2007 Lincoln University of Missouri Combined Research and Extension Annual Report

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2007 Lincoln University of Missouri Combined Research and Extension Annual Report

I. Report Overview

1. Executive Summary

Missouri ranks second only to Texas in the number of farms. Of these 106,000 farms 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 within a residential development would seem an alternative to complete loss of farmland and an ideal method for examining various agricultural practices at the rural/urban interface. This system, or center, would be as self□contained as possible and would be evaluated for mutual economic benefitsbetween the housing residents and the farm owner/manager.Other potential areas that can be evaluated at this center include: impact on human health, the environment, distance from food production to consumption, energy use and labor requirements.

This center will be the focal point for a highly integrated research and extension unit at Lincoln University. Research will be conducted at the center and the information transmitted to limited resource producers throughout the state of Missouri. This center will complement our extension urban youth and 4□H programs in Jefferson City, Kansas City, St. Louis and the Bootheel, because we can bring these youth to campus for summer camps (they will have free accommodations in our youth development camp). Youth will be exposed to agricultural practices at the center and will be provided the opportunity to assist the center operator.This will be a unique center in Missouri and it will be developed in cooperation with the University of Missouri.

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

Approval was received for utilizing facilities grant funds to begin the planning process for this integrated system.

Animal science

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 is currently very application oriented at Lincoln University and examines various herbal treatments for the impact on internal parasite load.In a new project this year, nanotechnology expertise from a member of the physics faculty will be used to begin development of an intravaginal device for detection of estrus.As of this report, there was a .5 FTE professional effort in research and a .5 FTE professional effort in extension in small ruminants.There have, however, been over 2,550 direct contacts with adults in programs throughout Missouri, including Fiber Workshops and Goat production and artificial insemination workshops.

The University of Missouri has no plans for expanding extension efforts into goat production and this 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.

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 producer support for starting aquaculture production research for Missouri producers.Research is needed that is specific to the climate in Missouri because Missourihas wide climatic variationand is the number one aquaculture producing state in the North Central Region.

This project continues to be in the research stage, but it is reported that there have been 50 direct adult contacts and 50

indirect adult contacts by researchers in aquaculture.There are 3.5 FTE's in this program.

Plant Science

This program will be highly integrated with the Extension Small Farm Program. Studies will 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.

This program has 2.5 FTE's in research and 1.5 FTE's in extension. This program reports a total of 170 direct contacts and 2050 indirect contacts.

Environmental Science

The overall goal of this research program 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. Studies in environmental science will focus on minimizing the impacts of agriculture on soil, water and air quality.

This program is currently focused primarily in research with a total of 15.0 FTE's, including 2 post-doctoral and 5 graduate students. There were at total of 8 direct contacts and 25 indirect contacts with 6 peer-reviewed manuscripts published.

Human Nutrition

Basic, as well as applied, studies will continue in this area examining the causes and impacts of obesity and hypertension in minority populations. Efforts are currently underway to hire an additional person in food safety that will have a split research and extension appointment.

The human nutrition program has 2.0 research and 4.5 extension professsional FTE's.Included in the extension FTE's are EFNEP personnel as well as area educators in the urban extension programs.There were 2520 direct contacts in this program.

Programs without strong research counterparts

Extension efforts to improve the educational and economic opportunities for under□represented populations in Kansas City, St. Louis, Jefferson City 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 youth and 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

The FTE's for Minority Health and Aging were counted in the Human Nutrition.The remaining programs have 15.0 FTE and over 5,000 direct contacts and approximately one-half are youth.

Total Actual Amount of professional FTEs/SYs for this State

Year:2007	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	23.0	0.0	25.0
Actual	0.0	21.5	0.0	23.5

II. Merit Review Process

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

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

2. Brief Explanation

Research proposals submitted by investigators for Evans□Allen funding are reviewed within each program area, then submitted to the Director.The director evaluates them on feasibility and that they follow the Plan□of□work and complement/integrate with the extension programs.Proposals are then submitted to scientists for evaluating scientific merit.Reviews of the scientists are returned to the research director.The names of reviewers are removed and the research 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 to CSREES.

III. Stakeholder Input

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

- Targeted invitation to traditional stakeholder groups
- Targeted invitation to 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

Stakeholder input this year was primarily from association meetings such as the Missouri aquaculture association, the Missouri goat producers association and the sheep producers association.Solicitiations of other comments included direct inputs from producers, invited presentations by producers and information from other qualitfied individuals regarding integrated farming systems.

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

1. Method to identify individuals and groups

- Use External Focus Groups
- Needs Assessments

Brief Explanation

Efforts have been focused this year on the best way to develop an integrated farming system and the components that the system should include.

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

1. Methods for collecting Stakeholder Input

- Meeting with traditional Stakeholder groups
- Meeting with 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

The major efforts have been to invite selectd individuals from the general public and from traditional and non-traditional producers for input regarding integrated farming systems.

3. A statement of how the input was considered

- Other (In developing an integrated program)

Brief Explanation

Information gained is being used to attempt to hire personnel that will best fit the needs of small, integrated farm operations in Missouri.Additional information obtained was regarding the possibility of using biofuels in a more localized situation.The information on biofuels is still being taken into consideration and has not yet been acted upon.

Brief Explanation of what you learned from your Stakeholders

The best integrated efforts include both livestock and plant producing systems.There is interest in minimizing inputs and in minimizing labor requirements for these integrated systems.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	2613656	0	2765251

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	0	1968551	0	2789481
Actual Matching	0	1255123	0	2405708
Actual All Other	0	407129	0	0
Total Actual Expended	0	3630803	0	5195189

3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous years				
Carryover	0	496835	0	420433

V. Planned Program Table of Content

Program #1

V(A). Planned Program (Summary)

1. Name of the Planned Program

Animal Science

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
301	Reproductive Performance of Animals		12%		12%
302	Nutrient Utilization in Animals		13%		13%
303	Genetic Improvement of Animals		25%		25%
307	Animal Management Systems		25%		25%
311	Animal Diseases		12%		12%
313	Internal Parasites in Animals		13%		13%
	Total		100%		100%

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2007	**Extension**		**Research**	
	1862	**1890**	**1862**	**1890**
Plan	0.0	1.0	0.0	4.5
Actual	0.0	0.5	0.0	4.0

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

Extension		**Research**	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
0	108858	0	1191065
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	0	848043
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Growth and Economics of Bluegill Sunfish Production :

Reserach was conducted to develop new methods for the production of food-size sunfish. Food sized sunfish have not been produced in the North Central Region that meets target weights (227-340 g), with in a two year production cycle. The new methods may enhance development of industry in Missouri and other States.

The result of the cost analysis of pond grow-out is not completed. Data has been collected and is being analyzed. Also during the last year of the study, growth of F1 generation fish obtained from the original P1 parents was compared to selected F3 progeny. Preliminary analysis of results indicate that F3's out performed.

Aquaculture Nutrition Research Initiative in Missouri: Developing a Least-Cost Diet to Produce Bluegill Fingerlings

Technologies and methods developed from this facilities and equipment may be applicable to other areas of research and teaching at Lincoln University. The project objectives were to complete the set up of a nutrition research laboratory, complete the set up of an aquaculture water recirculation system; to evaluate commercial diets for bluegill larvae. Measurable outputs include the setting up of the nutrition research laboratory with the essential procedures and the completion of the animal stage of objective 2. Research activities include the completion of the animal growth phase in evaluating seven popular commercial diets for growth parameters and survival rates for bluegill larvae (Lepomis macrochirus); Animal performance has been statistically analyzed and feed stock is undergoing additional nutritional analysis for fatty acid and amino acid profiles. The aquaculture water recirculation system consists of 32 54 gallon tanks with a biofilter, bead filter, sump tank and an ultraviolet light. The system is fully functional and has been used for Objective 2 and several student projects. Some problems do exist with paint peeling off the system tanks. Proximate analyze equipment, supplies and procedures for Kjeldahl nitrogen, lipids, lipids evaluation, minerals, and dry matter has been procured and set up. Other equipment set up includes a freeze dryer and GC/MS. Equipment purchased but not yet set up is fiber digestion and bomb calorimeter. Dissemination of information includes the sharing of best commercial feed to a startup bluegill farmer and to other coworkers within our research group. More public dispersion of the information is anticipated when laboratory analysis is complete.

