Annual Report
University of Missouri and Lincoln University Outreach and Extension
Table of Contents

I. Planned Programs - Overview

University Outreach and Extension (The University of Missouri and Lincoln University) is positioning itself to meet unprecedented opportunities and challenges in the 21st century. It is a time of technological revolution and shifting demographics; constrained resources and increased demand for access; new issues facing our learners and renewed demands for accountability. University Outreach and Extension is poised to meet these challenges and opportunities and to provide a level of excellence in programming that is recognized nationally as well as in Missouri. Guiding programming and performance is the University Outreach and Extension 21st Century Strategic Direction,
http://outreach.missouri.edu/about/21stcentury/index.html

University Outreach and Extension, in its "Design for the Future," set priorities to focus on improving student learning and achievement; increasing research and scholarship capacity and productivity; ensuring program access and quality; and broadening outreach capabilities.

University Outreach and Extension programs are designed to serve diverse populations, including people of all ages as co-learners. Current program areas include:

- Agriculture, food and natural resources
- Business and industry
- Community development
- Human environmental sciences
- 4-H youth development.

Each content area provides educational programming designed to respond to priority issues identified by people in Missouri. Programming engages the campuses of the University of Missouri and Lincoln University and involves partners in the public and private sectors.

UO/E is committed to attaining national recognition as a leader in fostering a learner-centered environment. In this environment:

- Learners are central to the process.
- The learner applies research-based knowledge.
- The learner is valued as a partner in the learning process.
- Program access and quality are recognized as essential to providing educational opportunity and excellence.

In fostering a learner-centered environment, faculty are recognized nationally for their research and scholarship. To this end, University Outreach and Extension implemented a planning process to guide its strategic direction

University Outreach and Extension programming is based on the needs, aspirations and issues identified by the people in communities throughout the state. University Outreach and Extension program priorities are based on substantial stakeholder input. During 1998-99, a deliberative group process involved 7,012 citizens in 275 sessions in each of Missouri's 114

counties. This process resulted in identification of issues, concerns and educational aspirations of Missourians.

In addition, ongoing stakeholder listening occurs through the County Extension Council infrastructure, 4-H councils, partnership program teams, as well as through priority program evaluations, and survey information collected in program content areas. Continuous listening to learners and stakeholders creates an environment of continuous improvement.

Within the context of the University priorities, University Outreach and Extension is focusing resources on three overall priories:

1. Economic Viability.
2. Strong Individuals, Families and Communities.
3. Healthy Environments.

Implementation strategies to support program priorities include: internal and external partnerships; effective outreach and extension councils; a flexible, diverse faculty reaching diverse audiences; finance and resource development; and the integration of information technology.

University Outreach and Extension helps improve people's lives through research-based education in high-priority areas. Federal Smith-Lever 3b & c resources have been essential to provide ongoing community-based non-formal education meeting local needs and aspirations. These funds have been leveraged and integrated into priority programs in the five AREERA goal areas; therefore this report includes total program performance in the planned areas inclusive of federal, state, local and external funds. State priority programming supports the following areas.

- Biotechnology – (Goal 1 & 3)
- Business Development (Partially, goal 1)
- Citizen Engagement (Goal 5)
- Community Based Infrastructure (Goal 5)
- Environmental Quality (Goal 4)
- Healthy Families (Goals 3 & 5)
- Healthy Living (Goals 3)
- High-Growth Companies and Target Industries (Partially, goal 1)
- Leadership Development (Goal 5)
- Natural Resources and Environment (Goal 1)
- Pre-Business Planning (Partially, goal 1)
- Production Agriculture (Goal 1)
- Workforce Preparation (Goal 5)
- Youth Development (Goal 5)

Missouri has made great strides in this fiscal year to achieve diversity, affirmative action and equal employment goals. We are truly making progress toward ensuring that Diversity in

staffing, advisory groups, Extension County Councils, audiences and programming become a reality. Following are examples of what has occurred in the past fiscal year:

- As a participant in the "Change Agent States for Diversity" (CASD) project; an organizational profile was done to determine the make up of our workforce and our Extension County Councils. This profile indicated that we have made some progress in our recruitment and hiring efforts.
    - As part of the CASD project, we will complete a Climate Assessment of Diversity in University Outreach and Extension with 389 employees in the next fiscal year.
    - Outreach and Extension instituted the new recruitment system, which utilizes technology to its full advantage with a CD ROM, graphics and visuals that are award-winning in appeal. Twenty-five plus people attended workshop in August 2001 that focused on diversity and the recruitment/hiring process. A second workshop has been scheduled for the next fiscal year.
    - Outreach and Extension conducted 2 diversity workshops for faculty and staff across the Outreach and Extension system that included strategies for implementation.
    - The Outreach and Extension leaders reviewed diversity, affirmative action and equal employment performance six times a year to determine progress and discuss actins for improvement of performance. Leaders meet every other month and include administration, regional directors, campus program leaders, directors and content-based program leaders. Statistics related to performance in recruitment, interviewing, hiring and retention related to faculty is carefully evaluated along with changing membership of County Extension Councils. These reports and ensuing continuous learning dialogues have been very successful in improving performance.
    - Outreach and Extension began a process to enhance the "applicant materials review" and interview procedure with an up-to-date PowerPoint presentation on the importance of diversity among staff in University Outreach and Extension. This newly revised procedure will go into effect February 2002.
    - The University of Missouri Outreach and Extension hired 4 people of color as regional specialists. This means we reached our goal for minority hires as set forth in our Affirmative Employment Plan (on file at CSREES). Currently, people of color make up 6% of the organization's employees.
    - Outreach and Extension recruiting efforts are people centered and are designed to build a sphere of influence among colleges and universities in order to recruit highly qualified minority faculty.

      Thirty-one recruiting teams conducted on site recruiting at targeted universities, colleges, professional associations and career planning and placement centers with diverse student enrollment or membership. UOE endeavors to include minority faculty in all recruiting teams.

      The development of an intentional recruiting plan and the implementation of

the award winning career/recruiting web site resulted in the following applicants:

- 34 Blacks- PhD
- 14 Blacks- MS
- 10 Asian/ Pacific Islander-PhD
- 8 Asian/Pacific Islander-MS
- 1 Native American or AK Native-MS
- 6 Hispanics-PhD
- 1 Hispanic – MS
- 8 Unknown PhD
- 18 Unknown MS

- The workforce profile for UOE at the system level is:
  - 33% of the SPD's represent a minority (1 out of three is Black)
  - 25% of the RD's are minorities (Two out of eight are Black)
  - 50% of HRD and AA/EEO represent minorities (2 Black and one Hispanic out of six)
  - Currently there are 16 regional faculty that represent a protected class.
- Outreach and Extension instituted a Diversity Catalyst Team for Missouri. This team will help to plan and carry out our diversity initiative in the next fiscal year. This team is also important to the work of the CASD project.

Table 1 and graph 1 show the overall expenditure of University of Missouri Outreach and Extension for the 2000-2001 programming year to be $36,659,822 with 7.5 million in federal Smith-Lever 3b & 3c funds. These dollars are critical to the core mission of University Outreach and Extension and permit us to be flexible enough to address emerging community issues, learner needs and aspiration and continue a statewide community-based presence. The following report does not reflect the contributions of more than 18,000 volunteers involved in priority programs.

PROGRAMS	TOTAL
Smith-Lever 3b&c	
Regular 3(b) and 3(c)	6,916,474
CSRS Retirement	334,451
Expanded 4-H	217,504
Expanded Part-Time Farmer	29,395
Rural Development	73,116
Total 3(b)&(3c)	**7,570,940**
Smith-Lever 3d	
Expanded Food and Nutrition	1,885,967
Farm Safety	22,391
Food Safety & Quality (Carryover only)	52,727
Cotton Pest Management	49,593
Integrated Pest Management	364,583
Urban Home Gardening	0
Pesticide Impact Assessment	0
Water Quality (Carryover only)	21,069
Total 3(d)	**2,396,329**
OTHER PROGRAM FUNDS:	
STATE	**17,560,399**
COUNTY	4,640,197
NON-TAX	4,491,957
LOCAL	**9,132,154**
FEDERAL (Other than Extension Administered)	0
TOTAL OTHER PROGRAM FUNDS	26,692,553
TOTAL ALL PROGRAMS	**36,659,822**

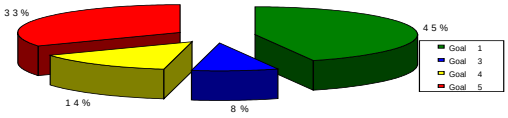
Graph 1: Overall Expenditure of University of Missouri Outreach and Extension for the 2000-2001

Graph 1: Overall Expenditure of University of Missouri Outreach and Extension for the 2000-2001

Table 2 and graph 2 show University of Missouri Outreach and Extension expenditures by goal area for 2001.

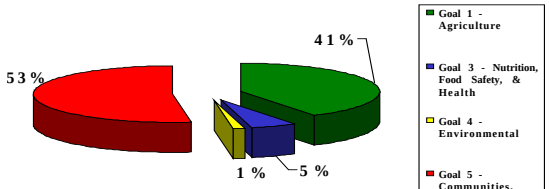
	2001 Planned	*2001 Actual*
Goal 1	1999 % of Plan 01	
Integrated Cropping Systems	$3,035,540	$3,527,287
Forages	$1,517,770	$1,763,643
Prof Livestock Prod.	$3,035,540	$3,527,287
Total - Goal 1	**$7,588,850**	**$8,818,217**
Goal 3		
Nutrition and Diet	$988,500	$1,148,634
Food Safety	$131,800	$153,151
Consumer Health	$329,500	$382,878
Total - Goal 3	**$1,449,800**	**$1,684,663**
Goal 4		
Watersheds	$461,930	$536,761
Animal Waste	$989,850	$1,150,202
Nutrient Management	$989,850	$1,150,202
Total - Goal 4	**$2,441,630**	**$2,837,166**
Goal 5		
Total Families programs	$2,639,600	$3,067,206
Total Youth and Vol. Leadership	$3,035,540	$3,527,287
Total - Goal 5	**$5,675,140**	**$6,594,493**
	$17,155,420	$19,934,538

Table 2: University of Missouri Outreach and Extension Expenditures by Goal Area for 2001



Graph 2: University of Missouri Outreach and Extension Expenditures by Goal Area for 2001

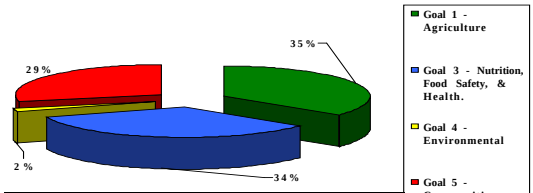
Graph 3 shows the percentage of FTE's of professional faculty/staff in each goal area for FY 01.



	Goal 1	Goal 3	Goal 4	Goal 5
FTE	139.61	17.3	5	176.85

Graph 3: Percentage of FTE's by Professional Staff

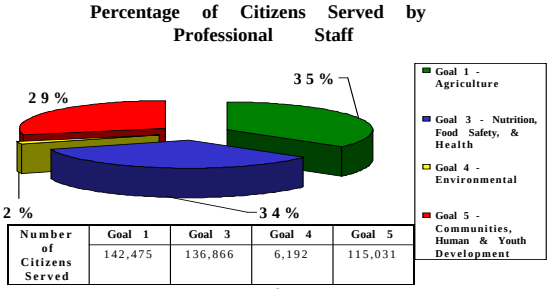
Graph 4 shows the total number of contacts with Missouri learners by goal area in FY 01. Over two million contacts were documented. These contacts range from informational issues to major educational programs with sequence learning over time.



Number of Citizen Contacts	Goal 1	Goal 3	Goal 4	Goal 5
	712,377	684,334	39,060	575,158

Graph 4: Percentage of Contacts by Goal

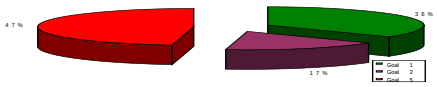
Graph 5 shows the total number of Missourians by goal area who were engaged in sequenced educational programming during FY 01. The 400,578 learners represent over 7% of the state's total population of 5,595,211.



Number of Citizens Served	Goal 1	Goal 3	Goal 4	Goal 5
	142,475	136,866	6,192	115,031

Graph 5: Percentage of Missourians by Goal

Lincoln University receives $2,300,000 for Cooperative Research and $2,770,000 for Cooperative Extension. In Cooperative Extension these resources are allocated to goals 1,2, and 5. See graph 6.



Graph 6: Lincoln University Allocated Resources by Goal

Goal 1: An Agricultural System that is Highly Competitive in the Global Economy

Missouri's agriculture is reflective of the nations as a whole. It is characterized by very few farms (< 10%) accounting for the vast majority of the actual production, while most of Missouri's farms and farmers (65%) gross les than $10,000 annually while seeking a rural lifestyle. Assisting these farms and farmers to be competitive in local, regional, and where necessary global markets require various approaches. Some require cutting edge adoption of technology to the production system itself of plants and animals. Others are more focused on the business design and strategy of being competitive, with more of an emphasis on profitability than production efficiency alone.

