $5,000. Enhanced vitality and viability of rural communities. Increase farm retention rates.

Outcome # 1

1. Outcome Target

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-Develop better understanding of environmental factors which contribute to the mosquito's ability to transmit disease to humans and animals. To develop mosquito population management strategies focused on manipulation of environmental factors to influence the mosquito's ability to transmit disease.

2. Outcome Type : Change in Knowledge Outcome Measure

2011:4085   **2012:**4085   **2013:**4085   **2014:**4085   **2015:**4085

3. Associated Knowledge Area(s)

- 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
- 721 - Insects and Other Pests Affecting Humans

4. Associated Institute Type(s)

- 1890 Extension
- 1890 Research

Outcome # 2

1. Outcome Target

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

2. Outcome Type : Change in Action Outcome Measure

2011:1640   **2012:**1640   **2013:**1640   **2014:**1640   **2015:**1640

3. Associated Knowledge Area(s)

- 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

4. Associated Institute Type(s)

- 1890 Extension

- 1890 Research

<u>**Outcome #** 3</u>

1. Outcome Target

Farmers adopt new technologies for increased and sustainable production.

2. Outcome Type : Change in Condition Outcome Measure

2011:1640   **2012:**1640   **2013:**1640   **2014:**1640   **2015:**1640

3. Associated Knowledge Area(s)

- 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

4. Associated Institute Type(s)

- 1890 Extension

- 1890 Research

<u>**Outcome #** 4</u>

1. Outcome Target

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. Outcome Type : Change in Knowledge Outcome Measure

2011:150   **2012:**150   **2013:**200   **2014:**200   **2015:**250

3. Associated Knowledge Area(s)

- 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

4. Associated Institute Type(s)

- 1890 Extension

- 1890 Research

Outcome # 5

1. Outcome Target

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. Outcome Type : Change in Action Outcome Measure

| **2011:**1000 | **2012:**1200 | **2013:**1200 | **2014:**1400 | **2015:**1500 |

3. Associated Knowledge Area(s)

- 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

4. Associated Institute Type(s)

- 1890 Extension

- 1890 Research

Outcome # 6

1. Outcome Target

Enhanced profitability of small farms. Increase farm growth income by $5,000. Enhanced vitality and viability of rural communities. Increase farm retention rates.

2. Outcome Type : Change in Action Outcome Measure

| **2011:**1200 | **2012:**1200 | **2013:**1250 | **2014:**1450 | **2015:**1450 |

3. Associated Knowledge Area(s)

- 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

4. Associated Institute Type(s)

- 1890 Extension

- 1890 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect 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.)

Description

A major factor regarding the aquaculture program are energy costs for maintaining facilities at proper temperature, as well as water quality issues.For the Small ruminant program, it will be dependent upon the ability to find and acquire appropriately trained personnel and long-term demand for goat meat.

For plant science, changes in the Federal Government's agricultural and economic policies could have an adverse effect on planned programs. That is the same if local and State government policies change. Stakeholder expectations and natural disasters could also negatively impact programs and outcomes.

V(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- Case Study

Description

Many of these programs at the current time are still at the level of determining appropriate research methods.The economics of these will be determined and if the program appears to be economically feasible, then it will be transferred and evaluated under field conditions as case studies.
The plant science program will undergo annual evaluations and a comprehensive evaluation at the end of the five year period.

2. Data Collection Methods

- Sampling
- Mail

- On-Site
- Structured
- Unstructured
- Case Study
- Observation
- Tests

Description

    Those producers receiving the updated information and incorporating it into the program will be evaluated for their perceptions including labor, economics and marketing.

    Send survey instrument to a random sample of the targeted population. Utilize the services of a Program Evaluation Specialist to work with the Program personnel for collection, analyses, and evaluation of data. The final report will be compiled and professionally produced. Copies will be sent to all appropriate key personnel.

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Community and Leadership Development

2. Brief summary about Planned Program

     The Community and Leadership Development (CLD) planned program will include: community and organizational-based workshops, meetings, trainings, curriculum implementation, community assistance, organizational development, fund development, community and organizational planning, information exchange, etc, to communities and organizations that help improve the overall quality of life and standard of living for those communities and enhance the efficiency and effectiveness of those organizations. The CLD program creates, applies and transfers multidisciplinary knowledge to help people understand community change and identify opportunities in a collaborative manner.

     The targeted audience will be underserved and underrepresented communities. Also targeted among adults will be those who are currently serving in or aspire to serve in a leadership role or in an agency, organization, neighborhood, club, community, business.

3. Program existence : Intermediate (One to five years)

4. Program duration :   Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : No

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
602	Business Management, Finance, and Taxation		15%		0%
608	Community Resource Planning and Development		25%		0%
802	Human Development and Family Well-Being		5%		0%
803	Sociological and Technological Change Affecting Individuals, Families, and Communities		5%		0%
805	Community Institutions, Health, and Social Services		15%		0%
806	Youth Development		10%		0%
901	Program and Project Design, and Statistics		10%		0%
902	Administration of Projects and Programs		10%		0%
903	Communication, Education, and Information Delivery		5%		0%
	Total		100%		0%

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Situation

Due to the rapid growth of small towns and the numerous laws associated with managing them, many community leaders have requested training to assist them in executing their duties. Small towns and community leaders are often unprepared for their roles in administration and management, especially when it comes to expending tax payer's money.

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.

Hundreds of small town administrators in the state of Missouri are entrusted with managing the day-to-day affairs of their communities, from issuing permits and licenses, to handling local elections, to collecting taxes. These persons must comply with a variety of local and state laws and ordinances set forth by elected officials at all levels of government, as well as answer to their local constituents. Keeping up with thousands of laws and processes is not easy for the small town administrators in Missouri. They need training in how to manage their responsibilities and to keep up with constantly changing policies. Many organizations and agencies are finding their managers/officers have not had formal training in how to manage organizations, other people, and/or the public. As a result, there are often miss-steps and time lost as these individuals learn "on the job."

When officers or administrators in small towns or community organizations don't have the skills needed to manage projects, it costs the organization in efficiency and effectiveness - affecting profitability, membership and poor public relations. Many organizations don't have the internal resources to provide training in many of these needed areas of administration. They are constantly looking for affordable experts at the university to provide applicable skills in a format useful to the learner.

Training will help participants become more effective within their organizations and ultimately enhancing the quality of life and standard of living within the communities they serve. Communities reap rewards when residents become involved, raise their awareness of issues, and improve their leadership skills. Building a community where people want to live, work and play has its long term rewards.

The Lincoln University Center for Community and Leadership Development (LUCCLD) has developed training sessions and workshops in leadership and administrative management that help participants work more effectively with village, town, and city boards; communicate with citizens; and establish policies that use local resources wisely. The program also helps participants build a professional network for continued learning and support. The sessions often focus on leadership skill development, laws, rules, and regulations that affect small towns and communities. Sessions will also focus on the effects of educational processes, governmental administration, business and economic development, public health and human services.

Training and workshops in this area aims to better prepare supervisors and officers for their position and responsibilities. Workshop topics are Basic Leadership Skills, Work Planning and Goal Setting, Customer/ Resident Relations, Effective Communication Skills, Budgeting, Fund Accounting and Grant Administration, "Nuts and Bolts" of Personnel Management, Managing "Troubled" and "Problem" Employees, and Negotiations.