2. Brief description of the target audience

Limited resources audiences

V(E). Planned Program (Outputs)

1. Standard output measures

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

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	2000	80000	400	2000
2007	2550	80000	2500	4000

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

Patent Applications Submitted

Year	Target
Plan:	0
2007 :	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan			
2007	1	1	2

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Research Projects Completed* Year Aquaculture Small Ruminant Large Ruminant 2007 1 1 0 2008 0 1 0 2009 4 1 0 2010 0 1 1 2011 2 1 1 *Projects reported only in year of completion Presentations Year Aquaculture Small Ruminant Large Ruminant 2007 4 2 0 2008 6 2 0 2009 6 2 0 2010 6 2 0 2011 6 2 0 Manuscripts Year Aquaculture Small Ruminant Large Ruminant 2007 3 1 0 2008 4 1 0 2009 4 1 0 2010 5 1 0 2011 5 1 0

Year	Target	Actual
2007	12	79

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O No.	OUTCOME NAME
1	Aquaculture- Define sunfish nutritional requirements. Develop a fast growing sunfish cultivar. Identify viable production systems for sunfishes. Make available a fish health protocol. Small Ruminants- Assess the use of herb cultivars for control of internal parasites. Investigate new cultivars of grasses and legumes for potential improvement of weight gains in lambs and kids. Large Ruminants- Develop biosensor for determining levels of lutenizing hormone (LH) in the blood.
2	Transfer new technologies for sunfish, small and large ruminant production to farmers. Farmers will use learned technologies.
3	Farmersadopt new technologies for increased and sustainable production.

Outcome #1

1. Outcome Measures

Aquaculture- Define sunfish nutritional requirements. Develop a fast growing sunfish cultivar. Identify viable production systems for sunfishes. Make available a fish health protocol. Small Ruminants- Assess the use of herb cultivars for control of internal parasites. Investigate new cultivars of grasses and legumes for potential improvement of weight gains in lambs and kids. Large Ruminants- Develop biosensor for determining levels of lutenizing hormone (LH) in the blood.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2007	2053	2550

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Production of fish in ponds, tanks, raceways, or in any kind of confinement at all requires artificial feeding and the preparation of commercial feeds by feed manufacturers, or the formulation of experimental diets by scientists. Evaluating feedstuffs for use in aquaculture diets may employ a number of procedures. These procedures should identify nutrient composition, palatability, digestibility, productive value, physical and handling characteristics, and provide economic comparisons. These analytical methods require a wet laboratory facility equipped with modern analytical equipment to perform necessary experiments.

Lincoln University has adequate technical expertise on board to address its aquaculture nutrition research priorities. The expertise comprises a fish nutritionist, a laboratory technician, and an aquaculture facility technician. However, the team needs at least two student research assistants for help.

Lincoln University lacks both the bioassay fish tanks at the Busby farm for fish nutrition studies and the appropriate laboratory equipment instruments and supplies for the analyses of nutrient and tissue compositions.

What has been done

Technologies and methods developed from this facilities and equipment may be applicable to other areas of research and teaching at Lincoln University.

The project objectives were to complete the set up of a nutrition research laboratory, complete the set up of an aquaculture water recirculation system; to evaluate commercial diets for bluegill larvae.

Measurable outputs include the setting up of the nutrition research laboratory with the essential procedures and the completion of the animal stage of objective 2.

Research activities include the completion of the animal growth phase in evaluating seven popular commercial diets for growth parameters and survival rates for bluegill larvae (Lepomis macrochirus); Animal performance has been statistically analyzed and feed stock is undergoing additional nutritional analysis for fatty acid and amino acid profiles.

Research Technician Greg Dudenhoeffer successfully attended a training course in 'Techniques of Ion Trap GC/MS' sponsored by Varain Products.

The aquaculture water recirculation system consists of 32 54 gallon tanks with a biofilter, bead filter, sump tank and an ultraviolet light. The system is fully functional and has been used for Objective 2 and several student projects. Some problems do exist with paint peeling off the system tanks.

Proximate analyze equipment, supplies and procedures for Kjeldahl nitrogen, lipids, lipids evaluation, minerals, and dry matter has been procured and set up. Other equipment set up includes a freeze dryer and GC/MS. Equipment purchased but not yet set up is fiber digestion and bomb calorimeter.

Dissemination of information includes the sharing of best commercial feed to a startup bluegill farmer and to other coworkers within our research group. More public dispersion of the information is anticipated when laboratory analysis is complete.

Results

Developing the technologies and methods to implement aquaculture nutrition studies at Lincoln University has the potential to increase production of marketable fish in Missouri and other North central states. The results of the studies could have a positive effect on aquaculture industry in Missouri by providing information applicable to many small farms.

The development of aquaculture water recycled system allows us to conduct practical research experiments that can provide valuable information to farmers and other researchers. The evaluation of the commercial feeds experiment has already assisted one local farmer that has changed commercial feeds and commented to us how well his larvae are flourishing since doing so. Our fish nursery is also in the process of changing our larval feed supply. Once our laboratory results are in; the data published and presented; and one undergraduate student working on a preliminary project that should result in several presentations and two possible scientific journal articles.

The principal investigator was on a sabbatical leave for six months. He was awarded a six-month U.S Fulbright Scholarship to Uganda, Fall 2007.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

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

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2007	1010	1010

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Currently the United States is a major importer of seafood products which contributes to the trade deficit. Increasing U.S. aquaculture production could reduce need for imports and enable diversification of farm production. The relatively young aquaculture industry needs a greater range of species and methods to be based upon to enable sustainable production. Environmental concerns, especially those pertaining to exotics, are directing much of the efforts to expand aquaculture to include native species. Most species already developed or being investigated readily reach sizes suitable for the existing markets and tend to be predators on other fishes. The latter characteristic has challenged the developers of least cost manufactured diets to reduce the need for feedstuffs of fisheries origins (i.e. fishmeal and fish oil).
We have decided to concentrate our efforts on bluegill sunfish Lepomis macrochirus. It is native to much of the United States and has a naturally more omnivorous diet that may enable rapid development of diets using agricultural rather than fishery derived feedstuffs. Limitations of the bluegill sunfish are also evident in limited ability to reach market size within the 18 months desired by the aquaculture industry and their propensity to reproduce uncontrollably in production ponds.

What has been done

Wild and semi-domesticated bluegill were obtained from 12 locations, quarantined, acclimated to laboratory conditions and then conditioned to breed naturally into pre-fabricated nest under close observation. Multiple populations of northern and coppernose bluegill, one population of putatively pure southwestern bluegill and one population of hand-paint were sampled. Northern bluegills of existing Lincoln University of Missouri stock were used for monosex development, interspecies hybridization and ploidy manipulation.

A preliminary family selection trial based on northern bluegill sunfish acquired within the state of Missouri was run to test methods. Three females of Lincoln University stock were mated to five males (two Lincoln University and one each from Fabius River, St. James Ditch and North Fork White River) in a complete (3 x 5) factorial design yielding 15 broods. Broods were reared separately under similar conditions until large enough to uniquely marked as individuals. Broods were then combined into 12 'common garden' tanks and fed either floating or sinking versions of the same manufactured trout diet formulation. Thereafter, common garden groups were combined to yield 2 common gardens in outdoor ponds to be finished over a single growing season fed a floating manufactured catfish diet.

Results

Developed a breeding system ideal for family selection of bluegill sunfish. Selective breeding of bluegill sunfish is worth effort. We have produced at least some male bluegill sunfish that produce broods with a desired male dominated sex ratio. Methods used to produce allotriploids are likely not to be appropriate for optimal production of allotriploids.

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

Farmersadopt new technologies for increased and sustainable production.