Production efficiency was addressed through programs directly specifically at technology adoption to improve overall competitiveness. Electronic and spatial technologies were further developed in Missouri such as the programs developed in the CARES and Precision Agriculture centers. These programs are directed at putting the latest in spatial data analysis in a useable form to the producer. Nutrients, pesticides, water use, soils, and other resources used in the crop production system are all variables utilized and optimized through the use of computerization. Production efficiency was also further developed via the biology of the systems themselves. Missouri's diagnostic clinics provided reliable and timely data on soils, pests, and nutrients directly to producers using their services in crop production. Missouri's beef cow herd continued genetic improvement through the public/private educational partnership known as the Show-Me Select Heifer program. This and other animal production programs integrate improvement in genetics, reproduction, and nutritional sciences directly with producers on their farms.

The business strategy and design of Missouri's farms was further developed among a host of programs with specific target audiences. Small farms participated and benefited from those connecting rural production and urban consumers. It also connected designer production of specialty fruits, vegetables, and other products with a commercial trade, the chefs in Missouri's largest cities. Another program, the Value-Added Development Center, was launched in coalition with the state departments of agriculture and economic development. Specifically directed at exploring and assisting producers with alternative business designs for their farms, this program assisted all farms via its focus on business principals rather than the scale or scope of production. Lastly, the impact of the life sciences on the structure of agriculture and rural communities was addressed through the on-going dialog and educational work of EMAC – Missouri's center dedicated to the study and education of change due to biotechnology.

University Outreach and Extension is taking agriculture into the 21st century with tools to enhance profitability in crop and livestock production, forestry and horticulture; strengthen communities; and protect the environment.

1862 Agricultural Experiment Station Research - University of Missouri-Columbia – Goal 1

Key Theme: Adding Value to New and Old Agricultural Products

The Missouri Value Added Development Center was established to provide Missouri Ag producers and decision makers with timely, credible, and pertinent information relating to value added agriculture. The program includes contracting, identity preserved markets, use of technologies for dissemination, the role of social capital in forming producer clusters, the impart of "trust" on farm profitability, marketing post farm-gate products and assessing consumer willingness to pay for branded meat products.

Key Theme: Agricultural Profitability

Economists monitor livestock markets and develop information and strategies useful to producers in enhancing their farm revenue. Data on production and prices is maintained and published weekly, price forecasts for cattle and hogs are developed, and an annual land price survey is conducted. This information is set up on a web site to give farmers better information on anticipated price changes and knowledge of marketing alternatives to allow producers to adjust their marketing plans to enhance their income.

Variety evaluation is an important part of cotton production in Missouri because the short growing season does not allow many of the longer maturing varieties to be produced profitably. Control of vegetative growth and good defoliation in a low temperature regime are necessary in the short season environment. Eighty-seven percent of the growers surveyed used the Official Cotton Variety Test results for making a variety choice decision.

Developing cropping systems that reduce costs and increase yields. Farmers on sandy soils may benefit from subsoiling but deep tillage did not result in yield increases on silt loam and clay soils. Using variable rate N is profitable when 25% or more of a cotton field has a significantly lower yield potential that the rest of the field. In a soybean cyst nematode infested field, N fertilizer significantly increased soybean yields for one year to off-set nematodes, but found that farmers should rotate to a non-host host crop or nematode resistant variety in the second year.

Key Theme: Animal Genomics

Efforts to improve methods for maintenance of genetic variation in livestock populations has led to the development of a procedure for identifying sets of animals for the USDA swine germlasm preservation program. Our procedures identifies least-related subsets for sampling under a wide variety of conditions. The computer code has been delivered to USDA and will be used for animal selection in species in addition to swine. This software is critical to obtaining a true picture of the current state of the genome in livestock species.

MU has developed the technology to create embryos in vitro and create transgenic pigs. A gene from a fluorescent jellyfish has been transferred into an embryo and grown into pig with

a yellow snout and hooves. Moving that gene is the first step to proving that swine could someday be used as producers of transplant organs.

Key Theme: Animal Production Efficiency

Research shows that 1/3 of all infertility can be attributed to male causes. Detection of a protein from the sperm of infertile bulls may create a reliable test for human male infertility. The protein ubiquitin appears to be a marker of semen abnormalities.

Work on the characterization of the ubiquitin-dependent mechanisms for the destruction of sperm mitochondria at fertilization has led to the development of ubiquitin-based assays for sperm quality to be used in human infertility treatment, toxicology screening and assessment of semen quality in farm animals. In collaboration with Queen's University, PT32 was discovered, a perinuclear theca-harbored sperm protein with a signaling domain for the activation of the c-Yes tyrosine kinase pathway. PT32 is a candidate component of the elusive, sperm borne, oocyte activating factor (SOAF), considered by many to be the holy grail of fertilization research. This work will help advance the diagnostics and treatment of infertility and contribute to the treatment of diseases that depend on the progress of assisted reproductive technologies.

Early abortion is a major cause of economic loss in the livestock industry. Our studies emphasize large domestic ruminants with the goal of increasing pregnancy success by defining how the early preimplantation embryo signals its presence to the mother, thereby triggering appropriate maternal responses that allow the pregnancy to continue. Three discoveries are significant: (1) There is sexual dimorphism among bovine embryos in developmental competence and embryonic signaling. These phenomena have broad general implications for culture of all mammalian embryos. (2) Discovery that embryonic transcription factor, Oct-4, has silencing as well as activating activities. (3) An unusual factor, containing a terminal Kunitz domain, produced by sheep and cow embryos, has the ability to maintain calcium-activated potassium channels in a fully open state and to dilate capillaries. The factor, which is produced prior to implantation, might be involved in preparing implantation sites for embryos.

Feeding studies were conducted to determine the effect of arginine (Arg) and Glutamine (Gln) on nursery performance and intestinal morphology of pigs. Results suggest that .6% Arg is detrimental to nursery pig performance, while 1.2% Gln had positive effects on both performance and intestinal morphology. The use of glutanine in phase I starter diets to replace all or part of the plasma protein could result in fifty dollars per ton savings in feed cost.

Key Theme: Aquaculture

Aquaculture is the most rapidly growing segment of the agriculture industry in the United States. A large portion of Missouri's current production is oriented around recreational markets. A transition must be made towards the development of aquaculture enterprises that are devoted to food fish production and markets. Through the development of a "Missouri

Aquaculture Initiative", research-based information and extension programs are created to provide farmers with information to evaluate the feasibility of aquaculture and to potentially diversity their farm operations.

A bioenergetics model for white crappie was evaluated and improved and then modified to predict condition levels. This model was then applied to evaluate impacts of warm water exposure in Missouri impoundments on white crappie weight and condition loss. Results should help fishery managers decide which impoundments may be a poor choice for expending efforts to develop white crappie fisheries, due to thermal regimes that are too warm in summers**.**

Key Theme: Biotechnology

Established the Economics and Management of AgroBiotechnology Center (EMAC) to build a nationally and internationally recognized research program in consumer decision-making and b behavior, specifically towards genetically modified foods. EMAC's consumer program should become a place where academics, media, and industry look for cutting-edge research on consumer behavior towards GMF's.

Key Theme – Grazing

Winter feed cost is the single highest cost associated with beef production. Approximately 20% of the 2.3 Million beef cows in Missouri are fall calving. If 50% of Missouri prodcuers practicing fall calving were to adopt winter grazing practices, they would save between 11.5 and 17 million dollars annually. The work with diverse pastures has already demonstrated the ability of legume-based pastures to reduce or eliminate the need for nitrogen fertilization thereby reducing production costs and lowering potential for environmental contamination.

Key Theme: Plant Health

Oak wilt is a disease with increasing impact in Missouri due to urban expansion into surrounding forestland, ignorance of the current distribution of the disease, and ignorance of the influence of forest management activity on disease intensification. Our studies have shown conclusively that herbicides cannot be reliably used to halt root graft expansion of oak wilt epicenters. We have shown that the roots of treated oaks survive far longer than stems and canopies. These findings will re-direct efforts toward other means of halting root graft spread of oak wilt.

The structure of the Arabidopsis RPS4 resistance gene and the corresponding protein product determine function in plant disease resistance signaling. A suppressor screening approach has been initiated to identify additional elements in the RPS4 signaling pathway that would not be detected in loss-of-function screens. We have identified a second EDS1-dependent bacterial resistance specificity. Closing of this gene is in progress and will allow structural comparisons with RPS4. Understanding the way plant resistance proteins work can be used to improve engineering of durable innate pathogen resistance in crop plans, with significant benefits to sustainable agricultural production and the environment.

Filed a provisional patent on a yeast promoter, stronger than the ones currently in use. This promoter might have practical application in the use of yeast for research and for production of commercial products. The promoter we have identified provides an alternate promoter source for bioengineering in yeast. It can be used in conjunction with existing promoters for development of yeast vectors that direct high levels of expression of two foreign genes. In addition, we have identified a putative enhancer element with the promoter than might facilitate the expression of recombinant proteins produced in fermentation processes.

Key Theme: Plant Genomics

The ability to manipulate arginine levels in soybean seeds could have an impact on animal and human health as this amino acid has been shown to improve heart function, the circulatory and the immune systems. We are trying to find means to control degradation of arginine by inhibiting its entry into the nitochondrion, the cell compartment where most arginine degradtion occurs. We have cloned two arginine mitochontrial inner membrane transporters (Arg-MCP) from Arabidopsis that complement a yeast mutant deficient in the arginine-ornithine exchanger (ARG1). We have shown that one of the transporters CAT, favors the exchange of arginine among the basic amino acid lysine, ornithine and citrulline.

Established that the pyruvate dehydrogenase kinase that phosphorylates and inactivates PDC is a novel serine protein kinase yet has the signature motifs of histidine protein kinases. We have closed multiple forms of the E2 or core component of the complexes and are establishing the roles for the mono- and di-lipoyldomain isoforms in the assembly and activity of the complexes. Establishing the regulation of the plastid PDC should help us manipulate oil content in oil rich seeds. Engineering chimeric and hybrid complexes for polyhydroxyalkanoate biosynthesis can relieve the bottleneck in the production of biodegradable plastics in plants.

Filed final patent to protect the technology that showed that isolated peptides in solution recapitulated the behavior of the phage-displayed peptides, an important step for reducing the technology to practice. This should lead to rapid means of breeding pest resistance into agricultural pests.

In legumes the ureide pathway supplies most of the nitrogen that is required for growth. Our research has demonstrated that extant descriptions of the ureide pathway are incomplete, and that there must be at least two more enzymes in the pathway than have previously been recognized. One enzyme has been purified and its gene cloned.

Soybean cyst nematode reduced soybean production in the U.S. more than any other pest. Losses have gone from 279 million bushels to 169 million bushels due in great part to farmers increased planting of high yielding SCN resistant varieties. A soybean line (NS97-6946) has been developed that is resistant to all major races of soybean cyst nematodes . The line was developed from a cross of Essex s PI438503A. We have released SN97-6946 as a germplasm source to be used as a parent by soybean breeders in crossing to develop soybean varieties containing SCN resistance to all major races. Over 90 percent of the soybean varieties

available today depend on PI88788 or Peking as their source of resistance to SCN. The release of this line will broaden the genetic base of resistance to SCN. S96 2692 is being released as a germplasm line for use by breeders. It has resistance to race 1, 2,2 3, 5, and 14 of SCN, root knot nematode and reniform nematode. It has moderate resistance to SDS and peanut root knot.

Key Theme: Plant Production Efficiency

Common waterhemp management in soybean and corn: It is considered one of the five most problematic weeds in Missouri and several surrounding states. Utilization of appropriate soil-applied herbicides and postemergence glyphosate in glyphosate-resistant soybean is the most efficacious strategy. We published one of the first manuscripts which addressed postemergence control of this weed in glyphosate-resistant soybean. Corn projects indicate that soil-applied and postemergence herbicides are needed to achieve seasonlong suppression of this weed.

Higher weed control expenses are perceived as a limitation to adoption of no-till, glyphosate soybean production. We have shown that herbicide rates can be reduced 25 to 50% when combined with frequent early-season scouting and utilization of narrow row spacing in a no-till system.

ALS resistant common sunflower studies determined that 3 plants/m2 present for the entire growing season reduced soybean yield from 50 to 72%. If removed from the field within 4-8 weeks after planting, yield losses are minimized. If removed earlier, new emerging plants will cause significant yield loss. If removed later than 8 weeks after planting, yield loss due to early-season interference has already occurred.

Integration of herbicide-resistant corn into Missouri crop production systems caused a reduction of Atrazine use. Enhanced weed control was noted when utilizing atrazine in combination with imazethapyr + imazapyr, glyphosate or glufosinate in the respective herbicide-resistant corn varieties. These programs have proven to be as or more effective at controlling weeds as the traditional soil-applied programs that are currently being used in Missouri and reduce reliance on atrazine by approximately 50%. Glyphosate-resistant corn technology is particularly effective in managing perennial weeds such as johnsongrass.

Palmer amaranth contol is exceptionally difficult for cotton producers and Palmer amaranth can cost growers up to $15.00 per acre in extra heribicide applications. This represents a value of 4.5 million dollars based upon the 300,000 acresneeding treatment. Our research supports a 24c special local need label for the herbicide Reflex for preemergence use in cotton.

Increasing use of transgenic crops hs resulted in issue pertaining to the performance of postemergence herbicides. Glufosinate and glyphosate activity on velvetleaf is impacted by the time of day applications are made due to leaf angle and t he light conditions change. Single applications of glyphosate in resistant soybean should be timed between 1.5 and 5.5 weeks after planting for optimum weed control and crop yield.