The LUCCLD has developed a series of workshops and training sessions to help them administer better. Critical skills areas include: Leadership, Community Resource Planning, Negotiation Skills, Planning and Development, Communication Skills, Youth Development, and General Community and Organizational Skills. The goals of this training are to assist individuals to be more professional and effective with personnel issues and when communicating with citizens and employees.

The LUCCLD has also launched efforts aimed at empowering citizens with information and skills to heighten awareness and deepen civic involvement. The goals of these workshops and training are to improve participant's skills in working with others, to increase citizen involvement, and effective decision-making to affect change.

Many of the training sessions and workshops will be based on the cohort model, meaning that the same group of individuals will participate in a series of sessions from start to finish (two-nine hour sessions). Program sessions will focus on such topics as self-awareness, understanding and leading people, getting results, and strategic thinking.

Priorities

Improving small towns and community organization efficiency through teaching and improving leadership and management skills of will be emphasized.

Provide Leadership and Organizational Development Training for Small Towns and Communities in Missouri.
General Community and Organizational Skill Building Leadership Programs.
Preparing Small Town and Community Leaders to Work more effectively with the Public.
Training and Skills that Improves Small Town, Community and Organizational Efficiency and Effectiveness.
Leadership Management Skills for Improved Efficiency and Human Relations.

2. Scope of the Program

- In-State Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

That the program is assured of continuous funding.
That the stakeholders will use the information provided to enhance their community interaction.
That people will accept training opportunities offered to them by the program.
That policy makers will be persuaded to enact appropriate legislation, if necessary.
That there will be adequate personnel to operate the program.
That there will be adequate administrative support to maintain the program.

2. Ultimate goal(s) of this Program

Community goal attainment.
Increased capacity to deal with current and future issues.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	**1890**	**1862**	**1890**
2011	0.0	2.0	0.0	0.0
2012	0.0	2.0	0.0	0.0
2013	0.0	2.0	0.0	0.0
2014	0.0	2.0	0.0	0.0
2015	0.0	2.0	0.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

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. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
● Education Class ● Workshop ● Group Discussion ● One-on-One Intervention	● Newsletters ● Web sites ● Other 1 (Word of mouth and announcements)

3. Description of targeted audience

Small towns, community organizations and agencies.

V(G). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons(contacts) to be reached through direct and indirect contact methods

Year	Direct Contact Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
	Target	Target	Target	Target
2011	120	300	50	150
2012	130	350	55	165
2013	150	400	65	175
2014	160	400	75	185
2015	170	450	100	200

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

2011:0   **2012:**0   **2013:**0   **2014:**0   **2015:**0

3. Expected Peer Review Publications

Year	Research Target	Extension Target	Total
2011	0	0	0
2012	0	0	0
2013	0	0	0
2014	0	0	0

Year	Research Target	Extension Target	Total
2015	0	0	0

V(H). State Defined Outputs

1. Output Target

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

   2011:75   **2012:**75   **2013:**75   **2014:**75   **2015:**75

V(I). State Defined Outcome

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 Target

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. Outcome Type : Change in Action Outcome Measure

| **2011:**75 | **2012:**75 | **2013:**75 | **2014:**75 | **2015:**75 |

3. Associated Knowledge Area(s)

- 602 - Business Management, Finance, and Taxation
- 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
- 806 - Youth Development
- 901 - Program and Project Design, and Statistics
- 902 - Administration of Projects and Programs
- 903 - Communication, Education, and Information Delivery

4. Associated Institute Type(s)

- 1890 Extension

Outcome # 2

1. Outcome Target

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. Outcome Type : Change in Knowledge Outcome Measure

| **2011:**75 | **2012:**75 | **2013:**75 | **2014:**75 | **2015:**75 |

3. Associated Knowledge Area(s)

- 602 - Business Management, Finance, and Taxation
- 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
- 806 - Youth Development
- 901 - Program and Project Design, and Statistics
- 902 - Administration of Projects and Programs
- 903 - Communication, Education, and Information Delivery

4. Associated Institute Type(s)

- 1890 Extension

Outcome # 3

1. Outcome Target

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. Outcome Type : Change in Condition Outcome Measure

2011:75 **2012:**75 **2013:**75 **2014:**75 **2015:**75

3. Associated Knowledge Area(s)

- 602 - Business Management, Finance, and Taxation
- 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
- 806 - Youth Development
- 901 - Program and Project Design, and Statistics
- 902 - Administration of Projects and Programs
- 903 - Communication, Education, and Information Delivery

4. Associated Institute Type(s)

- 1890 Extension

V(J). Planned Program (External Factors)

1. External Factors which may affect 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.)

Description

All these factors may affect our planned outcomes, directly and/or indirectly.

V(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- Retrospective (post program)

Description

     Since the majority of our programming will come as the result of invitations from small towns and organizations for specific programming, behavioral modifications and anecdotal evidence will comprise the majority of our programming evaluations.

2. Data Collection Methods

- Sampling
- On-Site
- Unstructured
- Observation
- Other (Testimonials)

Description

     On-site surveys will be collected through evaluation forms. In addition to the above methods, there will be program reviews.

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Family and Youth Development

2. Brief summary about Planned Program

The needs of families today are complex and require many skills to become or maintain self-sufficiency. The focus of the programs and activities will promote positive human development. Activities will extend knowledge to participants and convey a sense of belonging, teach life skills, and provide opportunities for mastery, competence and independence. This work also includes a focus on the educational, social, health, and emotional development of program participants.

3. Program existence : Intermediate (One to five years)

4. Program duration :   Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds :   Yes

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		10%		0%
724	Healthy Lifestyle		5%		0%
801	Individual and Family Resource Management		5%		0%
802	Human Development and Family Well-Being		20%		100%
803	Sociological and Technological Change Affecting Individuals, Families, and Communities		5%		0%
805	Community Institutions, Health, and Social Services		6%		0%
806	Youth Development		40%		0%
901	Program and Project Design, and Statistics		4%		0%
903	Communication, Education, and Information Delivery		5%		0%
	Total		100%		100%

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Situation

In the United States, more than one-third (37%) of youth live in low-income families. This means the parents of these children made less than 200% of the poverty guidelines established by the federal government. The statistics concerning children living in poverty are again rising after a 10-year period of decline (National Center for Children in Poverty, 2004).

According to The National Center for Children in Poverty (NCCP), minority children are more likely to live in poverty than

those from the majority population. These minority children are also the group that leads the recent statistics showing increases of children in poverty. Low income families tend to have high mobility rates. High rates of mobility create instability and turmoil associated with issues such as the increasing educational achievement gap in low income and minority children.

Looking at The National Assessment of Educational Progress (NAEP), also known as "the Nation's Report Card," data, the Education Trust concluded that, "By the time (minority students) reach grade 12, if they do so at all, minority students are about four years behind other young people. Indeed, 17 year-old African American and Latino students have skills in English, mathematics and science similar to those of 13 year old white students." Another way to measure the achievement gap is to compare the highest level of educational attainment for various groups. Here too there are gaps at all levels. Hispanic and African-American high school students are more likely to drop out of high school in every state. Of these high school graduates, college matriculation rates for African-American and Hispanic high school students remain below those of white high school graduates - although they have risen in recent years. Furthermore, of those students enrolling in college, Hispanic and black young adults are only half as likely to earn a college degree as white students.