2. Associated Institution Types

•1890 Extension
•1890 Research

3a. Outcome Type:
Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2007	1010	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

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

1. Evaluation Studies Planned

- After Only (post program)
- Case Study

Evaluation Results
{No Data Entered}

Key Items of Evaluation
{No Data Entered}

Program #2

V(A). Planned Program (Summary)

1. Name of the Planned Program

Family and Youth Development

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
724	Healthy Lifestyle		5%		5%
801	Individual and Family Resource Management		5%		5%
802	Human Development and Family Well-Being		25%		25%
803	Sociological and Technological Change Affecting Individuals, Families and Communities		5%		5%
805	Community Institutions, Health, and Social Services		6%		6%
806	Youth Development		45%		45%
901	Program and Project Design, and Statistics		4%		4%
903	Communication, Education, and Information Delivery		5%		5%
	Total		100%		100%

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2007	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	22.0	0.0	0.0
Actual	0.0	13.5	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	1246778	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	872509	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	125225	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Design, implement and evaluate educational programs for youth-at-risk. Program implementation will include club member retention, workshops, camps and after school programs.

Examples of specific activities 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 First Program: 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, offered in Charleston Junior High School, for girls to learn the advantages of remaining abstinent.

-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, Earl Nance Sr. Elementary and Baden Elementary. 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.

-Black History Programs in Charleston, Caruthersville, and Sikeston. Lincoln University staff and youth team up with the Suzanna Wesley Center, Caruthersville School District, and Gloryland Community Center. For youth (K-12) in the school districts.

-Health and Fitness Classes

-Health fair designed to educate youth on nutrition, fitness, and the dangers of alcohol, tobacco, and other drugs.
eat Activities

Field Day - a culmination of educational workshops on a variety of topics, talent show, and entertainment for all ages.

-Black History Program, an educational program on the accomplishments and struggles of African-Americans.

-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.

-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.

2. Brief description of the target audience

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

V(E). Planned Program (Outputs)

1. Standard output measures

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

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	0	0	460	0
2007	2580	17400	2110	9750

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

Patent Applications Submitted

Year	Target
Plan:	0
2007 :	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan			
2007	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

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

Year	Target	Actual
2007	100	1133

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O No.	OUTCOME NAME
1	Short term: 1) Enhanced academic productivity, 2) Improved rate of community volunteerism 3) Development of leadership skills, 4) Increased knowledge and 5) increasedlife 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, 4) Better social standards, and 5) Better life choices.
3	Long term: 1) Improved education levels, 2) Increased standard of living, 3) improved quality of life.

Outcome #1

1. Outcome Measures

Short term: 1) Enhanced academic productivity, 2) Improved rate of community volunteerism 3) Development of leadership skills, 4) Increased knowledge and 5) increasedlife skills.

2. Associated Institution Types

•1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2007	150	233

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Enhanced quality of life through improved life skills: communication, understanding self, culture, and community. Awareness of health and wellness issues.

What has been done

After school tutoring, Summer Camp, Teen Talk, Fatherhood First Program, Cultural Arts & Awareness, HIV/AIDS Awareness, Women's Wellness Conference, Resource Fairs, Wellness-Nutrition and Exercise Programs.

Results

Networks and Collaborations were expanded, providing more human and financial resources for Extension programs. Teachers reported improvements in student behavior and academics achievement. Parental involvement in school increased. Increased school and community involvement by adults and children.

Programs for underserved youth and adults increased. Increased participation created need for some waiting lists. Participants know more about cultures of the world. Youth are better able to express themselves in the classroom, at home, and in public. Parents-increased involvement in children's education.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

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

2. Associated Institution Types

•1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2007	150	604

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

When compared to the entire population, there is a disproportionate number of African Americans living with obesity and chronic diseases such as diabetes. Lack of exercise in adults and youths may contribute to the increases in the amount of obesity in the population. African Americans, and low income people have less chance of receiving preventive health care services. Low income groups have less access to current technology.
To provide a learning environment where youth develop leadership skills, social competencies, learn how to build positive support networks of friends and mentors, develop critical thinking and decision making skills, develop public speaking skills, develop positive relationships, and recognize positive opportunities.
Youth face critical issues including: Teenage pregnancy, striving towards educational excellence, use of recreational drugs and HIV and STD's.

What has been done

Pass It Forward, HIV/AIDS information forum for youth, Teen Health-Programs that address teen issues: Injury Prevention, Tobacco, Health, Teen Pregnancy. Urban Garden-Six community gardens. Exercise program: Double Dutch Competition. Youth Entrepreneurship-Mini Society.
4-H Leadership Academy, Summer Enrichment Program, Weekly In-School Programs, Weekly After School Programs, Character Building Workshops.
After School Tutoring, Summer Camp, TeenTalk, Fatherhood First Program, KidsBeat, Black History/Cultural Awareness Programs, Sexual Abstinence, Women's Wellness Conference.

Results

Youth have developed and improved social competencies, increased their self-esteem through role playing and public speaking, have become involved in community service projects, developed leadership skills through leading or participating in workshop sessions and community service projects.

Program participants make healthier life choices. Of 1,200 people participating in LU health education programs, 808 completed a survey and indicated adopting at least one good health behavior.

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

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

2. Associated Institution Types

•1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2007	150	296

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Incarceration rates: African Americans make up 12% of the US Population; however, African Americans make up approximately 50% of the prison population.
Graduation rates: 72% of all high school students graduate with a regular diploma; however, 56% of African American students graduate with a regular diploma.
College preparation: 40% of graduates are ready for college; however, 23% African American graduates are eligible for college.

What has been done

Plant and garden displays, Bringing Bread to Life program for elementary students, Collaboration with Cole County Master Gardeners, FFA Floriculture competition, Annual Leadership Academies, Youth are being reached through in-school programs that have lasted for more than three years. The Youth Futures program prepares first generation college students for college.

Results

Youth continue to become socially responsible and productive citizens through fostering personal and social responsibility. People maintain healthier lifestyles. Program participants enhance interest in gardening. Youth who have participated in Lincoln's programs for more than one year, experience, self improvement through increased social competency, achieve academic success, and strive for improved quality of life.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development
802	Human Development and Family Well-Being
724	Healthy Lifestyle
805	Community Institutions, Health, and Social Services

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

Tornado in Fiscal Year 2006 impacted 2007 activities due to the total loss of facility.

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

1. Evaluation Studies Planned

- Retrospective (post program)
- Before-After (before and after program)
- During (during program)

Evaluation Results

Improved self-esteem as a result of improved life skills, Delayed gratification due to observing plant growth that matures into vegetables, Increase in physical activities to 20 minutes per day, 2 times per week for adults and 20 minutes daily for youth, Increased health screening for adults and youth. Computer training for low income individuals.

After School and Summer Enrichment Programs, as well as Annual Programs such as Field Day, Falling Into Fall, Spring Bling, Area and local Black History Programs and local fundraising efforts with the Alumni Chapter of LU are well received by the Southeast MO, Communities.New community leaders are emerging to assist in the implementation of youth programs.Programs are improving nutrition/and fitness as core activities.Students who participate in youth program improve grade levels become more involved in school and civic activities. They are more involved in sports and spend time assisting with programs that help the elderly as well as provide leadership to children who are younger.Youth leaders are emerging.Children who participate are also demonstrating greater cultural sensitivity as well as acquiring greater life skills.Youth are making more positive life choices such as abstaining from or learning how to delay involvement in sexual activity and refrain from use of drugs. LU programs have helped the participants develop greater self-confidence, and self-worth and efficacy. They are also demonstrating a greater sense of purpose and destiny including college/career planning and development.

Through collaborative arrangements and partnerships agreements with state, private local organizations, and university/academic partners, the following was accomplished:

Participants plan to have more blood pressure screenings, Participants have made family and friends aware of the importance of a healthy lifestyle, which included more physical activity, especially walking, Staff provided on-line skills training that empowered participants to become proactive in seeking health information via ehealth.