Key Theme: Ornamental/Green Agriculture

Results indicate that the Missouri Gravel Bed technique may allow trees and shrubs to be planted bare root all summer long with results similar to those for container grown and balled and burlapped plants. Cost savings in labor and freight associated with bare root harvesting and handling could be passed on by growers to retail and landscape nurseries.

Source of Federal Funds: Hatch, Grants

Scope of Impact: Multi State

1890 (LU) Cooperative Research Programs — Lincoln University – Goal 1

Key Themes — Agricultural Profitability; Animal Health; Animal Production Efficiency Plant Production Efficiency; Aquaculture and Small Farm Viability; Diversified/Alternative Agriculture.

Project Title: MOX-MERIDITH An Integrated and Systems Approach to Animal Production on Small Farms in Missouri

Accomplishments and Results

On March 23 and 24 an artificial insemination workshop for beef cattle was held at the new facility located on Busby farm. The workshop quickly filled with area producers. During the workshop, participants received lectures on reproductive anatomy, handling frozen semen, the Missouri Show Me Select program, estrous detection, sire selection, nutrition and estrus synchronization. The speakers included Mr. Max Bade from American Breeders Service, Mr. David Patten from the Missouri Department of Agriculture, Mr. Edward Hagen from Consolidated Nutrition and Mr. Greg Dudenhoeffer and Dr. Steve Meredith from Lincoln University. The majority of time during the class was spent palpating cows and passing pipettes through the cervix. All the participants were able to successfully pass pipettes through the cervix by the end of the workshop.

Studies were conducted in the summer on two of the objectives of the group project. These included: 1) a study to evaluate the effectiveness of Gallagher electric fence systems for containing sheep and goats and 2) a study to compare three warm-season forages on growth and carcass characteristics of lambs.

Fencing Study

It appeared that, once trained, the animals would not attempt any escapes (no successful escapes at this time with 3, 2 or 1 electric wire). To increase the desire to escape, all electric

wires were then removed and the animals driven from the pens and allowed to graze the pastures, after two weeks, the animals were again placed in their appropriate pens and a single electric wire used (16" from the ground). This time, the wire did not contain the sheep or goats and an additional wire was added (12" & 24" from the ground). The two wires prevented all but two additional escapes. At this point, under the conditions of our study, it appears that two wires (one ground and one electrified) is adequate to prevent escape by either sheep or goats.

Grazing Study

Total gain (mean se) for the lambs during the grazing trial was higher (P<.05) for treatment 1 (5.87 .89 kg) than for treatment 2 (1.84 .76 kg) or treatment 3 (2.5 .68 kg). Backfat thickness was greater (P<.05) for treatment 1 and 3 (.08 .006 in) than for treatment 2 (.007 .006 in). There was no difference in loineye area among treatments. Carcass characteristics of wethers were not different among treatments. In conclusion, these three forages can be used for summer grazing for lambs, but lambs grazed on Donegal soybean gained better than lambs on the other two treatments.
MOX_OC94_611 Sweet Potato Production in Central and Southeast Missouri

Overall Impact of Study

Fencing Study

Results from these studies resulted in data that producers can utilize for building easily constructed and inexpensive fencing systems for containing sheep and goats.

Grazing Study

This study has demonstrated that Donegal soybeans are a superior warm-season forage for lambs.

Project Title: MOX- MARSH Warm Season Vegetable Adaptation and the Potential for New Crops in Missouri

Accomplishments and Results

The general objective is to develop cultural and management systems to improve the adoption of cowpea, okra and sweet potato in Missouri and to assess the economic implications of these practices. The specific objectives are: 1) to determine the effects of thidiazuron and proline on embryogenic and organogenic development of cowpea, 2) to determine the effect of planting date and seed treatment on seedling establishment and yield of cowpea, 3) to evaluate the performance of selected commercial sweet potato varieties when treated with different rates of nitrogen fertilizer and times of irrigation, and 4) to determine the economic implications of culture and management practices used in the production of sweet potato and cowpea in Missouri. 5) Determine the interest of limited resource farmers in production of specific alternative crops.

This project was funded in March 2001. Since that time, studies have been initiated on four of the objectives of this project. A lab study is in progress to determine effects of proline and thidiazuron on okra. A field study to determine planting date and seed treatment effects on stand establishment was conducted, and the data is being prepared for economic analysis. Samples and data are being collected form sweet potato field study. It is anticipated that data collection and laboratory analyses and statistical analyses will be completed in approximately six months.

Overall Program Impact

This study will involve developing cultural and management systems to improve the adaptation of cowpeas, okra and potato in Missouri, and assessing the economic implications of these practices. Such a study is a very appropriate because these types of data for sweet potatoes in Missouri apparently have not been collected or at least not widely available to farmers and other producers in the state. It will initiate the development of database of sweet potato in Missouri, provide cultural systems to facilitate the improvement of chilling tolerance in cowpea and okra, and supply valuable economic information relevant to the production systems of the three crops.

Discussions with farmers at a recent Stakeholders Symposium indicated the need for information on alternative crop production and marketing. In addition to the issues on the specialty warm season vegetables being addressed in this project, a new objective will be added to determine the interest of limited resource farmers in the production of other alternative or new crops

Federal Funding Source

Evans-Allen

1862 University Outreach and Extension — University of Missouri System – Goal 1

Key Theme — Adding Value to New and Old Agricultural Products

a. Program Description:

Two trends have dominated in agriculture over the past decade. First, the number of farms has decreased substantially. Second, the value of price received on the farm has declined relative to the consumer price paid. In an effort to jointly combat these trends, agricultural producers are seeking innovative and profitable means to enhance their portion of the end-user dollar. The Missouri value added effort was established to help producers with the business aspects of value added ventures. Though the statistics indicate that 80% of start-up businesses fail, it is realized that attempting to do something is better than doing nothing. Thus, the Missouri value added effort is

concentrated on helping Missouri, and national constituents, with the business aspects of planning, organizing and operating the value added business in order to increase success rate.

Missouri Value Added Development Center (http://valueadded.missouri.edu/index.htm) unique in its structure. Although headquartered in Columbia, its efforts extend throughout the state via approximately 45 Agricultural Business Counselors (ABCs). ABCs are the key to Center activities by maintaining local connections with producers. Specifically, ABCs are the point of contact for local producers interested in value added endeavors. Once contact is made, ABCs assist individual producers or producer groups by facilitating the business development process.

Value added is globally defined to be the process of agriculture producers capturing a greater portion of the end-user dollar. The purpose of the Center and Agricultural Business Counselors is to enhance Missouri agric-producer profitability and sustain rural community economic viability by assisting agricultural entities in the business development and economics of value-added ventures.

The mission of the Center and Agricultural Business Counselors is met through:

- Value added producer educational programs delivered through the ABCs.
- Value added professional development programs delivered through the Center.
- Put-to-action applied research directly applicable to value added.
- Collaboration with research faculty to produce quality and relevant information.
- Assistance to entrepreneurs and entrepreneurial groups in start-up, marketing and distribution of agricultural products.
- ♣ Assessment of potential and actual impact of value added ventures at the farm, community and regional levels.

b. Program Impact:

The value added agriculture effort provides assistance to more than 50 individual or group projects, representing in excess of $120 million in capitalization. Co-learning is facilitated by University Outreach and Extension Ag Business Counselors.

There are currently five NxLeveL – Tilling the Soils of Opportunity courses underway, with nearly 50 participants in all. Center staff and ABCs have been involved with Ag Lenders programming throughout the state, reaching nearly 100 persons. More than 20 presentations have been given to county councils in order to raise awareness of the value added effort. One Agri-Expo was held with 103 attendees and 4 more expos will occur throughout the state over the course of this month. The Missouri Value Added Development Center website has had more than 35,000 website hits over the course of the past year. Since this approach to value added programming is new in Missouri, impact/outcome data has not be documented.

Outcomes will be reported in FY 03.

c. Source of Funds: Smith-Lever, NRI, State, USDA-Rural Development, Kellogg Foundation

d. Scope of Impact: State Specific

Key Theme —Animal Production Efficiency

a. Program Description:

Several factors have influenced the type of livestock production systems currently practiced in Missouri. Climate, soil types and terrain, location, availability of markets , environmental regulations, renewable resources such as grain, forages and water, governmental policies and its people have all contributed to structure and viability of animal agriculture in the state.

Missouri ranks sixth in the United States in swine production with nearly 4,000 operations producing a total of 6.3 million pigs. The total number of Missouri swine enterprises has declined rapidly from 10,500 operations in 1994 to 5,000 operations in 1998. Another 20 percent were lost by 2000. However, total average inventory of pigs has changed very little.

Missouri ranks second in the U.S. in total number of beef cows in production, with 2,062,000 cows on nearly 60,000 farms. Revenue generated from cattle production in 1999 contributed $890 million to Missouri's economy. Over a 10-year period the value of Missouri cattle production is nearly tied with the value of Missouri soybean production as the number one commodity in the state**.** Beef enterprises are finding it increasingly difficult, to compete in a global marketplace where large producers use economies of scale to be more profitable. This is especially true for producers in Missouri, given the average herd size of 34 cows.

Some of the major factors impacting the livestock industry are lack of quality labor, greater demands from consumers for a wholesome product, biosecurity and air quality issues, waste management and water quality, business management, new technology and many other issues. To address these trends and issues the *Livestock Production Systems* program has focused on three major program trusts:

1) **Improved/Enhanced Production Efficiency of Beef Herds in Missouri**. This program educates beef producers about breeding strategies, genetic predictions, EPD, AI, economics, animal health and the selection of replacement heifers. The educational methods used include workshops, livestock seminars, demonstrations, field days, producer tours, computer programs, web sites, mass media, guide sheets, and individual consultation. The major Named Program related to this thrust is the **Show-Me Select Heifer Program** (http://agebb.missouri.edu/select/).
2) **Improved Marketing and Financial Strategies for Beef Cattle Producers in Missouri.** This program educates beef producers about retaining ownership, production and nutritional management, animal health record keeping, operational

assessment, alternative marketing, and feedlot management. The major educational method used include feed lot tours, marketing programs, distance learning, ultrasound demonstrations, stocker seminars, workshops, producer tours, guide sheets and the mass media. The major Named Program related to this thrust is the Premier Beef Marketing Program (http://agebb.missouri.edu/commag/beef/premierbeef/index.htm **).**

3) **Swine Production for the 21st Century Technology Education and Implementation Program (TeDI).** This program educates swine producers about modern production techniques, artificial insemination, modern waste management, nutrition, animal health, record keeping, niche market development, and labor management. Educational methods used include seminars, workshops, individual consultation, "success stories", guide sheets and mass media.

Missouri is a member of the **Livestock Marketing Information Center**, which is a collaborative effort between USDA, state extension specialists and industry cooperators. This program involves a coalition of 24 states including Missouri.

b. Program Impact:

1) Show-Me-Select Replacement Heifers sold for an average of $1047 per heifer. This price received per head is substantially greater than the price paid for bred heifers at conventional livestock sales. The heifers sold through the sanctioned Show-Me-Select sales generated gross receipts of $6,947,512.
2) Eighty-eight counties (77%) have at least one or more buyers of Show-Me-Select Replacement Heifers.
3) Eighty counties (70%) enrolled one on more producers in the Show-Me-Select Replacement Heifers Program. This involved 36,025 heifers on 393 farms throughout Missouri. One hundred forty-nine local veterinarians received training and were also involved in the programs implementation.
4) As a result of the Show-Me-Select Replacement Heifer Program seventy-eight percent (78%) of the herds now use artificial insemination and seventy-seven percent (77%) now use estrus synchronization.
5) Post-weaning to pre-breeding development of Show-Me-Select Replacement Heifers improved based on pre-breeding examinations (weight, reproductive tract score, and pelvic measurements). When the program was initiated 54% of the herds reported cyclicity rates of $\geq$ 50%, whereas, today nearly 70% of the herds reported cyclicity rates of 50%.
6) Response of Show-Me-Select Replacement Heifers to estrus synchronization treatments improved from 29% in the first year of program implementation to over 65% this past year.
7) Incidence of dystocia was reduced in the Show-Me-Select Replacement Heifers compared to the national average of 18 to 30% to less than 10% during the past 3 years.
8) The estimated total annual economic impact of the Show-Me-Select Replacement Heifers program is $5.2million of new economic activity and the creation of 125 jobs.