Findings in the NAEP primer suggest that the most successful policy initiatives recognize the critical role that parents and communities play in the care and education of young children. These efforts also encourage integration of existing programs, services, and funding streams into a flexible and comprehensive system of supports for children and families.

Difficulties in school typically result in fewer youth graduating which results in a cycle of poverty because about two-thirds of children, whose parents have no high school diploma, live in low income families.

Consistent with targeting requirements of the Older Americans Act (OAA), the Paula J. Carter Center on Aging places emphasis on services to persons with the greatest social and economic need, including members of racial and ethnic minority groups. Among the OAA Title III service recipients, 21.8 percent were members of racial and ethnic minority groups.

The efforts of Lincoln University's extension programs are concentrated in areas of Kansas City, St. Louis and Southeast Missouri where poverty levels exceed 50%. Lincoln University provides services in and around the Jefferson City area. In Jefferson City, many of the families residing in public housing are from the large urban areas of Kansas City and St. Louis. About 50% of the parents in this housing have not graduated from high school (JCHA, 1999). These statistics reflect the critical educational needs of this audience as well as the opportunity to share life development skills.

In an effort to meet the needs of this diverse audience of low income children, families, and elders, various programs must be developed and implemented that offer a level of success that has measurable outcomes. The needs for this audience are complex and generally have not been met adequately by existing programs. New ways of "reaching, teaching and inclusion" for this audience must be developed and discovered. Traditional methods are not adequate.

Priorities

Priorities of these programs are to: 1) develop leadership skills 2) improve the literacy rate of minority and under-represented groups, 3) and provide a learning environment for after school enrichment, including school homework assistance. Leadership development programs will provide guidance in volunteerism, sense of belonging, development of social skills and mentoring skills.

Many poor families are devastated by the incarceration of a parent.When a parent returns from prison, the problems do not decrease but tend to exacerbate dysfunction in families.Extension staff will develop programs to address incarcerated parents and ex-offenders reentry in to the community.

The special health, psychological and social needs of the minority and underserved older adults are only partially being met. As Missouri's population continues to age, it reflects the faces of many races and cultural lifestyles. The implications of these demographic changes for current barriers still exist that precludes entry into the healthcare system. Not only will these systems have to accommodate a vastly larger number of older persons in the new millennium, but, those whose needs are more diverse and more complex.

There is a lack of accessibility, adequate training and affordability that affect the already overworked healthcare system. An increased awareness of cultural needs, diversity, and disparity can serve as a benefit to the growing number of underserved. For Missouri to advance into a working multicultural system, all residents and providers of the State must have access to information to insure that health management occurs.

2. Scope of the Program

- In-State Extension

- Multistate Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

a). There is adequate financial support and human resources available.

). Continued concentrations of efforts in 4 regions of the state, includes Central Missouri, Kansas City, St. Louis and the Southeast region.

c). The objectives of the program remain consistent with the University's Mission.

d). Additional personnel increases will result from increased success in obtaining extramural funding.

e). The clientiele served are motivated to implement what they learn.

2. Ultimate goal(s) of this Program

To decrease poverty, in the minority and under-represented population that have received our services. Ultimately, the decreased poverty should be no higher than the averages throughout the state of Missouri.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2011	0.0	22.0	0.0	0.0
2012	0.0	22.0	0.0	0.0
2013	0.0	22.0	0.0	0.0
2014	0.0	22.0	0.0	0.0
2015	0.0	22.0	0.0	0.0

V(F). Planned Program (Activity)

1. Activity for the Program

The activities in the four Regions; Kansas City, St. Louis, Central Region, and the Boothill region all have similarities and differences. However, all have been developed to design, implement, and evaluatee educational programs for youth-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 Teen Talk Abstinence Program, for girls 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 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 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. The current lot is located in Baden, called the Baden Triumph Garden. Plans are being implemented and resources are being sought for this location.

Specific examples of activities in the Boothill 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, talent show, and entertainment 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 50 + in Cole Co. area will become more aware and knowledgeable about importance of adopting a healthy lifestyle.
Participants will become proactive in seeking health information (increasing utilization of eHealth Medline Plus website).
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.

Activities that are or will be 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.
Not on my Watch Program for parents and youth to address the issue of Childhood Obesity.
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.

&nb

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
● Education Class ● Workshop ● Group Discussion ● Demonstrations	● Newsletters ● TV Media Programs ● Web sites

3. Description of targeted 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.

V(G). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons(contacts) to be reached through direct and indirect contact methods

	Direct Contact Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2011	150	200	725	1000
2012	165	220	800	1100
2013	180	245	880	1200
2014	200	270	1000	1300
2015	220	300	1100	1400

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

2011:0   **2012:**0   **2013:**0   **2014:**0   **2015:**0

3. Expected Peer Review Publications

Year	Research Target	Extension Target	Total
2011	0	1	1
2012	0	1	1
2013	0	1	1
2014	0	1	1
2015	0	1	1

V(H). State Defined Outputs

1. Output Target

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

  2011:130   **2012:**130   **2013:**130   **2014:**130   **2015:**130

V(I). State Defined Outcome

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 Target

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

2. Outcome Type : Change in Knowledge Outcome Measure

2011:300   **2012:**300   **2013:**300   **2014:**300   **2015:**300

3. Associated Knowledge Area(s)

- 607 - Consumer Economics
- 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
- 805 - Community Institutions, Health, and Social Services
- 806 - Youth Development
- 901 - Program and Project Design, and Statistics
- 903 - Communication, Education, and Information Delivery

4. Associated Institute Type(s)

- 1890 Extension

Outcome # 2

1. Outcome Target

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. Outcome Type : Change in Action Outcome Measure

2011:300   **2012:**300   **2013:**300   **2014:**300   **2015:**300

3. Associated Knowledge Area(s)

- 607 - Consumer Economics
- 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
- 805 - Community Institutions, Health, and Social Services
- 806 - Youth Development
- 901 - Program and Project Design, and Statistics
- 903 - Communication, Education, and Information Delivery

4. Associated Institute Type(s)

- 1890 Extension

Outcome # 3

1. Outcome Target

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

2. Outcome Type : Change in Condition Outcome Measure

| **2011:**300 | **2012:**300 | **2013:**300 | **2014:**300 | **2015:**300 |

3. Associated Knowledge Area(s)

- 607 - Consumer Economics
- 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
- 805 - Community Institutions, Health, and Social Services
- 806 - Youth Development
- 901 - Program and Project Design, and Statistics
- 903 - Communication, Education, and Information Delivery

4. Associated Institute Type(s)

- 1890 Extension

V(J). Planned Program (External Factors)

1. External Factors which may affect 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.)

Description

Numerous external factors can have a profound influence on outcomes. These include factors such as long-term support of the programs, personnel available, and public funding changes due to changes in priorities and legislative action.

V(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- During (during program)

Description

Extension administrators, as well as, advisory groups will be used to monitor progress of the programs and make recommendations regarding any changes that need to be made.

2. Data Collection Methods

- Unstructured
- Observation

Description

Data will be collected by specialists that are providing the services.This will be primarily through observations, one-on-one interviews and sampling from those that are receiving our services.

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Climate Change

2. Brief summary about Planned Program

The overall goal of the plan is: 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.