Key Items of Evaluation

- Funds are needed for transportation of participants especially in rural areas
- Extension needs full time employees paid from core dollars

Program #3

V(A). Planned Program (Summary)

1. Name of the Planned Program

Community and Leadership Development

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
608	Community Resource Planning and Development		40%		40%
802	Human Development and Family Well-Being		10%		10%
803	Sociological and Technological Change Affecting Individuals, Families and Communities		10%		10%
805	Community Institutions, Health, and Social Services		30%		30%
806	Youth Development		10%		10%
	Total		100%		100%

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2007	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	2.0	0.0	0.0
Actual	0.0	1.5	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	229925	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	135507	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

For 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, and thinking strategically, basic leadership skills, work planning and goal setting, customer/resident relations, effective communication skills, budgeting, funding accounting and grant administrations, managing "troubled" and "problem" employees, and negotiations.

2. Brief description of the target audience

Small towns, community organizations and agencies.

V(E). Planned Program (Outputs)

1. Standard output measures

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

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	50	100	30	60
2007	365	212	173	505

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

Patent Applications Submitted

Year	Target
Plan:	0
2007 :	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan			
2007	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- # # # of informational sessions # of workshops # of presentations # of participants Evaluation forms Anecdotal responses Changed behavior and procedures of participants and organizations

Year	Target	Actual
2007	75	245

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O No.	OUTCOME NAME
1	Development or update of plan Increased participation and diversity Awareness of need to develop or update plan Awareness of need for increased participation and diversity.
2	Increased partnerships and resources Plan/project implementation Local officials take actions that increase citizen participation. Increased civic engagement in deliberating public issues Increased knowledge, understanding & skills
3	Evidence of community goal attainment Increased capacity to deal with future issues Change in community practice Improved community fiscal and economic performance Citizens of varying cultures increase their participation and engagement in local government and in the community Sustained capacity for informed local decision making Group or organizational sustainability

Outcome #1

1. Outcome Measures

Development or update of plan Increased participation and diversity Awareness of need to develop or update plan Awareness of need for increased participation and diversity.

2. Associated Institution Types

•1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2007	50	640

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Urban League of KC, KC Chapter of NAACP, DHHS Region VII solicited assistance from LU Cooperative Extension to address: Increase of violent crimes committed by youth, Poor computer literacy in the African American and low income areas of Kansas City, MO.
St. Louis City Public Officials and neighborhood leaders solicited LUCE staff to assist and direct a neighborhood project to revitalize a vacant abandon lot, as well as create a sense of pride in the neighborhoods.

What has been done

KC Youth Ambassador Program,Teen Health Summit, and
Summer Leadership Academy
Community leaders, local churches, volunteer organizations, and neighborhood associations, were contacted and invited to participate in a coalition to change an abandon lot into a neighborhood asset. Monthly meetings were held with coalition members, information displayed at resource fairs, networking meetings, and garden sessions were included in the summer program.

Results

Greater collaborative relationships have been forged among St. Louis community groups, government and the University. As a result, the capacity of the University to deliver programs has increased. Resources and volunteers' time have been donated to assist in the development of a community garden.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Increased partnerships and resources Plan/project implementation Local officials take actions that increase citizen participation. Increased civic engagement in deliberating public issues Increased knowledge, understanding & skills

2. Associated Institution Types

•1890 Extension

3a. Outcome Type:
Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2007	50	135

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The Urban League of KC, KC Chapter of NAACP, DHHS Region VII solicited assistance from Lincoln University Cooperative Extension to address: Increase in violent crimes committed by youth, Poor computer literacy in the African American and low income areas of Kansas City, MO.
St. Louis City public officials and neighborhood leaders solicited LUCE staff to assist and direct a neighborhood project to revitalize a vacant abandon lot, as well as create a sense of pride in the neighborhood.

What has been done

KC Youth Ambassador Program, Teen Health Summit, and
Summer Leadership Academy. Community leaders, local churches, volunteer organizations, and neighborhood associations, were contacted and invited to form a community coalition to change an abandon lot into a neighborhood asset. Monthly meetings of the coalition and interested parties were held.

Results

Historically no ethnic minority youth were involved in the Youth Ambassador program in Kansas City. Through the combined efforts of LUCE and community partners, a total of 15 African American young people were appointed Ambassadors.

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development
806	Youth Development

Outcome #3

1. Outcome Measures
Evidence of community goal attainment Increased capacity to deal with future issues Change in community practice Improved community fiscal and economic performance Citizens of varying cultures increase their participation and engagement in local government and in the community Sustained capacity for informed local decision making Group or organizational sustainability

2. Associated Institution Types

•1890 Extension

3a. Outcome Type:
Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2007	50	110

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Members of the neighborhood have expressed their appreciation for the work being done by Lincoln University to improve/beautify the community. They have committed their personal resources to support and maintain the efforts being undertaken.

What has been done

Over 450 volunteer hours were contributed to the success of the garden.

Results

The Urban Garden program has helped to provided renewed interest in the neighborhoods. Volunteers and staff hours have been dedicated to removing damaged and dead trees, weeds, trash, and debris from the garden, planting new trees and grass seeds, and fertilizer and lime have been applied to the garden.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development
608	Community Resource Planning and Development

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Other (personnel change)

Brief Explanation

One person withing the program left the program in summer 2007.

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

1. Evaluation Studies Planned

- Retrospective (post program)

Evaluation Results

Evaluation method included a soil test for the garden. The progress of the community garden was captured in pictures to evaluate progress.. Because of the renew sense of pride and interest in the garden, the garden will receive more positive attention and attract more partners, volunteers, and resources.

Key Items of Evaluation

Program #4

V(A). Planned Program (Summary)

1. Name of the Planned Program

Environmental Science

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		25%		25%
112	Watershed Protection and Management		20%		20%
123	Management and Sustainability of Forest Resources		5%		5%
136	Conservation of Biological Diversity		10%		10%
141	Air Resource Protection and Management		10%		10%
215	Biological Control of Pests Affecting Plants		5%		5%
216	Integrated Pest Management Systems		5%		5%
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals		10%		10%
403	Waste Disposal, Recycling, and Reuse		5%		5%
723	Hazards to Human Health and Safety		5%		5%
	Total		100%		100%

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2007	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	0.0	7.0
Actual	0.0	0.0	0.0	15.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	0	755004
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	0	775089
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Geospatial Studies: The specific objective of the geospatial studies is to create a geospatial digital database.Such a product would provide the basis for natural resource inventory, environmental monitoring and modeling through the use of geographic information systems (GIS). The database will play a major role in designing field sampling strategies, plotting sample locations, conducting spatial analysis and modeling of analytical data.

Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) has sufficient spectral and spatial resolution to map the broad vegetation types for the investigation. A geobotanical approach was implemented to identify areas of anomalous vegetation growth. The spatial and spectral resolutions of ASTER image are adequate to map the spatial extent of the mine waste including the thermal infrared bands. Distinction between the different mine waste types has not been possible from the VNIR bands. The longer wavelength bands (SWIR and TIR) will be utilized, despite their coarser spatial resolution, to see if they can make such a distinction possible based on the physical differences of the mine waste types, i.e., grain size and moisture content.

Soil Chemical Studies:

The column leaching of P-treated mine wastes were simulated using an integrated approach, including simulated precipitation leaching procedures (SPLP), toxicity characteristic leaching procedures (TCLP), and leaching procedures at presence of plant growth. The stability of formed lead phosphates in treated wastes was evaluated against solution pH and root interactions, in context of metal leachability and plant metal uptake.

Plant and water samples were collected from P-treated plot of contaminated site in a interval of 3-4 months. The samples were analyzed for metals to determine metal accumulation in plant tissues and aqueous metal level.

Air Quality Studies:

For 2006-2007, studies were mainly conducted at Lincoln University ‘s farms. Experimental plots at each of Lincoln University sampling sites were mapped using global positioning sites (GPS). Thermal properties were directly measured and soil samples were collected for analysis of initial soil chemical and physical properties. At Freeman Farm, corn and soybeans were planted in the two experimental plots. Corn was fertilized with NPK at 60, 120 and 180 lb/acre but soybean was not. Corn and soybean growth and yield were monitored. Thirty two sampling chambers were installed in the cornfield and twenty chambers in the soybean field at Freeman Farm, twenty at each Carver and Busby Farm. We collected air samples from June to December and analyzed them for CO2, CH4 and N2O at the Dickinson Research Center Laboratory. We also collected soil samples for determinations of chemical and physical properties.