9) There are currently more than 100 producers participating in the Premier Beef Marketing Program.
10) Ten Premier Beef Marketing Groups have been established statewide. More than 1200 calves have been marketed through the program.
11) Calves sold through the Premier Beef Marketing Program have brought and increased the value of $54/head compared to other marketing alternatives. This has resulted and increase of $61,398 to 52 producers who have marketed their animals through the program to-date.
12) All of TeDI participating enterprises have adopted a computerized record-keeping system.
13) The elimination of pen mating systems has been incorporated into 20 of the TeDI swine enterprises, resulting in a reduction in total cost of production by an average of $5.00 per head marketed and the elimination of manure runoff
14) One sample TeDI swine enterprise has improved the sow housing environment, resulting in an increase of at least one pig per litter, possibly generating 28,500 more weaned pigs for the 500-sow, farrow-to-wean operation, creating an annual impact of $943,800.
~~15)~~ In a 25-year-old sow facility with a concrete floor in East Central Missouri, all sow feces and urine drained along with rainwater into the lagoon. The owner was unwilling to invest in modern housing system for all sows, but after four on-farm visits by extension specialists to assess options, he accepted a plan to increase productivity and prevent runoff. Total cost of construction for a new facility was only $50 per pig space, while typical new construction approaches over $600 per sow space.

c. Source of Funds: Smith-Lever, State

d. Scope of Impact: Multi-state partners: Arkansas, Colorado, Georgia, Idaho, Iowa, Kansas, Kentucky, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, North Dakota, Oklahoma, Oregon, South Dakota, Tennessee, Texas, Utah, Virginia, Washington, and Wyoming.

Key Theme — Plant Production Efficiency

a. Program Description: Integrated Cropping System

Production agriculture in Missouri and the entire U.S. is undergoing structural changes that challenge the viability of many rural communities. Increased production efficiency and global competition have given rise to a marketplace where profit margins are paper thin, favoring consolidation of smaller farms into larger operations that can benefit from efficiencies of scale. Often these larger farm managers own only a portion of the land in their operation, renting additional acres from owners who often are absent. Thus, farmers often know little about the management history of the fields they are farming. Added to this constraint is the fact that time is at a premium for farmers who often manage 2,000 or more acres. So, at a time when accurate, timely information is needed more than ever, many farmers are in a poor position to capture

that information.
The economic well-being of all Missourians depends on a healthy and vibrant agriculture. Nearly 80% of Missouri's 29 million acres are devoted to crop and rangeland. In addition, crop sales account for nearly 50% of total agricultural cash receipts (nearly $5 billion). The science and technology associated with crop management changes at an increasingly rapid pace. Identified trends, issues, and concerns include: increased environmental awareness; crop management in the information age; biotechnology; identity preserved and niche marketing; unintended consequences of technology adoption; consolidation in the input industry; small profit margins and global economy; competition among information sources.

The major program priorities for the Integrated Crop Program (ICM) are 1.) enhanced profitability of grain, fiber, and forage production; and 2.) reduced negative impacts of grain, fiber, and forage production on the environment.

During this reporting period the MAJOR program thrust for these ICM priorities have focused on and can be summarized as follows:

1) Enhanced profitability of grain, fiber, and forage production
   - ♣ programs focusing on the management of seven major or emerging crops (soybean, corn, wheat, forages for grazing, alfalfa, cotton, rice)
   - ♣ programs that compare cropping systems that incorporate transgenic cultivars with those that use traditional cultivars
   - ♣ precision agriculture and remote sensing
   - ♣ programs focused on improved marketing that incorporate a global perspective and consumer perspective
   - ♣ programs on alternatives to traditional cropping systems; focus on improved profitability and income stability
   - ♣ programs on value-added, niche markets including organic crop production

2) Reduced negative impacts of grain, fiber, and forage production on the environment
   - ♣ Integrated pest management
   - ♣ Pesticide applicator training
   - ♣ programs focusing on alternatives to traditional pest and nutrient management practices
   - ♣ soil management programs including soil conservation
   - ♣ best management practices for nutrients including appropriate development of nutrient management plans
   - ♣ role of GMO cultivars in pest management

For additional program information see Getting There From Here - Strategic Directions to Guide Missouri's Agriculture and Natural Resource Outreach and Extension Effort!
(http://cafnr.missouri.edu/extension/strategicplan/anrprogramplan.pdf **)**

b. Program Impact:

1) More than 30,000 corn and soybean producers developed cropping systems that enhance profitability and protect the environment. Approaches range from traditional crop rotation to more high-tech approaches such as precision agriculture and use of biotechnology.
2) Producers have benefits from the Precision Agriculture (http://www.fse.missouri.edu/mpac/) program because of the educational focus on using inexpensive GPS receivers (approx. $300) instead of receivers costing $2000 plus.
3) The Precision Agriculture Management (PAM) program has been involved with several EQUIP (NRCS sponsored) programs to improve nutrient management plans using precision agriculture technologies.
4) Currently there are 24 producers enrolled as PAM cooperators. The program reached over 200 Missouri crop producers affiliated with the PAM program this year. Through activities of the PAM program, over 15 Missouri Citizens learned some aspect of precision agriculture management.
5) Seven producers have added GPS capability to their yield monitors so they are able to produce yield maps. Approximately 40 other calls have been answered from crop producers and media in 8 other states.
6) Cotton growers in southeast Missouri lost 7.7 percent of their 2000 crop to insect infestation, despite spending more than $20 million to control these infestations. Extension specialists educated producers in the use of scouting or pest surveys to determine the best pest control strategies. Yields in fields where pest control decisions were made using pest surveys were estimated to be 50 pounds of lint per acre more than yields where no pest surveys were conducted.
7) Twenty of the cotton producers received in-depth crop-scouting training in an eight-hour course.
8) A highly successful series of integrated pest management publications were developed and distributed to Missouri producers. The manuals focused on identifying, scouting, assessing the extent of damage and making management decisions for the major insect, weed and disease pests of important crops.
   - *Corn Diseases*, IPM1001
   - *Soybean Diseases*, IPM1002
   - *Introduction to Crop Scouting*, IPM1006
   - *Practical Weed Science for the Field Scout: Corn &AMP Soybeans*, IPM1007
   - *Insect and Mite Pests of Apples*, IPM1008
9) A full-color manual, *Early Spring Weeds of No-Till Crop Production*, was printed and distributed as a North Central Regional Extension Publication, NCR614..
10) More than 2,000 commercial pesticide applicators attended commercial pesticide application training program. Training was held at five locations across the state.
11) An additional 1,000 private applicators were certified as the result of training by the regional specialist..
12) Ninety percent of the participants evaluated the commercial and private applicator training as good to excellent.

13) Rice weed control programs demonstrated for rice producers that the use of fewer chemicals, could save them $20 per acre when compared with weed controls used five years ago. These new programs use four to six pounds less pesticide per acre and call for significantly more ground application, reducing the risk of pesticide drift. Total savings are estimated at $2 million a year for Missouri rice producers.
14) Five hundred commercial crop advisors/professionals attended the Weed Science Field Day, the week-long Crop Management Clinic and the 20 hour Crop Diagnostic Clinic to receive continuing education training on the latest developments and research related to integrated pest management technology.
15) As the result of the herbicide-resistant crops educational programs, the acres of herbicide-resistant soybeans have increased from 15 percent in 1996 to more than 65 percent in 2000. Herbicide-resistant corn acres have increased from less than 5 percent in 1997 to approximately 12 percent in 2000. Part of this producer educational program involved the testing and demonstration of more than 1,000 treatments at three locations throughout the state.
16) The variety testing program provides unbiased comparison of soybean, corn and sorghum varieties at 40 sites. Last year, 587 soybean, 374 corn and 64 sorghum entries were compared for Missouri producers.
17) During the period, the cost of nitrogen fertilizer zoomed from $165 to $260 per ton. Educational activities focusing on the use of the nitrogen fertilizer response curves developed from field research, corn, rice and cotton producers were educated on alternatives to reduce their nitrogen use, production cost while maintaining productivity.
18) Irrigation scheduling tools developed by extension specialist have resulted in average corn and soybean yields that were, respectively, 7 and 9 bushels per acre higher than yields where such methods were not used.. A corn grower in Mississippi County said he had the best crop ever last year using the scheduling tools. A Pemiscot County soybean producer reported a $5,000 increase in gross profits on one field.
19) The Irrigation Conference was transmitted to producers live at nine sites in three different states.

c. Source of Funding: Hatch, ARS, State

d. Scope of Impact: State specific

Key Theme —Rangeland/Pasture Management

a. Program Description: Forages for the 21st Century

Forages represent a significant renewable natural resource for Missouri with more than 9.7 million acres in pastures and harvested forages. This represents approximately 33.5% of the total land in farms in Missouri. Missouri produces 7.1 million tons of hay (including alfalfa hay) or 4.7% of the total hay produced in the U.S. This ranks Missouri 4th nationally for total hay production. The agronomic practices associated with the Forages for the 21st Century program will enhance water quality, reduce soil

loss, and produce wildlife habitat while feeding Missouri's livestock industry. Missouri ranks 2nd in the nation for the total number of beef cows with over two million head on 60,000 operations. Nearly half of the beef producers production costs is for livestock feed during January, February and March. Forages represent about 90% of that cost for winter feed.

Missouri's dairy producers are struggling. Since 1991, almost 30% of Missouri's family dairies have gone bankrupt because of high feed costs, expensive capital investment and low profit margins. To respond to this trend dairy producers are adopting the grass-based dairy model so they can lower feed costs, minimize capital investments, increase profit and protect the environment.

To address these trends the *Forages for the 21st Century* has focused on three major program trusts:

1) **Winter Feeding and Stored Forages for Beef Cattle.** This program educates producers about stockpiling tall fescue, adaptation of winter annuals in Missouri, grazing residues, winter grazing management, how to lower feeding losses, ammoniation of low quality hay, forage quality and prudent use of supplemental feed. The methods used include workshops, livestock seminars and demonstrations at the regional research centers. In addition mass media, and Internet and guide sheets are effective.
2) **Grazing Systems and Pasture Management.** This program educates producers about management intensive grazing, new forages for grazing , nutrient cycling, forage quality, summer forages, legume persistence, warm-season grass establishment, tall fescue endophyte, and legume establishment into pastures. The methods used include regional grazing schools, special field days, guides and mass media.
3) **Grass-Based Dairies.** This program educates dairy producers about grazing management, forage quality for dairies, balancing rations on pasture versus in dry lot, low cost system design, record keeping, seasonal versus year-round dairies, fencing and watering systems, fertilization of pastures, improving soil resources and improving the families quality of life. The methods used include pasture walks, dairy schools, cow colleges, lender meetings, "core-groups", manuals, guides, demonstrations, seminars and mass media.

b. Program Impact

1) Grass-Based Dairy Producers using management intensive grazing to reduce feed cost, produced milk for 15% less than producers using conventional methods.
2) The grass-based dairies produced milk for $8.03/cwt. This is 36% less than the average for confinement dairies of $12.50/cwt.
3) Four "core-groups", of 20-25 participants/group, have been established. The educational model used is based on the very successful New Zealand model of producer co-learning. Farmers and/or educators from 15 states have come to observe and learn from the model.

4) Sixty-four percent of the producers involved in the grass-based dairy program as a result of the financial management workshops, have split their personal family financial records from their dairy enterprise financial records. By keeping their records separate, they are better able to make sound business decisions.
5) Six core group producers plan to expand their operations by increasing their herd size. It is estimated that this expansion will bring an estimated $4,062,300 into their communities.
6) Forty-percent of the core group producers report they plan to renovate or build new dairy facilities.
7) Over half of the core group producers plan to introduce three or more improved varieties into management-intensive grazing system.
8) Over two-thirds of the core group producers reported that their dairy operations were more environmentally friendly.
9) More that fifty percent of the producers involved in the grass-based dairy program reported that they feel that have more leisure time and enjoy a better quality of life.
10) Twenty-seven regional grazing three-day schools were conducted involving more than 700 producers.
11) Seventy-five percent of those that attended the grazing schools adopted at least one new practice taught in the school.
12) Fifty percent of those producers that attended the regional grazing school applied for state cost-share to establish a management-intensive grazing system. Twenty-five percent of those producers received cost-share.
13) Producers that have implemented a management intensive grazing system have found that they improved manure distribution, which has lowered P and K applications, improved legume persistence, which reduced N application requirements and increased nutrition, resulting in increased carrying capacity and improved water quality.
14) More that 20,000 producers have participated in the winter feeding/stored forage programs. Seventy percent of those producers have adopted one or more new concept/practice covered in the program.
15) Research has found that producers that adopt at least one of the winter feeding/stored forage concepts have reduced their winter feeding costs by 20%/year. This has resulted in savings for livestock producers of more than $1.26 million dollars per year.
16) Winter pastures acreage has increased by more that 30 fold since 1998, from 10,000 acres to more than 70,000 acres.

1890(LU) Cooperative Extension Service — Lincoln University – Goal 1

Key Themes — Small Farm Viability, Niche Market, Urban Gardening, Agricultural Competitiveness, Adding Value to Old Agricultural Products

SMALL FARM FAMILY PROGRAM

Program Description:

Approximately 80% of Missouri farms are classified as "small farms". Maintaining their viability is central to the survival and progress of many small townships and communities. Therefore, the survival and continued profitability of Missouri's small farms are major concerns for farmers and community leaders alike. These concerns have been expressed at all levels of the community, and through several forums.
The purpose of the Small Farm Family Program (SFFP) is to meet the informational and educational needs of farm families who are likely to be under served by other University Outreach and Extension (UO/E) programs. The under served are most likely to be those families with minority status and/or limited resources - including financial means, education, political power, social status, self-esteem, and thus, have limited access to usual sources of knowledge and information.
The SFFP personnel constantly strive for opportunities to educate program participants on the importance of conserving natural resources, maintaining and/or improving the environment, and on becoming less dependant on purchased inputs. As more research-based information becomes available on sustainable agriculture, these are passed on to the small family farmers. The program promotes technologies that are environmentally friendly, economically sound, and socially responsible.