"Risk characterization" which includes:
1) Survey of impaired soils, lands and waters in Missouri;
2) Identify major contaminants that threaten human health and ecosystem;
3) Characterize physical and chemical properties of contaminated sites;
4) Determine the degree and extent of contamination and geospatial distribution of contaminants;
5) Investigate the environmental behaviors and fates of contaminants.

"Integrated Risk Assessment" which includes:
1) Determination of the health and toxicological effects of identified contaminants;
2) Evaluate the ecological impacts of contaminants on water quality, microbial community vegetation, wildlife, etc.
3) Investigate the environmental behaviors and fates of contaminants.

"The cost-effective and environmental-friendly" remedial technology development which includes:
1) In-situ chemical immobilization (metals/soil);
2) Phytoremediation (metals and organics/soil);
3) Bioremediation (organics/soil-water);
4) Nanotechnology (metals-organic/waters).

"Integrated Risk Management" which will include:
1) Evaluation of long-term efficacy of remedial technology for ecological and health risk reductions; field testing and validation and field restoration.
2) Environmental monitoring.
3) Pollution Control.

3. Program existence : Intermediate (One to five years)

4. Program duration : Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

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%
111	Conservation and Efficient Use of Water		5%		0%
112	Watershed Protection and Management		15%		20%
123	Management and Sustainability of Forest Resources		5%		0%
125	Agroforestry		5%		0%
134	Outdoor Recreation		5%		0%
136	Conservation of Biological Diversity		25%		10%
141	Air Resource Protection and Management		0%		10%
205	Plant Management Systems		5%		0%
213	Weeds Affecting Plants		5%		0%
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals		0%		10%
401	Structures, Facilities, and General Purpose Farm Supplies		5%		0%
403	Waste Disposal, Recycling, and Reuse		15%		5%
502	New and Improved Food Products		5%		0%
704	Nutrition and Hunger in the Population		5%		0%
723	Hazards to Human Health and Safety		0%		20%
	Total		100%		100%

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

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. Acquiring knowledge on the effects of animal wastes from CAFOs on streams especially under local conditions, are important in understanding water quality changes and how it affects native fish species. 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 importantfor human, aquatic and environmental health. The hypothesis to test is that there are significant contributions of N, P, E. coli and antibiotic drugs from runoffs/seepage from cattle and swine wastes on water quality of selected Missouri streams.

Priority: Test water quality of selected Missouri streams to determine runoff/seepage impacts from cattle and swine wastes.

Risk Reductions and Remediation of metal-Contaminated Mining Wastes in Missouri :
Elevated metals in environment have been identified as a human health and ecological threat. In Missouri, there are thousands acres of lands that have been contaminated by various toxic metals such as Pb, Cr, Cd, due to mining activities, inappropriate waste disposals, industrial discharges, etc. Such contaminations have caused human health problems and ecological disaster. Remediation of Pb-contaminated soil for reducing the risk to human health is a national priority. In-situ immobilization is being tested and emerging as a potential cost-effective remedial alternative for safeguarding human and environment from metal-contamination.

Priority: Determine if in situ soil treatment can reduce risks and remediation of metal contaminated soils in Missouri

Watershed Based Studies:
The abandoned mines in the Central District are spread over four watersheds, namely Lake of the Ozarks, Lamine, Lower Missouri-Moreau, and Lower Osage. To date no significant work has been done to investigate the level of environmental disturbance and contamination that may have resulted from these abandoned mines. A watershed-based multidisciplinary study that integrates geospatial, geologic, hydrologic, geochemical, and ecological disciplines will be conducted in the Central District to assess the impact of the abandoned mines on the water quality and ecosystem. The objectives are to generate scientific data that characterizes the nature and magnitude of contamination and the level of environmental disturbance.

Priorities: To identify and map abandoned mines in a watershed context, and to identify and map contaminations that may arise from the abandoned mines.

Air Quality Studies:
The atmospheric concentration of CO_2, CH_4 and N_2O is ever increasing and 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.

Priorities: 1) Clarify the relationship between soil static characteristics and dynamic soil properties, or fluxes.
2) Develop a soil quality index to assess the relationship between soil properties and gas fluxes.
3) Improve methods to measure, monitor, quantify, and predict greenhouse gas fluxes and soil properties.

Behavior of Select Surfactants in Soil: Interactions with Physicochemical and Microbial Properties:
Contamination of agricultural soils with pesticides has become a serious environmental problem that has ultimately led to surface and groundwater pollution, threatening human health. Surfactants improve pesticide performance as a result of modifying one or more of the following spray solution characerics: mising, or emulsifying adn dispersing oil-soluble and water-soluble molecules; coverage, or spreading and wetting or sticking on leaf surfaces; spray retentioin; and absorption, or penetrating properties. There is a lack of information about the effect of different surfactants on soil enzyme activities and role on nutrient cycling.

Priorities: 1) Investigate teh changes in soil microbial consortia as affected by different surfactants.
2) Determine effect of different surfactants on plant nutrient uptake.
3) Measure te activites of enzymes involved in the cycling of C, N,and P.

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 have been degraded by introduced vegetation. Ninety four million ha of tallgrass prairie were present prior to the 19th century agricultural settlement of the mid-western states. Today, only 13% remain. Prairies are the most endangered ecosystem in North America and birds and other taxa that depend on prairies have declined in response to loss of habitat. In Missouri, where loss of grasslands was particularly severe, only 30,000 of 5.7 million ha still remain. Key to conservation and management of many grassland birds and other taxa is restoration of warm season grassland vegetation either on wildlife refuges and nature preserves, or on Conservation Reserve Program (CRP) fields.

Priorities: 1) Examine how management, use, and restoration of grasslands affect their biological diversity.

2) Develop recommendations for planting CRP fields which would increase their biological diversity.
3) Identify farm practices which would lead to conservation of biological diversity.

2. Scope of the Program

- In-State Research

- Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

(a) That the program is assured of continuous funding.
(b) That farmers will be motivated to change their management practices.
(c) That policy makers will be persuaded to enact appropriate legislation.
(d) That people will accept training opportunities offered to them by the program.
(e) That information supplied by the program will result in awareness and knowledge of environmental issues.

2. Ultimate goal(s) of this Program

The goals of these studies are to:
1) Provide baseline data on which relationships between human activities and natural ecosystems could be analyzed, and comprehensive management strategies developed.
2) Train future caretakers of the environment.
3) Raise awareness on major consequences of improper human activities on our cherished natural resources.
4) Improve environmental quality and sustainability.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	**1890**	**1862**	**1890**
2011	0.0	2.0	0.0	11.0
2012	0.0	2.0	0.0	11.0
2013	0.0	2.0	0.0	11.0
2014	0.0	2.0	0.0	11.0
2015	0.0	2.0	0.0	11.0

V(F). Planned Program (Activity)

1. Activity for the Program

Water Quality Studies:

1) To establish baseline data, evaluate practices at CAFOs identified sites, and quarterly determine the concentrations of E. Coli, nitrates, nitrites, ammonia, total nitrogen, phosphorus, and antibiotics in lagoon/holding tanks, during manure applications, in CAFOs runoffs, and in streams and compare data obtained with natural systems.
2) To evaluate rainfall events and possible water quality changes due to Escherichia Coli, nitrates, nitrites, ammonia, phosphorus, and antibiotic drugs in streams and leachates from identified CAFOs.