2. Brief description of the target audience

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

V(E). Planned Program (Outputs)

1. Standard output measures

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

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	15	40	5	10
2007	5	15	3	10

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

Patent Applications Submitted

Year	Target
Plan:	0

2007 : 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan			
2007	0	6	6

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Short term output measures are: Abstracts (7), presentation (7), Training students (10) and Workshop (1) Intermediate output measures are publications (7) Long-term: Will be felt after five years

Year	Target	Actual
2007	25	32

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

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

Outcome #1

1. Outcome Measures

Chemical and biological characterization of the ecosystems Contribution to understanding of interactions between human practices and natural ecosystems Enhanced stakeholders knowledge and understanding of environmental issues

2. Associated Institution Types

•1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2007	4	4

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Lead (Pb) contamination in soils and lands from abandoned mining and smelting areas in Missouri, has been identified as a human health and ecological threat. In the southwest and southeast Missouri, there are thousands acres of land and urban soils that have been lead contaminated by disposal of Pb, Cd, Zn-rich mine tailings and smelting operation. The residual lead content in the tailings materials is about one to half percent (10,000-5,000 ppm), and cadmium and zinc are also present. A survey conducted by the Missouri Department of Health showed that 17% of children under 7 years of age near the mining areas had elevated blood-Pb level exceeding the health-based standard of 10 ug L-1. The blood-Pb level was directly related to Pb concentration in soil. The Missouri Department of Conservation indicated that the Pb contamination had also created barren or sparsely vegetated lands and elevated metal concentrations in surface and ground waters in the mining areas.

In situ phosphate treatment that immobilizes Pb in soil and reduces its bioavailability is emerging as a potential cost-effective remedial alternative for safeguarding human and environment from Pb-contamination. The treatment efficacy of phosphates, particularly H3PO4, is being tested and evaluated in smelter-contaminated urban soil for Pb immobilization and reduction in Pb risk to human health. Preliminary results of the studies have shown that the H3PO4 treatment effectively immobilized soil Pb by transforming soil Pb from bioaccessible forms to non-bioaccessible forms and lowered the risk to human health as tested by a swine model and in-vitro extraction test. However, the efficacy of soil treatment using phosphate-based materials on lead bioavaibility or leachability of contaminated tailings is largely unknown and little studied.

Remediation of Pb-contaminated lands for reducing the exposure to human health is a national priority. In order for a large-scale implementation of phosphate remedial technology in mining-contaminated site, a site-specific or mining waste-specific assessment of in situ phosphate treatment is needed. It is hypothesized that in situ soil treatment through phosphate-based amendments could effectively reduce lead bioavailability and mobility in the tailing-contaminated areas, which helps re-establish vegetation cover and protects human and environment from contamination. The proposed study is designed to substantiate the hypothesis. If successful, results from this project will provide a site-specific assessment of phosphate treatment effectiveness on tailing remediation and scientific evidence that can support large-scale implementation of phosphate-based treatment in similar contaminated sites nationwide.

What has been done

The column leaching of P-treated mine wastes were simulated using an integrated approach, including simulated precipitation leaching procedures (SPLP), toxicity characteristic leaching procedures (TCLP), and leaching procedures at presence of plant growth. The stability of formed lead phosphates in treated wastes was evaluated against solution pH and root interactions, in context of metal leachability and plant metal uptake.

Plant and water samples were collected from P-treated plot of contaminated site in a interval of 3-4 months. The samples were analyzed for metals to determine metal accumulation in plant tissues and aqueous metal level.

A sequential extraction procedure was conducted to determine chemical speciation of soil Pb and identify metal species responsible for Pb immobilization and risk reduction. The chemical species was extracted from the most soluble to the least soluble fraction, including water-soluble, exchangeable, carbonate, Fe/Mn-oxide, organic, and residues. Phosphate speciation was also performed by the selective extraction procedures.

Results

1) Leaching experiments show that phosphate treatment effectively immobilized soil Pb and significantly reduced leachable Pb and plant uptake, which potentially lowered the ecological risk to water quality and plant community. The lead phosphates were chemically and biologically stable under the surface soil conditions, resistant to alteration of soil acidity and pant root influences.
2) Data of plant tissue and water analyses indicated that metal uptakes by plants were reduced and surface & ground water quality improved in terms of aqueous Pb and ecological toxicity, as a result of the soil treatment.
3) Chemical fractionation analyses revealed that the phosphate treatment induced soil Pb transformation from labile species to less bioaccessible and less leachable forms, which may account for soil Pb immobilization and risk reduction.
This study is to address environmental concerns by Missouri the residents living in or near contaminated mining areas. The outcome of the study will ultimately lead to a cost-effective and environmental-safe remedial technology or best land management practice that reduces health and ecological risk of soil Pb and restores contaminated site, which would safeguards human and environment from the contaminations and sustains natural resources. Over thousands residents in State of Missouri will benefit from this study in term of improvement of their quality of life and environmental quality.

4. Associated Knowledge Areas

KA Code	Knowledge Area
723	Hazards to Human Health and Safety
112	Watershed Protection and Management
102	Soil, Plant, Water, Nutrient Relationships

Outcome #2

1. Outcome Measures

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

2. Associated Institution Types

•1890 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2007	3	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The goals of this work on soil management practices and N2O, CH4 and CO2 fluxes are: i) to improve our understanding of the relationship between static and dynamic soil variables and greenhouse gas fluxes in various ecosystems and ii) to improve methods to measure, monitor, quantify and predict greenhouse gas fluxes and soil properties. Specific objectives of this study are to investigate (i) 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, (ii) how pore space indices vary in these soils with different vegetation types, (iii) 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 (iv) 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.

What has been done

Sampling sites for this project were Freeman Farm (Agricultural site) where corn and soybean are grown; Carver Farm (Grassland site) where a field plot was set on a permanent pasture, Busby Farm (forest site) where two plots were set inside the forest, and Lincoln University-Lilbourn research site and in a farmer cotton field in the Bootheel. However, for 2006-2007, studies were mainly conducted at Lincoln University 's farms. Experimental plots at each of Lincoln University sampling sites were mapped using global positioning sites (GPS). Thermal properties were directly measured and soil samples were collected for analysis of initial soil chemical and physical properties. At Freeman Farm, corn and soybeans were planted in the two experimental plots. Corn was fertilized with NPK at 60, 120 and 180 lb/acre but soybean was not. Corn and soybean growth and yield were monitored. Thirty two sampling chambers were installed in the cornfield and twenty chambers in the soybean field at Freeman Farm, twenty at each Carver and Busby Farm. We collected air samples from June to December and analyzed them for CO2, CH4 and N2O at the Dickinson Research Center Laboratory. We also collected soil samples for determinations of chemical and physical properties.

Results

Overall, CO2, CH4 and N2O fluxes showed strong variability between months and sampling sites. The forest and pasture sites acted a sink for CH4, but a source for CO2 and N2O. Sporadic uptake of N2O were observed across site. Soil thermal properties were correlated with gases fluxes across sampling sites. The results of this project were presented in form of abstracts at the Fourth USDA Greenhouse Gas Conference, American Society of Agronomy Annual meetings, The Association of Research Directors Annual Meetings, Missouri GIS Conference, The National Conference on Agriculture and Natural Resources Management, at the Missouri Academy of Science Annual Meetings, at the Moonson Asia Greenhouse Gas Conference (Japan) and at the Global Carbon Project Symposium in South Africa. Three graduate students joined the project as graduate research assistants: two working on their master degree in forestry and one working on his doctoral degree in soil sciences at the University of Missouri-Columbia. Ten undergraduate students enrolled in Fundamentals of Geographic Information Systems (GIS 316) and Applications of Geographic Information Systems (GIS 416) either directly participated in field sampling or used the data from this project for scientific presentations at various national meetings. Three prizes were won by students (first place oral or poster presentations) using data from this project: at Lincoln University Symposium, Missouri GIS Conference and at Missouri Academy of Science Conference.