Program Duration:

This program started in 1971. The state of Missouri still has about 100,000 small farms, and the majority is struggling to hold onto these farms while they still make a living. They desperately need help now, and will require assistance for years to come. Thus, this program must continue for a very long time.

Primary Audience(s):

This program is specifically geared toward serving small family farmers who are often not reached by other more traditional extension programs. These educationally and financially disadvantaged people also lack self-confidence and political power. They do not actively seek out information or assistance. The education assistants are recruited from the same locality, with similar backgrounds. Thus, it is easier for these education assistants to gain the confidence of targeted populations. They seek out families who could use the program assistance, and then work with them on a one-to-one basis.

Key Program Components:

The SFFP is unique in that it requires input and research-based knowledge from many areas, as it supports "all" educational and informational needs of a family farmer. The program implementers are obliged to seek out information wherever these might be available; this often forces collaboration with myriad organizations.

Accomplishments/Outcomes:

Over 2300 growers and stakeholders in the vegetable industry received the Vegetable Production Newsletter.
Three garden plots were established in Southeast Missouri. The program has been expanded to Pike and Ralls Counties.

Internal and External Linkages:

During the 28 years since the program's inception, an extensive and strong network of relationships have been developed among various program stakeholders. Through a signed Memorandum of Agreement between the two institutions, the organizational structure and the program implementation plan have been formalized. While LUCE provides the bulk of the operational expenses and leadership to the program, University of Missouri System Outreach and Extension (UMSOE) makes available an array of resources necessary to implement the program.
LUCE has designated a full-time person to provide leadership to the program, and UMSOE has included SFFP in the job responsibilities of three Regional Directors and three Farm Management Specialists (who serve as the Regional SFFP Coordinators). The program is delivered to the target population by SFFP Educational Assistants (EAs) on a one-on-one basis. At present, there are 20.

SHEEP AND GOAT PRODUCTION

Program Description:

The land area in Missouri suitable for sheep and goat grazing and browsing is 46% of the total land. Small ruminants primarily, sheep and goats are best suited for converting forage, forbs and browse into meat, milk and fiber as saleable and consumable products high in nutrition and wearable items. Profitable use of these non-arable lands is a concern raised in various forums. Co-grazing with sheep, goats and cattle are being encouraged by the Department of Natural Resources (DNR) with funding available to producers for fencing, watering systems and fertilizer to improve production per acre of land.
A partnership is being researched with DNR and Cooperative Extension to provide a holistic program to optimize production per grazing acre. This team approach to deliver this program in grazing, fencing, reproduction, selection, herd health, predator control, disease control, nutrition, management, and building plans for producers is being developed with the goal of increasing sheep and goat production by 75% in Missouri by 2004.
The development of relevant guide sheets and videotapes containing up-to-date research-based information addressing the needs of the producer will be used as output indicators. Other output indicators include the acceptance and participation in workshops, training seminars, and the implementation of Ram Test Stations. Each year producers will be encouraged through various educational avenues to participate in this program.

Primary Audience:

Small farm families and limited resource individuals and families, sheep and goat producers, regional livestock and other specialists.

Program Duration:

Program duration is expected to be 5 years from the time of inception until completion. The program is offered in all 114 counties, excluding urban St. Louis and Kansas City. Youth-oriented versions of sheep and goat production are on a continuous basis, as youth become of age to participate in 4-H programs.

Key Program Components:

The key components of this program are (a) involvement of producers, field extension personnel, and local community leaders in the introduction of this program to communities; (b) an interdisciplinary approach to address all aspects of sheep and goat production; and (c) a youth component.

Internal and External Linkages:

The program has, as a major component, forged partnerships with several organizations, including the 1862 university, local organization, State Department of Agriculture, the Missouri State Fair Marketing Councils, and youth development organizations.

Accomplishments/Outcomes:

This program presently reaches producers in over 100 counties. Collaboration with researchers at Missouri's two land-grant universities, coupled with networking among researchers from other states, provide the research for this program.

VALUE-ADDED FIBER PROGRAM

Program Description:

Wool produced on small farms is being sold for 5-15 cents per pound, and much of it is not selling at all. Mohair produced from adult Angora goats is stored in warehouses, and has been there for three years. The kid hair is selling, and some of the yearling mohair. The need to develop markets outside the commercial marketplace is imperative if producers of wool breeds are to stay in business. Developing value-added wool markets selling to hand spinners, quilters, and weavers is being done through different marketing channels. A 1000% mark-up per pound of wool can be achieved by educating producers on how to grade, skirt fleeces, make washed wool into roving and batts, and making it into yarn. Yarn can be used for knitting, crocheting and weaving, as well as locker-hooking, and in some cases used in tatting and counted cross stitch for crafters. By methods of processing, fiber from animals and plants will result in increased profit at the farm gate or

through Internet and festival event marketing. Through consultation with farmer groups, initiative has been taken to solve the marketing dilemma for Missouri small farmers.

Primary Audience:

The target audience for the program includes farmers producing sheep, goat, rabbit, llama and alpacas, regional livestock specialists, youth specialists and other specialists. Also targeted are individuals who purchase products with the intention of adding value.

Program Duration:

The program is planned for 5 years, with the addition of new communities upon demand.

Key Program Components:

The organization of producers into association to aid in the development of the program is one key component. Others include the delivery methods such as workshops, festivals and conferences that are organized by farmers and local extension staff.

Internal and External Linkages:

Internal - Partners with fine arts department on the Lincoln University campus
External - Partners with guild members throughout the state

Accomplishments/Outcomes:

Guide sheets, videos and newsletters will be developed in response to the topics requested by producers. The number of individuals participating by using these materials will be measured performance. Goals will be measured in terms of planned conferences, and participation in fiber festivals. Outcome indicators will include measures of new producers participating in the value-added program.

MARKET DEVELOPMENT FOR MISSOURI PRODUCTS

Program Description*:*

Southeast Missouri is the poorest part of the state. Because of the absence of marketing opportunities, lack of alternative farming enterprises and value-added production for the small disadvantaged farmers in the region, poverty is a persistent issue. The consequences of such a deplorable economic situation are far reaching in their societal impacts. For example, there is rural to urban migration by individuals who are not skilled enough to earn living wages.
Reports received from farmers indicate past development of markets and cooperatives, which could not be sustained for various reasons. The result is that farmers who are risk averse are afraid of venturing into more productive and profitable farm enterprises and cooperatives unless there are immediate market outlets. Direct, relationship, and other

niche marketing techniques are either unknown or very new to most of the small limited resource farmers in the region. By failing to organize into associations or cooperatives, these limited resource farmers cannot take advantage of the global competitive markets. Sheep and goat producers in Missouri form a category of farmers who need assistance in opening up markets in the face of expanding demand in the country, especially for goats. Overall, in repeated conference evaluations, small and limited resource farmers have always chosen marketing as their primary obstacle to increased profitability, growth, and sustainability.

Primary Audience:

The individuals targeted in this program are limited resource and small farmers who are traditionally underserved. Extension and outreach assistance will be required to meet the needs of the group. Both consumers and producers will be affected. While producers will be assisted, through extension, outreach, and conferences to produce safe food, consumers will be encouraged to buy them through various marketing strategies, and promotions. Community leaders will also be targeted. Improvement in the economic well-being and quality of life of these citizen groups will spill over into their rural communities. Information given out at conferences will help agricultural professionals to serve their clientele better. It is expected that more than two thousand (2,000) citizens will participate in this program annually from the year 2000 to 2004.

Program Duration:

The duration of the program is continuous and will last as long as there are farmers and workers expecting to sustain themselves on their farms and operations. For example, vegetable marketing will continue as long as producers are willing and able to produce for the market.

Key Program Components:

The key components of the program include, and not limited to, the following: (a) continuation of internet marketing of goats, (b) beginning of internet marketing of sheep, (c) developing marketing strategies for pastured poultry, (d) establishing a North Central Regional Center for Small Farms and Sustainable, (e) helping vegetable producers in the Bootheel to form a cooperative for purposes of marketing their products, (f) assisting in the development of web pages to advertise and sell natural fiber products from sheep and other animals, (g) submitting Fund for Rural America proposal whenever the funds are reinstated, to provide opportunities for people to farm and market their products to enhance their economic well-being, (h) developing market(s) for specialty products, such as cheese made from sheep and goat milk, (i) teaching marketing plan and pricing of crafts and other products, (j) marketing welfare-to-work program to potential employers, (k) marketing Lincoln University to the University of Wisconsin for purposes of internship for graduating seniors from Lincoln University, (l) organizing conferences and

workshops for the stakeholders to provide networking opportunities and disseminate current information on various marketing strategies, and (m) marketing feasibility surveys and studies.

Accomplishments/Outcomes:

The Missouri Goat Marketing Committee successfully merged with the Southern Missouri Goat Meat Association for the effective pursuit of the causes of the goat industry. 99% of farmers participating in the Internet Goat sales reported satisfaction with sales. In the three years since the auctions have been in place prices have increased by approximately 30% for a Top Kid, an average annual increase of 10%. In the Enhancing Teaching through Computer Literacy Program for Information Providers and Farmers, 8 high school students from the Bootheel received training on the campus of Lincoln University and returned to the Bootheel to train farmers.

Internal and External Collaborations (Linkages):

The internal collaborators include the University of Missouri and Lincoln University extension and outreach professionals. The external linkages include the Missouri Department of Agriculture, the United States Department of Agriculture (USDA) and its various agencies, for profit and not-for- profit organizations, and non-governmental organizations (NGOS).

HORTICULTURE PRODUCTION (PRIMARILY FRUITS AND VEGETABLES)

Program Description:

Approximately 47% (by weight) of food consumed by Missouri citizens are fruits and vegetables. Missouri imports over 90% of its fruits and vegetables. Missourians are concerned about the quality, nutrition and safety of the fruits and vegetables they consume. They also desire to have more knowledge and control over the food that they consume. Local and regional production offers the opportunity to provide fresher and higher quality produce to the Missouri consumer, whether this produce is grown in commercial operations or home gardens. Knowledge of the production of safe and healthful fruits and vegetables, without negative impacts on the environment (e.g. water pollution caused by fertilizer nutrients and pesticides), are desired by both commercial and home gardeners.

Production of these crops also offers economic alternatives for many small and medium scale growers within the state. Most of these crops are not widely grown on a large scale and information is greatly lacking to assist new and existing commercial growers. A multi-facet dual educational program is offered - one to assist commercial operations to be more successful and profitable, and the other to assist home gardeners to make their gardens more productive, both with fruits and vegetables that are safe, nutritious and high quality. The issues and delivery methods were developed from the expressed needs of both clientele groups from surveys and county program plans and requests from growers and extension personnel. A major target audience for the home gardening component are

extension personnel and Master Gardeners who work with limited resource, minority, inexperienced and youth gardeners.

Primary Audiences:

The target audience for this program are commercial fruit and vegetable growers and home gardeners. Emphasis is also placed on youth, minority and limited resource audiences.

Program Duration:

This is an ongoing program. Some components, such as the crop nutrition program, are multiyear in scope and are opened ended. For example, according to the Missouri Department of Natural Resources, less than 10% of Missouri farms have had their soil tested within the past three (3) years. Increasing the nutritional value of these crops and reducing fertilizer application rates may take decades.

Summary:

Both the commercial fruit and vegetable production and home gardening components have been underway for several years. The crop nutrition component has been added within the past two years. This program has drawn interest nationally due to its emphasis on 1) quality of production (not just quantity of yield), 2) eliminating soil fertility as the limiting factor in crop production and 3) reduction of fertilizer inputs , thus reducing groundwater pollution.

Key Program Components:

For the period 2000-2004, between 2000 and 3000 growers will be targeted through the Vegetable Production Newsletter and educational meetings such as the Great Plains Vegetables Conference. A major emphasis will be placed on the crop nutrition program (including a water quality component), which uses soil testing and plant analysis to determine proper fertilizer applications (including micronutrients) to crops to increase productivity and quality, and to reduce fertilizer inputs and environmental pollution. Other educational components will include, guide sheets, workshops and conferences, educational tours, direct grower assistance, diagnostic services, field days, and training and support to area extension specialists. With home gardening, training of Master Gardeners and Extension educational assistants are key components of the program.

Accomplishments/Outcomes:

For commercial growers outcome indicators are increased quantity and quality of products, increased market share and profitability of horticulture producers, and reduction in production inputs (fertilizers, pesticides, etc.). For home gardeners, outcome indicators are increased quantity and quality of fruits and vegetables grown in home gardens, proper and safe use of pesticides, reduction of pesticides and fertilizers used by home gardeners.

Internal and External Linkages:

This program involves representatives of state and local organizations, e.g. Missouri Vegetable Growers Association, Missouri Department of Agriculture, Missouri Department of Natural Resources, and various commodity groups and local gardening groups.