3) Relate farm operations on the partitioning adn fate of phosphorus in streams and sediments.
4) Assess the occurrence of antibiotic drugs in native fish collected from streams near CAFO identified sites.
5) Apply analytical data obtained in water quality modeling to better predict water quality near a CAFOs site.
6) To provide BMPs that will assist in water quality improvements near identified CAFOs in Central Missouri.
7) Develop new methods for the accurate determination of the source and magnitude of fecal pollution in water.

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 database will play an integral role in designing field sampling strategies, plotting sample locations, conducting spatial analysis and modeling of analytical data. 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 specific objectives of this study are to investigate,
1) How soil pore space and thermal properties indices (pore tortuosity factor, relative gas diffusion coefficient and thermal conductivity, diffusivity and resistivity) relate to greenhouse gas fluxes from soils under agricultural fields, forest and pasture,
2) How pore space indices vary in these soils with different vegetation types,
3) How pore space indices, soil thermal properties (thermal diffusivity, conductivity and resistivity), greenhouse gas fluxes and other dynamic soil properties relate to static soil characteristics such as texture and bulk density in soils under agricultural fields, forest and pasture, and finally
4) How the use of geo-spatial technologies (GPS, GIS and Geostastics) in our sampling strategies improve the estimation of greenhouse gas fluxes, static soil characteristics and dynamic soil properties.1) Examine how management, use, and restoration of grasslands affect their biological diversity,

Behavior of Select Surfactants in Soil: Interactions with Physicochemical and Microbial Properties

The specific objectives of this study are**:**
1. Study the changes in soil microbial consortia as affected by different surfactants. Knowledge of the natural evolution of microorganisms in the soil will be crucial to successful study of the fate of these chemicals and possible bioremediation design schemes.
2. Determine the effect of different surfactants on plant nutrient uptake. This objective will investigate the possible interactions of surfactants with macro-and micronutrient uptake by plants.
3. Measure the activities of enzymes involved in the cycling of C, N, P and S in the presence of different surfactants.Surfactants can interact with microbial enzyme activity.

Natural Resource Diversity Studies

Objectives of the studies are to
1) Examine how management, use, and restoration of grasslands affect their biological diversity,
2) Develop recommendations for planting CRP fields which would increase their biological diversity, and
3) Identify farm practices which would lead to conservation of biological diversity.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
● Education Class ● Workshop ● Demonstrations ● Other 1 (Student research and training)	● Newsletters ● Web sites

3. Description of targeted 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

V(G). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons(contacts) to be reached through direct and indirect contact methods

Year	Direct Contact Adults Target	Indirect Contacts Adults Target	Direct Contacts Youth Target	Indirect Contacts Youth Target
2011	30	70	20	40
2012	35	80	25	50
2013	35	80	25	50
2014	35	80	25	50
2015	35	80	25	50

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

2011:0   **2012:**0   **2013:**0   **2014:**0   **2015:**0

3. Expected Peer Review Publications

Year	Research Target	Extension Target	Total
2011	10	0	10
2012	12	0	12
2013	14	0	14

Year	Research Target	Extension Target	Total
2014	15	0	15
2015	16	0	16

V(H). State Defined Outputs

1. Output Target

- 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

  2011:47   **2012:**52   **2013:**52   **2014:**52   **2015:**52

V(I). State Defined Outcome

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 Target

Chemical and biological characterization of the ecosystems.

2. Outcome Type : Change in Knowledge Outcome Measure

2011:4   **2012:**4   **2013:**4   **2014:**4   **2015:**4

3. Associated Knowledge Area(s)

- 102 - Soil, Plant, Water, Nutrient Relationships
- 111 - Conservation and Efficient Use of Water
- 112 - Watershed Protection and Management
- 123 - Management and Sustainability of Forest Resources
- 125 - Agroforestry
- 134 - Outdoor Recreation
- 136 - Conservation of Biological Diversity
- 141 - Air Resource Protection and Management
- 205 - Plant Management Systems
- 213 - Weeds Affecting Plants
- 314 - Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals

- 401 - Structures, Facilities, and General Purpose Farm Supplies
- 403 - Waste Disposal, Recycling, and Reuse
- 502 - New and Improved Food Products
- 704 - Nutrition and Hunger in the Population
- 723 - Hazards to Human Health and Safety

4. Associated Institute Type(s)

- 1890 Extension

- 1890 Research

Outcome # 2

1. Outcome Target

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

2. Outcome Type : Change in Action Outcome Measure

2011:3   **2012:**3   **2013:**3   **2014:**3   **2015:**3

3. Associated Knowledge Area(s)

- 102 - Soil, Plant, Water, Nutrient Relationships
- 111 - Conservation and Efficient Use of Water
- 112 - Watershed Protection and Management
- 123 - Management and Sustainability of Forest Resources
- 125 - Agroforestry

- 134 - Outdoor Recreation
- 136 - Conservation of Biological Diversity
- 141 - Air Resource Protection and Management
- 205 - Plant Management Systems
- 213 - Weeds Affecting Plants
- 314 - Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals

- 401 - Structures, Facilities, and General Purpose Farm Supplies
- 403 - Waste Disposal, Recycling, and Reuse
- 502 - New and Improved Food Products
- 704 - Nutrition and Hunger in the Population
- 723 - Hazards to Human Health and Safety

4. Associated Institute Type(s)

- 1890 Extension

- 1890 Research

Outcome # 3

1. Outcome Target

Environmental sustainability;
Improved quality of life

2. Outcome Type : Change in Condition Outcome Measure

| **2011:**1 | **2012:**1 | **2013:**1 | **2014:**1 | **2015:**1 |

3. Associated Knowledge Area(s)

- 102 - Soil, Plant, Water, Nutrient Relationships
- 111 - Conservation and Efficient Use of Water
- 112 - Watershed Protection and Management
- 123 - Management and Sustainability of Forest Resources
- 125 - Agroforestry
- 134 - Outdoor Recreation
- 136 - Conservation of Biological Diversity
- 141 - Air Resource Protection and Management
- 205 - Plant Management Systems
- 213 - Weeds Affecting Plants
- 314 - Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals

- 401 - Structures, Facilities, and General Purpose Farm Supplies
- 403 - Waste Disposal, Recycling, and Reuse
- 502 - New and Improved Food Products
- 704 - Nutrition and Hunger in the Population
- 723 - Hazards to Human Health and Safety

4. Associated Institute Type(s)

- 1890 Extension

- 1890 Research

Outcome # 4

1. Outcome Target

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. Outcome Type : Change in Knowledge Outcome Measure

2011:4	**2012:**4	**2013:**4	**2014:**4	**2015:**4

3. Associated Knowledge Area(s)

- 102 - Soil, Plant, Water, Nutrient Relationships
- 111 - Conservation and Efficient Use of Water
- 112 - Watershed Protection and Management
- 123 - Management and Sustainability of Forest Resources
- 125 - Agroforestry
- 134 - Outdoor Recreation
- 136 - Conservation of Biological Diversity
- 141 - Air Resource Protection and Management
- 205 - Plant Management Systems
- 213 - Weeds Affecting Plants
- 314 - Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals

- 401 - Structures, Facilities, and General Purpose Farm Supplies
- 403 - Waste Disposal, Recycling, and Reuse
- 502 - New and Improved Food Products
- 704 - Nutrition and Hunger in the Population
- 723 - Hazards to Human Health and Safety

4. Associated Institute Type(s)

- 1890 Extension

- 1890 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

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

Description

Natural disasters: Any natural disaster will change the overall outlook of the results and will limit our ability to collect the needed samples.