This project has so far generated new knowledge on the spatial distribution of greenhouse gas fluxes in our ecosystems. We are gaining new knowledge in the ways greenhouse gases are controlled by soil thermal properties. We are improving our methods for assessing the relationship between gas fluxes and soil properties. Our students have gained awareness in this issue of global warming and the impact of greenhouse gases. They have learned new techniques in sampling air from soil and measuring CO2, CH4 and N2O using gas chromatography. They have mastered new equipments such the thermal properties meter and exposed to advanced analytical methods using various equipments such as ICP for soil analysis.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
723	Hazards to Human Health and Safety
141	Air Resource Protection and Management

Outcome #3

1. Outcome Measures

Environmental sustainability Improved quality of life

2. Associated Institution Types

•1890 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2007	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
141	Air Resource Protection and Management
123	Management and Sustainability of Forest Resources
112	Watershed Protection and Management
102	Soil, Plant, Water, Nutrient Relationships
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Other (personnel change)

Brief Explanation

V(I). 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

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

Program #5

V(A). Planned Program (Summary)

1. Name of the Planned Program

Human Nutrition

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
702	Requirements and Function of Nutrients and Other Food Components		50%		50%
703	Nutrition Education and Behavior		25%		25%
724	Healthy Lifestyle		25%		25%
	Total		100%		100%

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2007	**Extension**		**Research**	
	1862	**1890**	**1862**	**1890**
Plan	0.0	0.5	0.0	2.5
Actual	0.0	4.5	0.0	2.0

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

Extension		**Research**	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
0	88961	0	213790
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	22843	0	362210
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	281904	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Subjects were recruited by public advertisement seeking healthy Caucasian and African-American women. Twenty Caucasian women with BMI <25 kg/m2 and 20 African-American women with BMI <25 kg/m2 were selected for comparison of races for risk factors of cardiovascular disease. An additional 40 African-American women were selected with BMI >30 kg/m2. This group was divided into two groups - 20 subjects for the intervention group and 20 subjects for the control group. An informed consent form signed by each participant was collected at the beginning of the study. Blood samples, health history, dietary intake, physical activity level and anthropometric data were collected from all subjects as the baseline data. Percent body fat was measured using a BodPod (Life Measurement, Inc. Concord, CA). Blood samples were collected from an antecubital vein into vacutainer tubes containing EDTA after 12-hour overnight fast. Waist and hip measurements were taken according to the procedures recommended at the Airlie Conference. The weight-loss program to meet objectives 1 and 2 are currently ongoing.

The following animal study was conducted to meet objective 3.

High-Fat Diet Treatment (12 Weeks): Eighty male Sprague-Dawley rats were obtained (Charles River Labs, Wilmington, MA) at 4 weeks of age, housed in individual stainless steel cages, and provided unlimited access to a commercial laboratory diet (Purina LabDiet, St. Louis, MO) for an acclimation period of 2 weeks. For the next 12 weeks, the rats had unlimited access to a high-energy (4.2 kcal/g), high-fat (38% of kcals) semi-purified diet. Greatest and least weight gain quartiles during this period were used to assign rats into diet-induced obese (DIO) and diet-resistant, non-obese (DR) groups.

Diet / Exercise Treatment (10 Weeks): DIO and DR rats were then divided into groups fed either a high-fat (38% of kcals) or low-fat (12 % of kcals) diet and either an exercise or sedentary treatment in a 2 x 2 x 2 (obesity x diet x exercise) design. Five rats were assigned to each treatment group. Rats had unlimited access to their respective diets for 10 weeks. Exercise treatment consisted of treadmill exercise 5 days/week using a commercial animal treadmill (Columbus Instruments, Columbus, OH). For the first week, rats were gradually acclimated to the treadmill apparatus. On each following week, speed and duration of exercise were increased to a maximum of 15 m/min for 1 hour each day for the final two weeks.

Carcass Analysis: At the end of the experiment, rats were anesthetized with sodium pentobarbital (45 mg/kg, i.p.) and blood samples were withdrawn by cardiac puncture. Hearts and livers were removed and frozen for later analysis. Fat depots (epidiymal and abdominal fat pads) were removed, weighed, and returned to the carcass for analysis of total energy content. To measure carcass energy content, carcasses were thawed, softened in an autoclave, homogenized in water, and samples were dried in an oven to a constant weight. Samples were removed and combusted in an adiabatic bomb calorimeter (Parr Instruments, Moline, IL).

2. Brief description of the target 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(E). Planned Program (Outputs)

1. Standard output measures

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

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	200	500	100	200
2007	1320	10060	1200	500

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

Patent Applications Submitted

Year	Target
Plan:	0
2007 :	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan			
2007	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- 1) Number of publication 2) Number of presentation 3) Number of workshops 4) Number of contacts 2007: number of presentation: 2 number of workshops: 6 number of contacts (direct & indirect): 1,000 2008: Number of publication:1 Number of presentation, workshops and contacts : Same as in 2007 2009: Same as in 2008 2010: Same as in 2008 2011: Same as in 2008

Year	Target	Actual
2007	1008	282

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O No.	OUTCOME NAME
1	Increase knowledge of good nutrition measured by surveys pre- and post-nutrition education. Increased awareness about relationship between nutrition and physical activity and chronic diseases measured by periodic surveys in research subjects and other clientele. increase nutrition knowledge and awareness of importance of nutrition for prevention of chronic diseases by 90% of participants in direct contacts and 70% of indirect contacts.
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: 2007 - 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 2008 - Utilization of research outcomes by the extension specialist (2-3 good nutrition guides). 2009 - Same as 2008. 2010 - Same as 2008 and number of citations of publications = 10 2011 - Same as 2008 and number of citations of publications = 15
3	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.

Outcome #1

1. Outcome Measures

Increase knowledge of good nutrition measured by surveys pre- and post-nutrition education. Increased awareness about relationship between nutrition and physical activity and chronic diseases measured by periodic surveys in research subjects and other clientele. increase nutrition knowledge and awareness of importance of nutrition for prevention of chronic diseases by 90% of participants in direct contacts and 70% of indirect contacts.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2007	700	194

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Adequate nutrition and exercise are essential for the health and well-being of humans. Dietary factors and exercise are associated with risk factors for coronary heart disease such as obesity, hypertension, non-insulin dependent diabetes mellitus and atherosclerosis. Epidemiological studies suggest that a disproportionate consumption of foods containing high levels of fat at the expense of foods containing complex carbohydrates, fiber and trace essential nutrients are correlated with cardiovascular health. Therefore, recommendations in the Dietary Guidelines for Americans for maintaining health include choosing foods that are low in fat, saturated fat and cholesterol and a diet consisting of plenty of vegetables, fruits and grain products while maintaining desirable body weight. Further research is needed to identify the role of specific dietary factors and exercise for reduction of risk factors for cardiovascular diseases such as hypertension, obesity and high blood cholesterol.

Obesity is a serious nutritional problem that exists in the United States and other developed countries. In 1999, an estimated 66% of U.S. adults and 13% of children and adolescents were overweight or obese. These data indicate a substantial increase in the number of overweight and obese individuals during the last 20 years. In response to these observations, the Surgeon General of the United States recently issued a challenge in The Surgeon General's Call to Action to Prevent and Decrease Overweight and Obesity. A significant component of this challenge is to increase research efforts to improve our understanding of the causes, prevention and treatment of overweight and obesity.

In the United States, the number of overweight and obese adults is greater in a number of minority and under served populations (Hispanic, African-American and Native American), and in women living under poor socioeconomic conditions. Data from NHANES I indicated that between the ages of 30 and 55 years, the prevalence of obesity in African-American women was nearly twice that in Caucasian women, and in women not obese at baseline, African-American women were 60% more likely to become obese within 10 years. Data from the NHANES studies also indicated that the greatest increase in prevalence of overweight may be occurring in African-American men and in people of Hispanic ethnicity indicating ethnic minorities and economically or socially disadvantaged groups are vulnerable population groups.