SOCIALLY DISADVANTAGED FARMER PROGRAM

Program Description:

The United States Department of Agriculture is criticized for the lack of service to small farmers, especially minority and female farmers. This audience appeals to the Cooperative Extension Program for help and assistance that can enhance, improve and strengthen their farm operation and insure that their farm operation is successful. The trend of loss of small farm family operations continues to escalate. On a national and global scale, the large agriculture corporations are addressing issues such as marketing, biotechnology, and land use. The small farmer finds it difficult to relate to issues of such magnitude because they are confronted with more basic and crucial issues such as money management, financing farm loans including operating loan, improving credit rating, developing satisfactory cash flow records, utilizing existing technology in crop production, and exploring alternative agriculture activities.
During the past year, the state legislature recognized the critical need for these issues to be addressed and as a result, the House and Senate Agriculture Committee convened four public forums throughout the state to listen to small farmers speak of their needs. Each session resulted in the committee recommending that more monies be allocated to address these problems.

Program Duration:

The program duration coincides with the Cooperative Extension 5-year plan. One hundred and sixty (160) farmers will be carried forward into the new year and an estimated 15 new farmers will be enrolled in the program each succeeding year. Ten (10) farmers will graduate from the program and will be eligible for follow-up assistance as needed.

Key Program Components:

The key components are: the design and implementation of the program by the Extension Project Staff and farmer cooperators enrolled in the program, the length of the program and the involvement of 90% of the farmers in all training workshops and demonstration sessions.

Accomplishments/Outcomes:

15 new small farmers were identified and enrolled in the 2501 Program. Workshops and conferences which providing information regarding economic assistance and viability were attended. Three presentations were given on LU Extension Programs.

Internal and External Linkages:

The program involves representatives from Extension, Missouri State Department of Agriculture, Women in Agriculture and several private banks and lending institutions throughout the state. USDA agencies including Natural Resources Conservation Service, Farm Service Administration, and Rural Development will also be involved.

Target Audiences:

The target audience remains farmers who have been enrolled in the program over the past 5 years and new farmers identified by the staff or by existing farmer-cooperators.

Resulting Impact: State Specific

Federal Funding Source

Smith-Lever

Goal 2: A Safe and Secure Food and Fiber System

1890 (LU) Cooperative Extension Service — Lincoln University –

Key Themes — Food Handling, Food Quality, Food Safety

TO PROVIDE A SAFE AND SECURE FOOD AND FIBER SYSTEM

Program Description:

* Very highly publicized outbreaks of food borne illness over the past 10 years have been attributed to microbial contamination of eggs, beef and fresh fruits and vegetables. Both restaurants and catered meals have also been implicated in cases of food borne illness affecting large numbers of people. In addition, food that may be uncontaminated when brought into the home can be handled, stored or prepared in ways as to allow the development of dangerous levels of illness-causing pathogens. Extension has a very important role to play in helping achieve the goals of the President's 1997 Food Safety Initiative.
* In addition, even though the U.S. food supply is among the most plentiful in the world, it is neither equally distributed nor equally available to all Missourians. Sadly, for a percentage of Missourians, reliable access to safe, affordable, culturally relevant food is not always a reality. According to the 1990 census, 13.3% of Missourians are living below the poverty level. While poverty is prevalent throughout the state's population, it is more predominant among minorities, people living in rural areas, children, the elderly and female-headed single parent households. Thirty percent of children 18 and under are food stamps recipients.

Performance Goals:

* To annually increase, in Missouri, public awareness, understanding, and information on food accessibility and affordability; to annually increase the effectiveness of citizen participation on public policy issues affecting food security (i.e. food access, affordability, and recovery).
* To annually increase, in Missouri, public awareness, understanding, and information regarding food safety and food borne risks and illnesses.
* Output indicators will include: a) number of workshops and presentations given on these topics, b) number of people attending these workshops, c) number and variety of fact sheets produced and distributed on relevant topics; d) number of public service announcements used on radio stations, broadcast area and approximate audience size at time of airing; and e) number of people subscribing to nutrition newsletter. Outcome indicators will include measures of awareness, knowledge and self-reported behaviors before and after attendance at workshops.

Key Program Components:

* To conduct a series of home visits with elderly food stamp recipients in southern Missouri and other regions as funding permit using lessons adapted from the curriculum Families First: Nutrition Education and Wellness System.
* To conduct a series of workshops for primarily low-income Missourians on nutrition topics including a variety of cooking activities.
* To produce a regular newsletter on pertinent nutrition, health and food safety issues for Missourians, especially those traditionally under served by other programs.
* To set up a web site with continually updated nutrition, health and food safety information and links to other web sites providing sound information on the Internet.

* Food Safety and You. A program, contingent on funding from USDA CSREES Plan of Work to provide food safety education to occasional quantity foods cooks, primarily low income African Americans, in the Bootheel and other areas of the state where it is needed. (funds applied for – pending funding)

Goal 3: Health and Well-Nourished Population

Chronic diseases such as cancer, diabetes, heart disease, and strokes continue to be major health problems in Missouri. In the most recent report by the Missouri Department of Health and Senior Services (2000), over 56% of deaths to Missourians were caused by chronic disease. Despite major advances in health care and the development of new treatment procedures, Missourians continue to face high-risk of dying from one of these diseases. Increasingly, scientists and health professionals are interested in addressing the prevention of these diseases rather than simply trying to stop their deadly progress at the end.

Although there are no simple preventive measures that can assure that Missourians can escape chronic diseases, there has been significant new research in nutrition sciences and exercise physiology that indicates that dietary behaviors and fitness activities play a major role in the prevention of heart disease, cancer and diabetes. In particular, our understanding of growth and development during childhood and adolescence, leads scientists to conclude that childhood and adolescence is a critical time in the development of eating and fitness habits that can lead to life-long positive or negative health outcomes. Research indicates that healthy eating patterns in childhood and adolescence promotes health and intellectual development and can prevent such childhood health problems such as iron deficiency anemia, obesity, eating disorders and dental cavities. Likewise, researchers have found that regular physical activity builds and maintains healthy bones and muscles, controls weight, and reduces feelings of depression.

The Missouri Department of Elementary and Secondary Education has been tracking youth risk behaviors in the state throughout the 1990s. These data suggest that our children are at significant risk due to poor eating habits and limited physical activity. For example, less than 25% of Missouri young people report eating five or more servings of fruits and vegetables each day. Alarmingly, the trend between 1995-1999 is towards lower consumption of these foods. This report also indicates that the rate of obesity among children and adolescents in Missouri has doubled in the past decade. Almost one-third of Missouri high school students report that they are overweight. Also, troubling are the inappropriate methods that adolescents are using to control their weight. Rather changing eating habits or increasing physical activity, about 1 out of 5 took diet pills, laxatives or vomited to keep from gaining the weight. The rate of physical activity among Missouri teens is also a concern. About two-thirds of young people are getting regular exercise, but the trend has shown no increase during the late 1990s.

These trends among Missouri children and adolescents indicate that there is an important need to increase healthy eating patterns and improve fitness. Researchers also have found that low income and ethnic minority children are at even greater risk poor diet and lack of exercise. This results from a combination of community and family factors that result in the lack of money to purchase food, the availability of healthy foods, difficulty in preparing food safely, limited safe community resources for physical activities other many other factors. Many Missouri families are in this limited resource group. The Missouri Department of Social Services reports in 2000 that 418,631 received food stamps. One out of five Missouri

children are living in households that receive food stamps. Additionally, over 1 out of 3 (36.1%) qualify for the free or reduced meal program provided through the schools.

Based on these findings the Nutrition and Health Program team of University Outreach and Extension has developed a comprehensive nutrition and fitness education program for all children (pre-school through high school) that teaches age-appropriate dietary and fitness knowledge and skills. Each level of the program provides a minimum of 12 teaching episodes of at least 30 minutes. These teaching materials are designed to be interactive and engaging of children so that can understand and practice appropriate eating and exercise habits. The children's program is conducted in school classrooms as a supplement to the regular science and health curriculum.

In addition this work, faculty have developed an interactive teaching exhibit of the human body that can be set up in large rooms that children can play the role of a food item (e.g., a vegetable, hamburger, etc.) and enter the mouth and walk through internal organs of the body (down the esophagus into the stomach, and so forth) in order to understand the consequences of nutrition and physical fitness on the body.

Additionally, there are specialized programs for parents with a particular emphasis on pregnant and parenting teens. These are also multi-session programs that are conducted in schools, community centers, health clinics and other locations that are easily accessible to parents who lived in impoverished rural and urban areas of Missouri. News media and information technology are also increasingly being used by the University of Missouri to deliver educational information.

State of Missouri Families 2002

University of Missouri Outreach and Extension's annual report provides a look at the conditions affecting family life. **State of Missouri Families** examines trends in health care, nutrition and other measures of well being. Reports on every county and the city of St. Louis are available.

The Nutrition and Health Program team of University Outreach and Extension has developed a comprehensive nutrition and fitness education program for all children (pre-school through high school) that teaches age-appropriate dietary and fitness knowledge and skills. Each level of the program provides a minimum of 12 teaching episodes of at least 30 minutes. These teaching materials are designed to be interactive and engaging of children so that can understand and practice appropriate eating and exercise habits. The children's program is conducted in school classrooms as a supplement to the regular science and health curriculum. Examples of high performing 21st century programs follows and these are linked to web sites for additional information.

In addition this work, faculty have developed an interactive teaching exhibit of the human body that can be set up in large rooms that children can play the role of a food item (e.g., a vegetable, hamburger, etc.) and enter the mouth and walk through internal organs of the body (down the esophagus into the stomach, and so forth) in order to understand the consequences of nutrition and physical fitness on the body.

Specialized programs for parents with a particular emphasis on pregnant and parenting teens are shown below. These are also multi-session programs that are conducted in schools, community centers, health clinics and other locations that are easily accessible

to parents who lived in impoverished rural and urban areas of Missouri. News media and information technology are also increasingly being used by the University of Missouri to deliver educational information.

1862 Agricultural Experiment Station Research — University of Missouri-Columbia

Key Theme: Human Health

- The Diseases of the Most Impoverished Program is developing a plan to persuade countries to administer three new vaccines for typhoid fever, cholera, and shigellosis. A customized decision analysis software application will allow decision makers to combine our research finding with country-specific information to predict the impacts of alternative policies. The economics team from the University of North Carolina, University of Missouri, and International Vaccine Institute prepared survey instruments and held a training session in Seoul, Korea. The team is also beginning analysis of existing typhoid cost data collected in India and is collaborating with researchers from Delhi, India.
- Consumers and health professionals are interested in the potential health benefits associated with consuming diets enriched in omega-3 polyunsaturated fatty acids. These fats are essential for proper growth and function of the eye and brain in newborns. These fats may reduce the risk of heart attack. Consumption of even greater amounts of these fats may reduce the incidence and severity of several inflammatory diseases in humans. However, at such high levels of intake, people's resistance to certain infectious diseases may be reduced. The research to increase the understanding of the impact these fats have on infectious disease resistance may reduce the risk of adverse effects on human health.

Source of Federal Funds: Hatch, Grants

Scope of Impact: Multi State

1890 (LU) Cooperative Research Programs — Lincoln University

Key Theme — Human Health and Nutrition

Project Title: MOX- CHI Dietary Factors Associated with Chronic Disease/Dietary Factors, Exercise and Cardiovascular Health

Accomplishments and Results

To accomplish our first objective, the effects of dietary fats and antioxidants on blood pressure and plasma lipids were investigated in several animal models. Animal models

studied were spontaneously hypertensive rats, Wistar-Kyoto normotensive rats, and New Zealand White rabbits. Dietary fat sources included corn oil (omega-6 fat), fish oil (omega-3 fat), olive oil (omega-9 fat) and beef tallow (saturated fat). Combination of vitamin E, vitamin C and beta-carotene was used as antioxidant sources.

To accomplish objective 2, our laboratory examined the influence of changes in diet composition, i.e. reduced protein intake or energy levels, on energy balance, running activity, and sympathetic nervous system activity in obese and lean animal models.

To accomplish objective 3, recipes containing antioxidant-rich fruit and vegetables were developed (first phase of the study). The second and third phases of this study, conducting a 3-month intervention program, and data analysis will be accomplished later. Twenty existing recipes utilizing fruits and vegetables were selected and modified by replacing the saturated fat with mono- (olive oil) or polyunsaturated fat (vegetable oils) and changing the amount of spices.

Ten to twenty panel members participated in evaluation of these modified recipes**.**

Dietary fish oil intake was effective in lowering blood pressure in spontaneously hypertensive rats, but not in normotensive rats. Increased consumption of dietary antioxidants lowered blood pressure only in spontaneously hypertensive rats consumed fish oil. Plasma triglycerides and cholesterol were reduced in animals consumed fish oil without significant changes in the ratio of total-cholesterol/HDL-cholesterol. Increased consumption of dietary antioxidants did not influenced plasma lipid profiles. Obesity caused by increased consumption of saturated fat in New Zealand White rabbits increased blood pressure. Plasma cholesterol was not affected but triglyceride was increased in obese rabbits compared with lean animals. The combined effects of dietary fish oil intake and exercise on blood pressure and lipid metabolism in spontaneously hypertensive rats will be tested in future experiments.

We found that levels of dietary protein influenced development of obesity in obese animal models. In addition, dietary protein levels influenced voluntary running activity thus altering energy balance. The effect of protein intake on running activity and energy balance was gender-specific, with males demonstrating a more robust response than females. These findings have contributed to a better understanding of the development of obesity and other disorders of energy balance and may lead to more effective programs for weight reduction and prevention of obesity.