Government Regulations: If there are new EPA regulations, specifically related to Hazardous Waste, Material, and/or Remediation then the overall focus or outcome of these studies could be altered.

Appropriation Changes: The funding for this program comes from legislative appropriation. Any changes in appropriation that removes this program as a funding priority could shut down this program since the existence of the program is dependent on funding.

Public Policy Changes: Currently, the areas designated are protected from direct human activities like residential and commercial real estate. A change in public policy that removes this restriction will make the sites vulnerable to human activities. Thus, the project will automatically come to a halt.

V(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- Before-After (before and after program)
- During (during program)
- Time series (multiple points before and after program)
- Comparisons between program participants (individuals, group, organizations) and non-participants

Description

Biological, chemical, and microbiological analysis will be carried out on the samples. Results obtained will be statistically compared with those obtained from the surrounding environments. Both intra and inter-parametric interpretations will be given to obtained statistics. This will form the basis of recommendations for appropriate management strategies to be put in place.

2. Data Collection Methods

- Sampling
- Observation

Description

Soil, water, plants, and air samples will be collected from the different sites using standard methods. The collected samples will be analyzed using appropriate standard chemical, microbiological and other analytical methods. Results obtained will be recorded and organized into data.

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Food Safety

2. Brief summary about Planned Program

Detection and identification of bacteria and food pathogen is an essential step in food safety inspection. This step will provide valuable information to consumers which could be used to prevent health problems. The current conventional methods used to detect and identify bacteria in food are reliable for ensuring food safety. They have been used for nearly one century as the official food screening procedure established by Food and Drug Administration (FDA). These methods are time consuming (5-7 days), labor intensive and, therefore, are not suitable to monitor food quality and to provide timely response to possible risks. By the time the *E-coli* is detected in the raw material, the product will be sold out and consumed (Swaminathan and Feng, 1994; Yang, Bashir, 2008; Vasavada et al., 1997). The slow response of these biosensors has prompted numerous groups in the last decade to develop other techniques to reduce the detection time. The objectives are: 1. Designing and fabricating MEMS based impedance biosensor system. The device will consist of two arrays of 3-D interdigitated electrodes (IDE) and a fluidic channel with an inlet and outlet. Each IDE array will consist of 100 pairs of gold electrode fingers fabricated using surface micromachining and photoresist sacrificial layer.2. Immobilizing the antibody using the Self-Assembled Multilayer (SAM) process. We will use the Self-Assembled Multilayer (SAM) process to immobilize the antibodies onto the IDE. This stage will provide the binding between bacteria and antibodies due to the high affinity between them. 3. Testing the device using impedance measurements. We will analyze the biosensor for the detection and selective identification of *E. coli* O157:H7 in beef when used in conjunction with the immobilized antibodies, and determine the magnitude and phase of the impedance of the bacteria effect alone. The effect of frequency on impedance measurements will be monitored and analyzed.

3. Program existence : Intermediate (One to five years)

4. Program duration : Medium Term (One to five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

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

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Escherichia coli O157:H7 is clearly one of the deadliest food borne pathogenic bacteria. It causes an estimated 73,000 cases of infection and 61 human deaths in the United States each year (Centers for Disease Control and Prevention, 2006).

This bacterium has been linked to hemolytic uremic syndrome and hemorrhagic colitis. These illnesses may cause diarrhea, seizure, stroke, kidney failure and even death (Food and Drug Administration, 2008). They are often misdiagnosed, resulting in expensive medical testing before they are correctly diagnosed. In addition, E- coli has the potential to cause enormous national and international economical devastation due to medical costs and product recalls, as recently occurred with the recall of tomatoes due to E. coli O157:H7 contamination. It can also be found in vegetables, unpasteurized milk, juice and unchlorinated water. Contamination can have a significant impact on businesses such as the beef -industry. E. coli O157:H7 can be found on most cattle farms and can live in the intestines of healthy cattle. Thus, the meat can become contaminated with E. coli O157:H7 during slaughter. Testing for the bacteria requires extensive analysis which has to meet certain challenging criteria. Sensitivity and response time for the analysis are imperative factors related to the usefulness of microbiological testing. An extremely selective detection methodology is also required because low numbers of pathogenic bacteria are often present in a complex biological environment along with many other nonpathogenic organisms. Traditional methods for the detection of bacteria are not available in the time scale desired in a clinical laboratory. In response to this problem, a number of instruments have been developed using various principles of detection, such as flow cytometry polymerase chain reaction, immunomagnetic separations, bioluminescence and mass spectrometry. These methods, however, are still time consuming and expensive. The proposed project will develop a novel 3-dimensional (3-D) interdigitated microelectrode array (IDE) based impedance biosensor. This biosensor will be capable of rapid detection and selective for accurate identification of 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. Each IDE biosensor consists of 100 pairs of gold electrode "fingers" with a length of 0.5 mm. The IDE array will be designed with spaces between the interdigitated electrodes nearly the size of the bacteria in order to detect a single or a few bacteria cells.

2. Scope of the Program

- In-State Extension

- In-State Research

- Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

1)Funding will be secure throughout the course of the project.
2)Extramural funds can be obtained to assist in expanding efforts with this project.
3) Maintain adequate number of personnel with the appropriate skills to complete the work.

2. Ultimate goal(s) of this Program

Measurable improvements in public health by modifying dietary practice and lifestyle changes and reduction of health care costs for specific populations such as African-Americans, low-income and other under-represented groups.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2011	0.0	2.0	0.0	2.0
2012	0.0	2.0	0.0	2.0
2013	0.0	2.0	0.0	2.0
2014	0.0	2.0	0.0	2.0
2015	0.0	2.0	0.0	2.0

V(F). Planned Program (Activity)

1. Activity for the Program

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

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
● Workshop	● Web sites
● One-on-One Intervention	● Other 1 (Nutrition education materials)

3. Description of targeted audience

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

V(G). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons(contacts) to be reached through direct and indirect contact methods

Year	Direct Contact Adults Target	Indirect Contacts Adults Target	Direct Contacts Youth Target	Indirect Contacts Youth Target
2011	200	500	100	200
2012	200	500	100	200
2013	200	500	100	200
2014	200	500	100	200
2015	200	500	100	200

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

2011:0　　　　**2012:**0　　　　**2013:**0　　　　**2014:**0　　　　**2015:**0

3. Expected Peer Review Publications

Year	Research Target	Extension Target	Total
2011	0	0	0
2012	0	0	0
2013	0	0	0

Year	Research Target	Extension Target	Total
2014	0	0	0
2015	0	0	0

V(H). State Defined Outputs

1. Output Target

- Number of publication, presentations, workshops and contacts.

  2011:1007   **2012:**1007   **2013:**1007   **2014:**1007   **2015:**1007

V(I). State Defined Outcome

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 Target

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. Outcome Type : Change in Condition Outcome Measure

2011:80   **2012:**80   **2013:**80   **2014:**80   **2015:**80

3. Associated Knowledge Area(s)

- 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

4. Associated Institute Type(s)

- 1890 Extension
- 1890 Research

Outcome # 2

1. Outcome Target

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

2. Outcome Type : Change in Action Outcome Measure

2011:100   **2012:**100   **2013:**100   **2014:**100   **2015:**100

3. Associated Knowledge Area(s)

- 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

4. Associated Institute Type(s)

- 1890 Extension
- 1890 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Economy
- Appropriations changes

Description

Planned research and extension activities are supported by external funding. Therefore, appropriations changes will directly affect the planned activities. The changes in US economy may affect the living standard and opportunities for education of clientele and eventually influence the outcome of research and extension activities.