Participants in a Lincoln University Human Nutrition Research Program stakeholder input survey conducted during the month of June, 2003 indicated that obesity is the most serious health problem followed by hypertension and type II diabetes in the Bootheel of Missouri and Mid-Missouri areas. The survey participants indicated that poor dietary habits and lack of exercise are the most serious risk factors for health in these areas and that they will willingly participate in an education program for changing their lifestyle to improve their health. In the proposed study, we will target African-American women since prevalence rate of obesity and physical inactivity are increasing and significantly higher in that population.

What has been done

Conducted 77 nutrition education and health screening events at senior centers, adult housing complexes,churches,beauty shops and during in-home visits.

Recruitment of Human Subjects:
Subjects were recruited by public advertisement seeking healthy Caucasian and African-American women. Twenty Caucasian women with BMI <25 kg/m2 and 20 African-American women with BMI <25 kg/m2 were selected for comparison of races for risk factors of cardiovascular disease. An additional 40 African-American women were selected with BMI >30 kg/m2. This group was divided into two groups - 20 subjects for the intervention group and 20 subjects for the control group. An informed consent form signed by each participant was collected at the beginning of the study. Blood samples, health history, dietary intake, physical activity level and anthropometric data were collected from all subjects as the baseline data. Percent body fat was measured using a BodPod (Life Measurement, Inc. Concord, CA). Blood samples were collected from an antecubital vein into vacutainer tubes containing EDTA after 12-hour overnight fast. Waist and hip measurements were taken according to the procedures recommended at the Airlie Conference. The weight-loss program to meet objectives 1 and 2 are currently ongoing.

Animal Study:
The following animal study was conducted to meet objective 3.

High-Fat Diet Treatment (12 Weeks): Eighty male Sprague-Dawley rats were obtained (Charles River Labs, Wilmington, MA) at 4 weeks of age, housed in individual stainless steel cages, and provided unlimited access to a commercial laboratory diet (Purina LabDiet, St. Louis, MO) for an acclimation period of 2 weeks. For the next 12 weeks, the rats had unlimited access to a high-energy (4.2 kcal/g), high-fat (38% of kcals) semi-purified diet. Greatest and least weight gain quartiles during this period were used to assign rats into diet-induced obese (DIO) and diet-resistant, non-obese (DR) groups.

Diet / Exercise Treatment (10 Weeks): DIO and DR rats were then divided into groups fed either a high-fat (38% of kcals) or low-fat (12 % of kcals) diet and either an exercise or sedentary treatment in a 2 x 2 x 2 (obesity x diet x exercise) design. Five rats were assigned to each treatment group. Rats had unlimited access to their respective diets for 10 weeks. Exercise treatment consisted of treadmill exercise 5 days/week using a commercial animal treadmill (Columbus Instruments, Columbus, OH). For the first week, rats were gradually acclimated to the treadmill apparatus. On each following week, speed and duration of exercise were increased to a maximum of 15 m/min for 1 hour each day for the final two weeks.

Carcass Analysis: At the end of the experiment, rats were anesthetized with sodium pentobarbital (45 mg/kg, i.p.) and blood samples were withdrawn by cardiac puncture. Hearts and livers were removed and frozen for later analysis. Fat depots (epidiymal and abdominal fat pads) were removed, weighed, and returned to the carcass for analysis of total energy content. To measure carcass energy content, carcasses were thawed, softened in an autoclave, homogenized in water, and samples were dried in an oven to a constant weight. Samples were removed and combusted in an adiabatic bomb calorimeter (Parr Instruments, Moline, IL).

Results

65% of the 1200 program participants reported increased knowledge of good health behaviors, disease prevention, disease symptoms, and the importance of seeking medical treatment.

High-Fat Diet Treatment (12 Weeks):
1. Rats consumed a high-fat diet for 12 weeks and gained a wide range of weight (305 -491 g). Rats gaining the most weight were assigned to the diet-induced obese (DIO) group. Those gaining the least were assigned to the diet-resistant (DR) group.

2. DIO rats consumed 17% more energy than DR rats during this period.

Diet / Exercise Treatment (10 Weeks):
1. Treadmill exercise significantly ($p<0.05$) reduced weight gain by 72% and 64% in DR rats consuming low-fat and high-fat diets, respectively. Exercise also significantly reduced weight gain (95%) in DIO rats consuming the low-fat diet but not in those consuming the high-fat diet. Low-fat diet significantly reduced weight gain in sedentary DR rats and in both sedentary and exercised DIO rats.

2. Neither treadmill exercise nor diet affected energy intake in DR and DIO rats.

3. Treadmill exercise reduced carcass energy by 22% and 24% in DR rats consuming low-fat and high-fat diets, respectively. Carcass energy was not significantly reduced by exercise in DIO rats. Diet did not significantly affect carcass energy values.

3. Treadmill exercise sign

4. Associated Knowledge Areas

KA Code	Knowledge Area
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior
724	Healthy Lifestyle

Outcome #2

1. Outcome Measures

-Number of citations of publications by other scientists in scientific papers. -Use of research results by nutrition extension and health care specialists. I-mprovement of eating behavior and physical activities. -Decrease in percentage of overweight and obesity in research and extension participants. Medium-term: 2007 - 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 2008 - Utilization of research outcomes by the extension specialist (2-3 good nutrition guides). 2009 - Same as 2008. 2010 - Same as 2008 and number of citations of publications = 10 2011 - Same as 2008 and number of citations of publications = 15

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2007	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle
703	Nutrition Education and Behavior
702	Requirements and Function of Nutrients and Other Food Components

Outcome #3

1. Outcome Measures

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

2. Associated Institution Types

•1890 Extension
•1890 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2007	0	55

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

A need for appealing health education programs for youth and adults in the African American community due to high incidence of obesity, chronic diseases and lack of physical exercise. The long-term goal in the Human Nutrition Research Program is to examine how dietary factors such as dietary fat, energy level, fiber, antioxidants and other nutrients, and physical exercise contribute to development and prevention of cardiovascular diseases. Cardiovascular health problems are more prevalent in under-served populations. The current project will produce information for healthful dietary recommendations to prevent diet-related cardiovascular diseases and maintain better health for the under-served populations in the state of Missouri as well as the general public in the United States. For this project, the following three objectives are designed to generate nutritional information to meet our long-term goal:
1) To study the effects of race and obesity on risk factors of cardiovascular
disease such as blood pressure, plasma leptin and CRP levels, insulin resistance and lipid profile.
2) To study the effects of body weight reduction on cardiovascular risk
factors in African-American women.
3) To study the effects of diet energy levels and exercise on energy balance, plasma leptin and CRP levels, and their association with risk factors of cardiovascular disease in diet-induced obese (DIO) rats.

What has been done

Workshops:Food Intake,Think Colored,Learn 2 Count,5x5x5,
Red Dress Fashion Show for Women and Heart Disease.Food Demonstrations,Double Dutch Jumping Competition,City Health Festivals.

Diet / Exercise Treatment (10 Weeks):
1. Treadmill exercise significantly ($p<0.05$) reduced weight gain by 72% and 64% in DR rats consuming low-fat and high-fat diets, respectively. Exercise also significantly reduced weight gain (95%) in DIO rats consuming the low-fat diet but not in those consuming the high-fat diet. Low-fat diet significantly reduced weight gain in sedentary DR rats and in both sedentary and exercised DIO rats.

2. Neither treadmill exercise nor diet affected energy intake in DR and DIO rats.

3. Treadmill exercise reduced carcass energy by 22% and 24% in DR rats consuming low-fat and high-fat diets, respectively. Carcass energy was not significantly reduced by exercise in DIO rats. Diet did not significantly affect carcass energy values.

3. Treadmill exercise significantly reduced the epididymal fat weights (42% and 31%) in DR rats fed the low-fat and high-fat diets. Exercise reduced epididymal fat weights in DIO rats fed the low-fat diet only. Abdominal fat weights were not significantly reduced by exercise. Diet did not significantly affect epididymal or abdominal fat weights.

Results

Participants learned: to make better food choices,the importance of daily exercise and how it relates to good health,about chronic diseases and other health issues.