We found that all 20 recipes tested were well accepted by panel members indicating that recipes can be modified in a way nutritionally more valuable and they can be usable in the second phase of the study. Panel members expressed two major reasons for not eating recommended amounts of vegetables: 1) they do not know how to cook, and 2) they do not have enough time to cook.

In general, Greek-style salad received best scores from panel members and African-American panel members expressed John's collard green with tomatoes as the best dish. Greek-style salad contained 4 cups torn spinach, half of medium cucumber, 1 medium tomato, half cup chopped onion, ¼ cup crumbled low fat cheese, 2 tablespoons sliced pitted ripe olives, 2 tablespoons lemon juice, 1 tablespoon olive oil, 1 teaspoon honey, 1 minced cove garlic and 1 tablespoon snipped parsley. John's collard greens with tomatoes contained 2 pounds fresh collard greens, 3 cups water, 2 tablespoons vegetable oil, 1 chopped large onion, 3 minced garlic cloves, 1 16-ounce can chopped tomatoes, half teaspoon red pepper flakes, 1 teaspoon salt and freshly ground black pepper to taste.

Overall Program Impact

The entire Human Nutrition Research Team Project aims to produce information for life style modification to prevent cardiovascular diseases. Nutrition is essential for sustenance, health and well-being. Dietary factors are associated with 5 of the 10 leading causes of death in the United States: coronary heart disease, some types of cancer, stroke, type II diabetes, and atherosclerosis.

Preventive dietary interventions by reducing fat energy level, increasing omega-3 polyunsaturated fat, and increasing fruit and vegetable consumption, and increasing exercise, will reduce risk factors such as obesity, hypertension, and lipid oxidation. These changes will improve health of the general population and reduce the nation's economic burden for medical treatments. Considering the loss of economic productivity due to illness, death and morbidity, other than medical costs, preventive intervention of cardiovascular disease by life style modification has a significant economic impact. Cardiovascular diseases cost the nation well over $135 billion. The information that will be generated from this project will be used for preventive interventions to reduce risks of hypertension, coronary heart disease, obesity, and certain types of cancer. Missouri residents as well as the general population of the United States will benefit from the results of our entire project.

1862 University Outreach and Extension — University of Missouri System

Key Theme — Human Nutrition

b. Program Description: Nutrition and Health: Family Nutrition Program

The Family Nutrition Education Programs (FNEP) (http://outreach.missouri.edu/fnep/index.htm) are an important part of University Outreach and Extension, bringing the latest nutrition information to low-income Missourians. FNEP helps clients achieve life long health and fitness. Paraprofessional nutrition educators work with clients individually and in groups, in their homes, in schools, and at agencies. Clients gain skills that pave the way for nutritional well-being and health. Programs include EFNEP, the Expanded Food and Nutrition

Education Program and FNP, the Family Nutrition Program.

In April 2000, 418,631 Missourians in 810,278 households received food stamps. Almost 19 percent of Missouri's children under the age of 18 received food stamps, and more than 36 percent participated in the free/reduced lunch program at schools. Research has shown families in poverty often have difficulty in securing an adequate amount of food for their family; in purchasing a diet rich in whole grains, fruits and vegetables; and in preparing and storing foods safely.

The Family Nutrition Program (FNP) brings nutrition information to low-income Missourians. FNP's main focus is youth and the adults who support them. Nutrition educators work primarily in schools, helping students achieve lifelong health and fitness. Each FNP participant attends an average of five sessions with a nutrition educator. Sessions vary from 30-60 minutes in length.

FNEP provides nutrition programming that meets learners' needs considering age, culture, reading level, and abilities. Lessons with hands-on activities are designed for youth and the adults that support them, pregnant teens, and immigrant populations. Family Nutrition Lessons include a series of up to 20 lessons. These are the core lessons:

- ♣ Making meals from what's on hand,
- ♣ Creative cooking,
- ♣ Making healthy food choices,
- ♣ Planning makes the difference,
- ♣ Stretching your food dollars, and
- ♣ Keeping foods safe.

Additional lessons address food groups, eating light, nutrition during pregnancy, feeding infants and children, and food preservation. Lessons for pregnant and parenting teens on healthy nutrition habits for improved birth outcomes. Programming also covers breast-feeding and feeding babies and toddlers. Programming is collaborative with the North Central Region states.

Body Walk is a unique educational program designed to involve kindergarten through fourth grade students in learning the skills and choices for healthy lifestyles. The program includes:

- A walk through exhibit providing a colorful and enticing staging area for memorable learning experiences about healthy behaviors and choices.
- Classroom activities and suggested resources for teachers to use to prepare the students prior to their walk through the exhibit and to reinforce the learning afterward.
- A take-home booklet for students to read with their families.

This program is sponsored by the Governor's Council on Health and Physical Fitness and is transported to elementary schools across the state.

Through School Enrichment nutrition programming children and teenagers learn about these topics:

- Food safety
- Food guide pyramid
- Basic nutrition for youth
- Balancing nutrition and physical activity for good health

For additional program information see: Missouri Families (http://missourifamilies.org/) and Show-Me Body Walk (http://outreach.missouri.edu/hesfn/bodywalk/).

b. Program Impact:

FNP reached 131,014 adults and youths in 2001. Educators sampled 178 teens that participated in FNP. Each teen was asked to report changes they had made since beginning the program in a) eating healthier meals and snacks, b) being more physically active, and c) keeping foods safer.

Results showed that:

- ♣ 71 percent (of 178 teens) are eating healthier meals and snacks.
- ♣ 63 percent (of 178 teens) are more physically active.
- ♣ 48 percent (of 178 teens) are keeping food safer.

Additionally, 77 percent of the teachers stated that they themselves make healthier food/beverage choices. Seventy percent of the teachers stated that they improved their food safety skills.

Some school classrooms participating have changed their policies about allowing adequate time for hand washing throughout the day. Some teachers have reported that allowing more time for proper hand washing has reduced the absentee rate within their classroom.

Cindy Boston, executive director of the Springfield Crisis Pregnancy Center, credits the FNP program's "Building for the Future" curriculum with normal birth weight babies.

"Every client who has attended the nutrition classes provided by the University of Missouri Outreach and Extension has had a normal birth weight. The only low birth weight babies were born to clients who did not attend any nutrition classes."

c. Source of Funds: Smith-Lever, State, Public/Non-profit agencies

d. Scope of Impact: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Colorado, Utah, Montana, and Wisconsin.

1890 (LU) Cooperative Extension Service — Lincoln University – Goal 3

Key Themes — Health Care, Human Health, Human Nutrition

TO ACHIEVE A HEALTHIER, MORE WELL-NOURISHED POPULATION

Program Description:

Substantial improvements have been made in the nation's health profile in the last twenty years. However, not all groups have benefited equally from these improvements. Many nutrition and health programs in Missouri are now aimed at helping the needs of minority populations that have not made the strides in increased quality of life enjoyed by whites.

A scientific consensus on the relationship between diet and chronic disease has emerged. To reduce disease risk, scientific panels emphasize the importance of a low-fat and low-cholesterol diet that can be achieved through an increase in the intake of fruits and vegetables, complex carbohydrates and fiber and a decrease in the intake of fatty foods. Recommendations for the public also include limiting sugar, alcohol and salt intake.

Focus groups conducted with members of the hard-to-reach American public (primarily low-income African Americans and Hispanic populations) showed that being healthy seemed to be important to participants and they were generally aware of what to do to stay healthy. However, chronic diseases such as cancer and diabetes were thought to be due to fate and heredity and beyond their individual control.

Primary Audiences:

Primarily low income Missourians and other under-served segments, like African Americans, Hispanic families, and those who use the food bank system of the state. We will also work with low-income groups particularly at risk for the major chronic diseases in which diet can play an important role in disease prevention or lessening of morbidity associated with a disease (e.g. hypertension, cardio-vascular diseases and stroke, cancer and diabetes).

Program Duration:

The programs have varying lengths, depending on the program and the needs assessments, and on funding for the programs. Some will be for FY 2000 only, while others will be used for FY 2000 – FY 20003 and some will be implemented for the entire five-year period.

Key Program Components:

To conduct a series of home visits targeting Food Stamp recipients to demonstrate the importance of a healthy diet in promoting long-term good health

To conduct a series of experiential workshops aimed at helping people make wise food choices and thus reduce risk of heart disease, hypertension and complications due to diabetes.

To present a variety of programs on various topics of interest to low income Missourians, including the following:

- Nutritious Snacks; Eating the Pyramid Way; Cooking for Health;
- Diabetes and Me; Community Food Security and Me; Supermarket Tours to
- Stretch your Budget; What's in a label?
- Food Stamp Nutrition Education Program
- Food Safety Education

In FY 2000 – 2005 radio public service announcements and at least one article in a newsletter a year will be employed to raise awareness about individual behaviors to enhance health and prevent accidents. The following topics will be addressed: (a) access to individual and family health care; (b) individual and family health (e.g. smoking and chemical dependency); and (c) reduction of accidents or risk of accidents in the home, school, workplace and community.

Accomplishments/Outcomes

Over 2300 contacts were made and with self reported changes in behavior:
42% reported moving closer to the recommended number of servings of the Food Guide Pyramid
24% increased physical activity
35% moved closer to the recommendations of the Dietary Guidelines
49% reported using a spending plan
37% reported shopping from a list more often
51% indicated they less often let food sit out more that 2 hours
62% indicated they washed their hands more often before touching food
24% indicated they kept raw meat separate from other foods more often

The goals of the Lincoln University Cooperative Extension Nutrition program are 1) to annually reduce health risk factors of low-income Missourians to improve dietary habits and physical exercise; and 2) to annually increase, in Missouri, public awareness, understanding and information on dietary guidance and appropriate nutrition practices.

Internal and External Linkages

These programs will be conducted in collaboration with Agriculture, Rural Development, and Youth and Family faculty and staff working with the Missouri Center for Minority Health and Aging and the Agriculture and Extension Information Center at Lincoln University Cooperative Extension. We will also work with the Lincoln University Cooperative Research Faculty in Human Nutrition and Agriculture and with the University of Missouri Outreach and Extension, primarily.

We will also collaborate with staff from the Departments of Health, Agriculture and Social Services when possible. In addition, we will work together with state and local agencies when performing activities pertinent to our target programs (e.g. Diabetes Foundation, Arthritis Foundation, Chef's Collaborative 2000 members). Collaboration with federal agencies including the Food and Drug Administration, the Centers for Disease Control and other agencies within the Department of Health and Human Services, as well as with other USDA agencies, including the Team Nutrition program will add to our ability to deliver effective programs. Over the next five years, we intend to strengthen links between the nutrition programs of our sister 1890 Land Grants and with nutrition programs at the 1862 Land Grants, primarily in the North Central region of the U.S.

MISSOURI CENTER ON MINORITY HEALTH AND AGING (MCMHA) PROGRAM

Program Description

Based on the 1990census results for Missouri, the population aged 65 and over numbered about 720,292 (14% of Missouri's residents), ranking Missouri 7th in the nation in percentage of older adults (65+). In Missouri, African Americans represent 89.3% of older minority ratings and Hispanics 5.5%. Research has substantially documented that older minority people, by almost all economic, health and social indicators are poorer and less healthy, have poorer housing, fewer options in personal and public transportation, and significantly more limited access to health professionals and to community-based programs and services. The mission of the Missouri Center on Minority Health and Aging is to provide leadership in the areas of health care, psychological and social needs of the minority elderly population in Missouri. This will be accomplished through education, training, policy analysis, and the use of technology as a strategic tool.

Primary Audience

The MCMHA serves limited resource African Americans, Hispanic Americans, American Indians, and Asian Americans in Missouri, as well as individuals with mental and physical disabilities. Our target areas are the urban areas of St. Louis and Kansas City and the rural area of Southeastern Missouri commonly referred to as the Bootheel.

Program Duration

The MCMHA is a long-term project that runs on a fiscal year of July 1 to June 30.

Key Program Components

The key components of the MCMHA are: (a) the Annual Missouri Institute on Minority Aging; (b) AgeWorks! Technology Advocacy Project; (c) Computer and

Entrepreneurial Skills Training Project; and, (c) the Breast and Cervical Cancer Control Project.

Accomplishments/Outcomes

Over 200 individuals have completed the ten-week computer literacy training and earned a certificate of completion. Five individuals who completed the entrepreneurial training wrote a business plan and started their own businesses.

The Minority Institute impacted the racial attitudes of its participants. The great majority of participants , 85%, reported that the diversity training was helpful to their current work and report feeling more knowledgeable of ways to communicate with different cultures. In the AGEWORKS Program, over 300 individuals have been provided free computer and multimedia training targeting seniors, citizens, minorities, persons with disabilities and women.

Internal and External Linkages

The MCMHA involves collaborative arrangements and partnership agreements with federal, state, private and local organizations and agencies. These partners provide assistance with planning, resources for training, financial support, research, and technical assistance to the MCMHA and its projects.

HOME HORTICULTURE

Program Description

There are a large number of limited resource families in Missouri that are found in target areas that the Lincoln University Cooperative Extension Program serves. These families are located in our rural and urban areas, many lack the knowledge, information, or skills to utilize existing resources to improve their quality of life. Home horticulture efforts will be to assist these families to improve their quality of life through educational programs. These programs will train participants to improve their diets by growing quality, nutritious fruits and vegetables to supplement their food budgets, and by managing their limited resources.