V(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- Before-After (before and after program)
- Comparison between locales where the program operates and sites without program intervention

Description

Surveys will be conducted before and after each research and workshops to evaluate impact of research and extension activities.

2. Data Collection Methods

- Whole population
- On-Site

Description

Surveys will be conducted for subjects selected by random sampling or for whole population on site depending on the nature of survey and size of the population before and after each research and extension activities.

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Sustainable Energy

2. Brief summary about Planned Program

A recent article titled,"The end of cheap oil" in National Geographic highlights a well-known fact that the world is in the twilight of plentiful petroleum oil and alternative sources of energy and raw material must be developed. Biofuel in the form of biodiesel offers one of the most attractive direct replacements of fossil fuel. Significant efforts in this area are already underway as evident from the increasing number of newly installed biodiesel plants in Missouri and around the world. The most common process for producing biodiesel is through the transesterification reaction of vegetable oil or animal fat with an alcohol and a catalyst.

One proposed study is designed to fully develop, evaluate, and demonstrate the capabilities of the innovative technology for economical and efficient producton 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). Micro-algae cultivation and harvest, and 2). Algae oil extraction and transesterification.

Another study is designed to develop and evaluate the use of leaves as a secondary source of fuel for a boiler application or to be used as secondary fuel for a power plant. Leaves could be used in lieu of or in combination with coal. To achieve the overall goal, the proposed work will focus on 1). Leaf collection methods, 2). Leaf storage and transformation into pellets, and 3). Testing the leaves and their residue for improved heating performance.

3. Program existence : Intermediate (One to five years)

4. Program duration :   Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

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

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Situation

A recent article titled,"The end of cheap oil" in National Geographic highlights a well-known fact that the world is in the twilight of plentiful petroleum oil and alternative sources of energy and raw material must be developed. Biofuel in the form of biodiesel offers one of the most attractive direct replacements of fossil fuel. Significant efforts in this area are already underway as evident from the increasing number of newly installed biodiesel plants in Missouri and around the world. The most common process for producing biodiesel is through the transesterification reaction of vegetable oil or animal fat with an alcohol and a catalyst.

Proposed studies are designed to fully develop, evaluate, and demonstrate the capabilities of the innovative technology for economical and efficient producton 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). Micro-algae cultivation and harvest, and 2). Algae oil extraction and transesterification.

Aquatic microalgae are photosynthetic microorganisms that have great potential to be the solution to growing energy and environmental challenges. Multidisciplinary collaborative research is conducted to develop economically-feasible microalgae biotechnologies that utilize carbon dioxide and wastewater as nutrient sources and yield biomass that can be converted to biofuels and other bioproducts.

Priorities

The major focus or priorities of the research program are:
Identification of high yielding, hardy, pest resistant microalgae strains.
Development of economically-viable, commercial scale algae cultivating that mass produce algal biomass and abate carbon dioxide and wastewater.
Development of an effective system for extracting oil from wet algae and converting to biodiesel.
Testing methods for fermenting algal carbohydrates into ethanol.
Proof of a concept for the self-supported system that integrates the microalgae cultivation processes with the bio-refinery, which is dedicated to algae-based biofulels and bioproducts.

Another study is designed to develop and evaluate the use of leaves as a secondary source of fuel for a boiler application or to be used as secondary fuel for a power plant. Leaves could be used in lieu of or in combination with coal. To achieve the overall goal, the proposed work will focus on 1). Leaf collection methods, 2). Leaf storage and transformation into pellets, and 3). Testing the leaves and their residue for improved heating performance.

There is a tremendous quantity (potentially 30 million tons per year) of leaves in the U.S. that are readily available, and have a good heating value, which is almost on a par with paper (approximately 7000BTU). Leaves do not require fertilizers or any contribution from fossil fuels and their combustion does not create any additiional carbon dioxide.

Priorities

1) Develop feasible and economic options for collecting transporting, and storing leaves.
2) Study the heating properties of leaves and methods to improve their heating value.
3) Study methods to transform raw leaves and residue into a useable, economical, and efficient fuel source.

2. Scope of the Program

- In-State Extension

- In-State Research

- Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

That the program is assured of continuous funding.
That stakeholders will be motivated to change their practices.
That policy makers will be persuaded to enact appropriate legislation.
That stakeholders will accept training opportunities offered to them by the program.
That information supplied by the research will result in heighted awareness and knowledge of alternative fuel options and environmental issues.

2. Ultimate goal(s) of this Program

Provide alternative fuel and energy sources.
Train future stewards of the environment.
Improve environmental quality and sustainability.
Mass cultivation of Microalgae in the mid-western United States.
Deveop methods to collect, store, transport, and transform leaves into a useable fuel source.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2011	0.0	1.0	0.0	1.5
2012	0.0	1.0	0.0	1.5
2013	0.0	1.0	0.0	1.5
2014	0.0	1.0	0.0	1.5

Year	Extension		Research	
	1862	**1890**	**1862**	**1890**
2015	0.0	1.0	0.0	1.5

V(F). Planned Program (Activity)

1. Activity for the Program

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

Another study is designed to develop and evaluate the use of leaves as a secondary source of fuel for a boiler application or to be used as secondary fuel for a power plant. Leaves could be used in lieu of or in combination with coal. To achieve the overall goal, the proposed work will focus on 1). Leaf collection methods, 2). Leaf storage and transformation into pellets, and 3). Testing the leaves and their residue for improved heating performance.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
● Workshop ● Demonstrations	● Newsletters ● Web sites

3. Description of targeted audience

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

V(G). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons(contacts) to be reached through direct and indirect contact methods

Year	Direct Contact Adults Target	Indirect Contacts Adults Target	Direct Contacts Youth Target	Indirect Contacts Youth Target
2011	30	70	20	40
2012	35	80	25	50
2013	35	80	25	50
2014	35	80	25	50
2015	35	80	25	50

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

2011:0 **2012:**0 **2013:**0 **2014:**0 **2015:**0

3. Expected Peer Review Publications

Year	Research Target	Extension Target	Total
2011	5	0	5
2012	5	0	5
2013	5	0	5
2014	5	0	5
2015	5	0	5

V(H). State Defined Outputs

1. Output Target

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

  2011:7 **2012:**7 **2013:**7 **2014:**7 **2015:**7

V(I). State Defined Outcome

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 and the potential use of leaves as an alternative fuel source.
5	Develop economical and efficient methods to collect, store, transport, and transform leaves into a useable fuel source

Outcome # 1

1. Outcome Target

Identify high yielding, hardy pest resistant microalgae strains.