This study will help the residents in Mid-Missouri to change to a healthier life style, particularly for reducing risk factors for cardiovascular disease and reducing their medical costs. The information generated from this study will be utilized for education of Cooperative Extension clientele, especially African-American women. The information generated from the proposed study will also be published in scientific journals and will contribute for healthy dietary recommendation for Missourians and people of the United States for reduction of cardiovascular disease risks. If the biochemical indicators tested for the risk of cardiovascular disease in this study are proven true, they can be used for better prediction of the risks for cardiovascular disease.

4. Associated Knowledge Areas

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

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Other (Personnel)

Brief Explanation

Unable to hire Nutrition Extension Specialsit.

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

1. Evaluation Studies Planned

- Retrospective (post program)
- Before-After (before and after program)
- During (during program)
- Comparisons between program participants (individuals,group,organizations) and non-participants
- Comparison between locales where the program operates and sites without program intervention

Evaluation Results

Underserved minorities and other disadvantaged adults 50 and older indicated they became more aware and knowledgeable about the importance of adopting a healthy lifestyle.Participants took a proactive role in seeking health information (e.g. increased utilization of the eHealth Medline Plus website).Participants became more aware of ways to manage their personal health.

Key Items of Evaluation

Health Education programs should consider using the Lay to Lay method of providing health information to low income and minoority audiences.

Community Outreach Workers utilized the lay-to-lay approach of teaching. The lay teachers were effective in providing health information to community groups. They were able to have participants more engaged in health related events.They built trust and encouraged participants to be more forthcoming with personal health information.
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Program #6

V(A). Planned Program (Summary)

1. Name of the Planned Program

Plant Science

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%		5%
111	Conservation and Efficient Use of Water		25%		25%
132	Weather and Climate		5%		5%
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants		10%		10%
204	Plant Product Quality and Utility (Preharvest)		5%		5%
216	Integrated Pest Management Systems		15%		15%
405	Drainage and Irrigation Systems and Facilities		5%		5%
503	Quality Maintenance in Storing and Marketing Food Products		5%		5%
601	Economics of Agricultural Production and Farm Management		15%		15%
604	Marketing and Distribution Practices		10%		10%
	Total		100%		100%

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2007	**Extension**		**Research**	
	1862	**1890**	**1862**	**1890**
Plan	0.0	3.5	0.0	2.0
Actual	0.0	1.5	0.0	2.5

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

Extension		**Research**	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
0	294029	0	629622
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	224264	0	420366
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

SUSTAINABLE SMALL SCALE HYDROPONIC CROPPING OF SPECIALTY VEGETABLE

Results from this study demonstrate that hydroponic growers can use the NFT system to grow a mixture of crops, which eases the production system, and allows a more efficient use of the limited production space, while satisfying market demand for variety of fresh vegetable and herb crops. Most limited resource hydroponic growers rely on this simplified NFT production system to satisfy the demand of their niche markets.The choice of soluble fertilizers that can be recommended to the hydroponic grower is increased, since there were no significant differences in yield and quality among the three types of fertilizers evaluated in this study. The soluble fertilizers (EXCL and PLTE) are more readily available in chain stores and local retail nursery shops, and cheaper per unit weight than those specifically formulated for hydroponic production.

The results of study for sweet potato showed that yield of number one size roots was significantly increased with plants were harvested after 120 days regardless of irrigation treatment. Leaf nitrogen content was significantly higher in plants harvested after 90 days of growth. Applying irrigation during the first 30 days of growth significantly increased the yield number one size and decreased the leaf nitrogen content. The lowest level of applied nitrogen produced a significantly higher yield of number one size roots. The result of the economic analysis indicates that the net benefits from treatments 1 and 2 were the same at $3,538 each. The net benefits for treatments 3, 4, 5, and 6 were $2,099, $1,729, $1,938, and $1,377, respectively.

2. Brief description of the target audience

Low-Income, limited resources farmers and ranches and underserved population in rural and urban communities.

V(E). Planned Program (Outputs)

1. Standard output measures

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

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	600	1800	100	300
2007	100	1800	70	250

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

Patent Applications Submitted

Year	Target
Plan:	0
2007 :	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan			
2007	0	1	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Publications Abstracts Refereed Journals Bulletins Years 2007-2088 primarily abstracts and bulletins Year 2009 transition year and years 2010-2011 primarily scientific manuscripts

Year	Target	Actual
2007	4	1

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O No.	OUTCOME NAME
1	Develop educational programs to encourage minority youth to get involved in farming. 2007: Increase the number of minority farmers by 200. Adoption of environmental sustainable crop production practices. 2008: Increase the number of farms adopting production practices by 150.
2	Improve small and minority farms income 2009: Increase the average small farm gross income by $5, 000
3	Enhanced viability of rural communities. Enhanced profitability of Small Farms. 2010: Increase Farm growth income by $5, 000 2011: Increase Farm retention rate by 4, 250

Outcome #1

1. Outcome Measures

Develop educational programs to encourage minority youth to get involved in farming. 2007: Increase the number of minority farmers by 200. Adoption of environmental sustainable crop production practices. 2008: Increase the number of farms adopting production practices by 150.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2007	200	170

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Small-scale agriculture can provide economic viability to communities and contribute to the reduction of poverty.

What has been done

Improved knowledge and skills, offered computer training and technical information, sponsored workshops and on-site visits.

Results

Five African farmers have gotten involved in new farming and about 20 minority farmers have strengthened their farm operations as a result of Lincoln University input.
Improved self-confidence, work efficiency,and productivity.

4. Associated Knowledge Areas

KA Code	Knowledge Area
604	Marketing and Distribution Practices
601	Economics of Agricultural Production and Farm Management

Outcome #2

1. Outcome Measures

Improve small and minority farms income 2009: Increase the average small farm gross income by $5, 000

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2007	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
601	Economics of Agricultural Production and Farm Management
604	Marketing and Distribution Practices

Outcome #3

1. Outcome Measures

Enhanced viability of rural communities. Enhanced profitability of Small Farms. 2010: Increase Farm growth income by $5, 000 2011: Increase Farm retention rate by 4, 250

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2007	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Increased income is necessary to have a viable rural community.
Reduce waste to landfill and convert waste into valuable soil amendment to improve crop production and environmental quality.
Investigation of insect resistant mechanism and deterrent potential of scented geranium (Pelargonium sp.)
LU has maintained a collection of scented geraniums. Some scented geraniums exhibited insect resistant and deterrent activities. This project is designed to examine morphological characteristics and biochemical and molecular biomarkers for distinguishing insect resistant and susceptible cultivars or hybrids. This study also includes demonstration of insect deterrent effects using bioassays and its potential IPM applications as well as the use as insect repellent to protect human health.

What has been done

Provided information and education as appropriate.
Lincoln University's (LU)Cafeteria food waste was collected and mixed with horse barn clean outs and shreaded office paper, two other waste stream utilized as carbon source, for aerobic composting. Formulating a composting recipe with proper C/N ratio, monitoring moisture, oxygen, and temperature, and quality evaluations ensure the success of LU composting food waste to produce soil amendment.
A collection of scented geraniums is maintained in LU Dickinson Greenhouse to support this study. Plant foliage is used for examining the insect deterrent effects by crushing and solvent extraction methods. Morphological characteristics are photographed for records. Plant extracts are examined by GC/MS. Plant young leaves are also used for genotyping by TRAP technique. Data are processed and integrated for scented geraniums grouping.

Results

Impacts
1. Strengthening LU waste management by reducing waste hauling to landfill and converting waste to useful soil amendment.
2. Strengthening LU environment science curriculum in waste management and pollution prevention and control.
3. Enhancement of LU outreach mission by conducting workshops and seminars on waste composting and compost uses in landscaping and gardening.

Impacts
1. Increase knowledge of scented geranium on morphology, biochemistry, and genetic diversity and relationship
2. Effective use of scented geranium for insect control and IPM to protect human health and improve crop production
It is assumed that the targeted audience is better off as a result of these efforts.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
216	Integrated Pest Management Systems

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Other ()

Brief Explanation

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

1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)

Evaluation Results

Key Items of Evaluation