2. Outcome Type : Change in Knowledge Outcome Measure

2011:1   **2012:**1   **2013:**1   **2014:**1   **2015:**1

3. Associated Knowledge Area(s)

- 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

4. Associated Institute Type(s)

- 1890 Research

Outcome # 2

1. Outcome Target

Develop commercial cultivation system for mass production of algal biomass

2. Outcome Type : Change in Action Outcome Measure

2011:1   **2012:**1   **2013:**1   **2014:**1   **2015:**1

3. Associated Knowledge Area(s)

- 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

4. Associated Institute Type(s)

- 1890 Extension

- 1890 Research

Outcome # 3

1. Outcome Target

Educate stakeholders on research status for environmental solutions

2. Outcome Type : Change in Knowledge Outcome Measure

2011:5	**2012:**5	**2013:**5	**2014:**5	**2015:**5

3. Associated Knowledge Area(s)

- 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

4. Associated Institute Type(s)

- 1890 Extension

- 1890 Research

Outcome # 4

1. Outcome Target

Educate farmers, scientists, and engineers about the economic feasibility of biomass production and the potential use of leaves as an alternative fuel source.

2. Outcome Type : Change in Action Outcome Measure

2011:4	**2012:**4	**2013:**4	**2014:**4	**2015:**4

3. Associated Knowledge Area(s)

- 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

4. Associated Institute Type(s)

- 1890 Extension

- 1890 Research

Outcome # 5

1. Outcome Target

Develop economical and efficient methods to collect, store, transport, and transform leaves into a useable fuel source

2. Outcome Type : Change in Knowledge Outcome Measure

| **2011:**10 | **2012:**10 | **2013:**10 | **2014:**10 | **2015:**10 |

3. Associated Knowledge Area(s)

- 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

4. Associated Institute Type(s)

- 1890 Extension

- 1890 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect 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.)

Description

All of these external factors could seriously jeopardize continued research and the ability to educate farmers and other scientists about the benefits of biomass production and leaves as an alternative fuel source.

V(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- Before-After (before and after program)
- During (during program)
- Time series (multiple points before and after program)

Description

Biological, chemical, and microbiological analysis will be carried out during research. Results obtained will be statistically compared with those obtained from the surrounding environments. Both intra and inter-parametric interpretations will be given to obtained statistics. This will form the basis of recommendations for appropriate strategies to be put in place.

Analysis of leave properties and potential heating value will be carried out during the study. Results will be compared with other similar-type studies.

2. Data Collection Methods

- Sampling
- Observation

Description

Microalgae samples will be collected and analyzed using appropriate standard methods. Results will be recorded and organized into data. Study of leaf properties and values will be analyzed using appropriate standard methods.

V(A). Planned Program (Summary)

Program # 7

1. Name of the Planned Program

Childhood Obesity

2. Brief summary about Planned Program

Optimal nutrition is important to the health and well-being of all people. Previous studies have shown that diet is a factor in 6 of the 10 leading causes of death in the USA. Improved nutrition will increase quality of life and productivity, and reduce health care costs in populations throughout the nation. Lincoln University is continuing to focus their efforts on relationships between nutrition and health, and on establishing optimal nutrient requirements for diverse populations. Programs are designed to ensure that nutritious foods are affordable and available, and provide guidance so that individuals and families are able to make informed, science-based decisions about their health and well-being.

Specific areas of focus include the role of diet and exercise on the development of obesity, hypertension and type 2 diabetes and their subsequent contribution to development of cardiovascular diseases. We also focus on education of public for prevention of these chronic diseases by life-style modification (healthy eating and increased physical activity). We also plan to study the biochemical and physiological basis for regulation of body weight and body fat distribution using a diet-induced obese animal model. While this research is relevant for all people, emphasis is primarily on specific subpopulations including African-Americans, low-income populations and other under represented groups.

3. Program existence : Mature (More then five years)

4. Program duration :   Long-Term (More than five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

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		10%		0%
701	Nutrient Composition of Food		20%		25%
702	Requirements and Function of Nutrients and Other Food Components		25%		25%
703	Nutrition Education and Behavior		25%		25%
704	Nutrition and Hunger in the Population		20%		0%
724	Healthy Lifestyle		0%		25%
	Total		100%		100%

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Nutrition-related chronic diseases are common in the State of Missouri and in the United States. Poor nutrition contributes to five of ten leading causes of death (heart disease, cancer, stroke, type 2 diabetes and arteriosclerosis) costing the US economy an estimated $250 billion annually. Nutrition research and education will improve the quality of the American diet and reduce health care costs.

The priorities of nutrition research will be finding the mechanism how obesity contributes to the development of

cardiovascular disease and finding reliable biomarkers for diagnosis of cardiovascular disease. The priority of nutrition extension will be prevention of nutrition-related chronic disease through nutrition education for improvement of nutrition and increased physical activity.

2. Scope of the Program

- In-State Extension

- In-State Research

- Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

1)Funding will be secure throughout the course of the project.
2)Extramural funds can be obtained to assist in expanding efforts with this project.
3) Maintain adequate number of personnel with the appropriate skills to complete the work.

2. Ultimate goal(s) of this Program

Measurable improvements in public health by modifying dietary practice and lifestyle changes and reduction of health care costs for specific populations such as African-Americans, low-income and other under-represented groups.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	**1890**	**1862**	**1890**
2011	0.0	1.0	0.0	2.0
2012	0.0	1.0	0.0	2.0
2013	0.0	1.0	0.0	2.0
2014	0.0	1.0	0.0	2.0
2015	0.0	1.0	0.0	2.0

V(F). Planned Program (Activity)

1. Activity for the Program

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

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods

● Workshop	● Web sites
● One-on-One Intervention	● Other 1 (Nutrition Education Materials)

3. Description of targeted 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 Misssouri.

V(G). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons(contacts) to be reached through direct and indirect contact methods

	Direct Contact Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2011	200	500	100	200
2012	200	500	100	200
2013	200	500	100	200
2014	200	500	100	200
2015	200	500	100	200

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

2011:0   **2012:**0   **2013:**0   **2014:**0   **2015:**0

3. Expected Peer Review Publications

Year	Research Target	Extension Target	Total
2011	0	0	0
2012	0	0	0
2013	0	0	0
2014	0	0	0
2015	0	0	0

V(H). State Defined Outputs

1. Output Target

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

2011:100   **2012:**100   **2013:**100   **2014:**100   **2015:**100

V(I). State Defined Outcome

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. I-mprovement 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 clientel. 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 Target

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. Outcome Type : Change in Knowledge Outcome Measure

2011:350	**2012:**350	**2013:**350	**2014:**350	**2015:**350

3. Associated Knowledge Area(s)

- 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

4. Associated Institute Type(s)

- 1890 Extension

- 1890 Research

Outcome # 2

1. Outcome Target

Number of citations of publications by other scientists in scientific papers.
        -Use of research results by nutrition extension and health care specialists.
        I-mprovement 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 clientel.
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. Outcome Type : Change in Action Outcome Measure

2011:15	**2012:**15	**2013:**15	**2014:**15	**2015:**15

3. Associated Knowledge Area(s)

- 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

4. Associated Institute Type(s)

- 1890 Extension

- 1890 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Economy
- Appropriations changes

Description

Planned research and extension activities are solely supported by external funding. Therefore, appropriations changes will directly affect the planned activities. The changes in the US economy may affect the living standard and opportunities of clientele and eventually influence teh outcome of research and extension activities.

V(K). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- Before-After (before and after program)
- Comparison between locales where the program operates and sites without program intervention

Description

Surveys will be conducted before and after each research and workshop to evaluate impact of research and extension activities.

2. Data Collection Methods

- Whole population
- On-Site

Description

Surveys will be conducted for subjects selected by random sampling or for whole population on site, depending on the nature of survey and size of the population before and after each research and extension activity.