Key Program Components

The length of workshops; turf management; urban gardening programs; improving on the community environment.

Accomplishments/Outcomes

Eight (8) week Home Landscape and Gardening Workshops were conducted reaching a minimum of 15 participants. These participants gained knowledge and skills needed

to develop their home grounds. The output indicators will be the number of participants who complete the workshop and develop a simple landscape plan.

SMALL FARM FAMILIES AND URBAN GARDENING

Program Description

Extension programs provide educational settings that reach both our urban and rural clientele to help families improve their quality of life.

Key Program Components

Program components include Home Horticulture programs, urban gardening program, Small Farm Family program, intergenerational activities in gardening for the elderly and youth.

Accomplishments/Outcomes

Demonstration plots have been developed to show how to grow vegetables. Developing and revising guide sheets, other educational materials for our limited resource clientele, and quarterly newsletters. Output indicators include the number of our clientele requesting materials, and visiting demonstration plots.

Federal Funding Source**: Smith Lever**

Goal 4: Harmony Between Agriculture and Environment

The quality of Missouri's natural resources are key to its two primary economic engines; tourism and agriculture. Perhaps like never before, the link between land use and management and the quality of the soil, water, and air are among the top concerns of our citizens. If there was one central theme of the past year's program development – it was collaboration.

Environmental issues tend to be managed in a reactionary mode, with study, programs, and education occurring in response to need. In an attempt to become more proactive, a coalition of interests formed the Council on Environment Quality at the University of Missouri. Collectively, the broad array of expertise and capacity have agreed to a central clearinghouse on Environmental Quality (EQ) and now author a coordinating website, newsletter, and discussion group. Key themes include dealing with hazardous materials such as industrial, household, and pesticides, land use, and landscape management schemes that enhance soil and water quality. This university coalition is also closely coordinated with other state and federal agency action.

The impact of these coalitions is beginning to be revealed among the programs. Greater participation of federal, state, and university expertise working together on solutions to the state's water quality problems have begun. The special challenge of confined animal feeding operations and resulting nutrient management plans is being forged. And lastly, the legacy of the Missouri river itself and its future as one of the continent's major drainage ways of agricultural production is a central focus of a multi-state coalition.

1862 Agricultural Experiment Station Research — University of Missouri-Columbia – Goal 4

Key Theme: Agricultural Waste Management

* Evaluation of trace mineral (specifically zinc and copper) retention and excretion in growing pigs is extremely important due to emphasis on environmental impact of animal manure nutrients. It has been determined that is beneficial for producers to feed lower concentrations of zinc independent of source to reduce the amount of zinc being excreted in the feces. Feeding 2,000 to 3,000 ppm Zn as Zn oxide appears to be the most efficient in stimulation post-weaning growth performance and also the most economical.

Key Theme: Endangered Species

* Assessed resident attitudes toward grizzly bears and grizzly bear recovery in the North Cascades of Washington. Results of the assessment are currently being used to develop a community-based communication program communication program on

grizzly bear recovery. Implementation of an effective communication program will prepare residents for recovery and enhance chances that recovery efforts will be successful.

* A three-year study was completed on the feasibility (biological and economic) of management actions for the recovery of endangered Piping Plovers. This work developed population simulation models and optimality analyses to measure the effectiveness of current, state-of-the-art management techniques. Research suggests that recovery of this endangered species is more biologically feasible, and at a lower cost, than previously thought. Application of the optimal management strategies identified in this research could reduce conflicts between endangered species management and human use of land and water resources.

Key Theme: Land Use

* Spatial decision support systems have been developed that enhance the capacity landowners, communities and resource management agencies to evaluate the economic and environmental impacts of agricultural management systems and changes in land use, and to improve the effectiveness of public policies in achieving sustainable resource management. The research has identified how alternative farming systems and landscape management practices influence water quality and net farm income, b) developed a theoretical model for measuring social and ecological carrying capacities for national parks, and c) developed an adaptive management approach for natural ecosystems.

Key Theme: Pesticide Application

* A new software tool employing unsupervised clustering methods was developed whereby fields can be sub-divided into management zones and tested to determine how many zones the field should be divided into. The software was tested on six claypan soil fields and results indicated that independent of field size, claypan soil fields should be divided into four to six management zones. An unexpected result is that plot-scale evaluation of post-emergence atrazine application as a strategy for reducing atrazine inputs shows that in two of three years both relative and absolute losses of atrazine were greater using only post-application compared to traditional pre-plant broadcast application.

Key Theme: Water Quality

* One of the goals of the team working on sustainable use of natural resources on private lands is to identify linkages between natural resource users and user groups (stakeholders) and agencies and using this information to form a more comprehensive and cohesive body for natural resource management decision making at the landscape/ecosystem level. This particular program encompasses several projects: e. coli tracking, watershed/community economic baseline development, including economic impacts on tourism from water quality, herbicide use in sensitive areas, stiff-stemmed hedges for erosion control and alternative watering sources and riparian

vegetation for controlling livestock access to streams. A watershed assessment and management plan was formulated for the Long Bran Watershed. The impact of the program is an increased awareness of water quality within the Long Branch watershed and adjacent areas as shown by the continuation of a planning effort by the U.S. Army Corp of Engineers in conjunction with the Missouri Department of Conservation to improve the quality of Long Branch Lake as a fishery resource, through considerable engineering expenditures, thus improving water quality and safety; and the enrollment of approximately 4,800 acres of cropland within the Long Branch Watershed under the Missouri Conservation Reserve Enhancement Program to be converted to grasses and/or trees, for a 15-year period.

Source of Federal Funds: Hatch, Grants

Scope of Impact: Multi State

1890 (LU) Cooperative Research Programs — Lincoln University – Goal 4

Key Themes — Nutrient Management Soil Quality; Water Quality

Project Title: MOX-OP98-418 Intrinsic Phytase Renders Phytate-Bound Minerals Available for Absorption by Growing Pigs

Accomplishments and Results

Early weaned pigs (n = 84) were used to determine the efficacy of IP from WM (25% of the diet) on availability of phytate-bound P, Ca, Mg, and Cu, and bone strength test of pigs fed corn-soybean meal based diet. The pigs were housed in raised-floor pens (7/pen) with pens serving as experimental units (3 pens/treatment). Diets used were: corn-soybean meal based control diet (D-1), D-1 plus microbial phytase (MP; Natuphos, BSF Corp.; D-2), D-1 plus 25% wheat WM as a source of IP (D-3), and D-3 plus MP, (D-4). The diets were also identified as either low (D-1 and D-2) or high (D-3 and D- 4) fiber diets. Commercial limestone and dicalcium-P were used as sources of Ca, and P. However, D-2 and -4 were marginally deficient in Ca and P compared to D-1 and D-3. Other nutritional ingredients were added at/or exceeding NRC, (1998) recommendation. Diets were fed in meal form once/d either on a regular (D-1 and D-3) or phase- fed basis (D-2 and D-4) with free access to water 24/d. Approximately equal amounts of feed and fecal samples were collected from each pen twice daily (0800 and 1400) immediately acidified and pooled weekly by pen. Fecal samples were sealed in plastic bags, and stored at-20^0 C until they were thawed and dried in a forced-air oven at 65^0 C. All samples were ground to pass through a 1-mm sieve and analyzed for Ca, Mg, and Cu using an atomic absorption spectrophotometer (Model 5100 PC, Perkins Elmer, Norwalk, CT) and P was analyzed using the AOAC (1990) procedure. Criteria used to measure treatment effects were Ca, P, Mg, and Cu concentrations in feces, and bone strength tests. Four pigs from each treatment group were randomly selected and sacrificed. Left thighbone of each pig was removed, cleaned of soft tissues and weighed. Using a hand-held

caliber, circumference of each bone was measured. Bone strength test was conducted (Instron Universal Testing Machine ; Model 1123, Instron Corp., Canton, MA) and force applied calculated. Phytase activity and total-P release in diet was determined according to Liu, et al. (1997). After significant F-tests (P<. 05) treatment mean differences were separated using the GLM model (SAS,1990).

Table 1 shows the total-P release and enzyme activity assay of the experimental diets and bone related parameters obtained from the experimental animals. There were some numerical differences among the groups of pigs fed the different diets in terms of enzyme activity and total-P release but non were statistically significant. Phytase activity of WM measured by the amount of P excreted in the feces in the current study was approximately 53 % of the commercially available MP. The enzyme activity IP was low compared to MP. However, the advantage of using IP over MP have to do with its most likely more resistant property to proteolytic enzymes in the stomach (Jongbloed et al.,1992) and its more active property at the low gastric pH (Ranhotra and Loewe, 1975) than the MP. The breaking force of thigh-bone within and between dietary fiber categories were not affected by treatment except for bones from pigs fed D-4, which were higher (P<.05) than from pigs fed D-1 and D-2. Also, even though pigs fed D-2 and D-4 were on Ca and P restricted diets, their bones were able to withstand the force applied to the same extent as the bones from pigs fed adequate Ca and P supplemented diets. The pigs also showed identical responses to the Ca and P fortified diet fed pigs for the other variables tested. Finding of no treatment effects between the control diet fed pigs and pigs fed Ca and P restricted- phytase supplemented diets, may indicate Ca and P replacement values of phytase in Ca and P restricted diets. Supplemental MP of the low fiber diet resulted in a 22.5% reduction in fecal P excretion. On the other hand, improvement in fecal P reduction in pigs fed high fiber diet supplemented with MP was only 10% (Table 2). Even though the average concentration of P in diets containing WM was higher than the corn soybean meal diets (5.1 Vs 7.0 mg/kg), the difference may have existed mainly in the form of phytate-bound P. WM contains 1.2% phytic acid and 1% phytic acid can chelate 0.36% Ca (Nelson et al.,1968) therefore, given that the WM used in the current study may have provided the pigs with approximately 3 mg of phytic acid/g of feed consumed. Results of the current study agrees with some of the earlier studies and if differences arise it may be from differences in body weight of pigs, duration of studies, and the Ca to P ratios used. Results of the current study may also differ from previous studies because of the phase feeding of the dietary proteins to pigs that were fed D-2 and D-4.

Table 1 Phytase activity and phosphorus release of and bone strength test of pigs

Items	D-1	D-2	D-3	D-4	R^2
P- release	2231	3808	3617	4768	0.97
Phytase activity [1]	0	2103	3939	5000	-
	Bone				
Strength test kg/mm	218.2[a]	210.8[a]	225.0[ab]	249.4[b]	
Weight, g	102.5	99.9	108.6	100.6	
Bone diameter, mm	18.1	18.0	17.5	18.1	

[1] PU/kg.
[a,b] Means in the same row bearing different superscript differ at P< .05 (a,b) level.

Overall Program Impact

Concentration of inorganic nutrients in swine excreta can be reduced by adding intrinsic and extrinsic phytase to the diet. It is physiologically feasible and environmentally advantageous to partially replace the inorganic-P in the diet with IP from WM for growing pigs. Based on the results obtained from the current study and from some of the results reported in previous studies, inorganic P used to supplement pigs, and the subsequent pollution problem from swine manure can be substantially reduced if the right amount of exogenous/endogenous phytase can be supplemented into the diet. Reduction of P excretion from supplemental phytase have relevance because, application of swine waste to agricultural soil can result in excessive accumulation of soil P and water pollution. Also, a modest level of WM substitution in the diet of pigs can substantially reduce feed cost. Alternatively, we may be able to use higher levels of WM in pig's diets if fiber degrading enzymes can be added and other nutrient densities adjusted accordingly. However, further investigation into the long-term effects of feeding WM on pig performance, and excretion of nutrients is important. Also, the assumption that pigs can sustain low-P and-Ca excretion continuously need to be carefully validated further over an extended period of time. Further research efforts are also required to make a definite quantitative determination of the enzyme activity and determine the replacement values of WM for MP.

Project Title: A Survey of the Occurrence of Environmental Toxins in Soil and Water Samples Collected from Three Southeast Missouri Farm Communities
(State Matched Project)

Accomplishments and Results

The main objectives reported here was to screen water samples from each community for potential toxicity using an acute toxicity bioassay (Alpha-Glucosidase Biosynthesis (AGB) Assay) and to analyze the samples for specific metal contaminates: lead (Pb), copper (Cu), cadmium (Cd), zinc (Zn) and chromium (Cr). Methanol extracts of soil samples were also screened for the presence of DDT residues using a commercially available DDT in soil test kit.

Toxicity Screening

Results of the AGB bioassay indicate the highest percentage inhibitions of alpha-glucosidase biosynthesis were elicited by samples collected from the local water treatment plant before (49%) and after treatment (56%) and from sites 3 in North Lilbourn (50.01%); sites 8 and 9 in Howardville (49.23% and 49.97% respectively); and site 11-in New Madrid (49.07%). The lowest percentage inhibition levels ranged between 8 and 18%.

Metal Analyses

The results of the AGB bioassay suggest that water being served to Lilbourn, Howardville, and North Lilbourn counties of Southeast Missouri may contain metal contaminants, since it has been reported that metals can inhibit enzyme biosynthesis in the bioassay. Based on theses results water samples were analyzed for the presence of lead (Pb), copper (Cu), cadmium (Cd), zinc (Zn) and chromium (Cr). The Environmental Protection Agency (EPA) national Maximum Contaminant Level Goals (MCLG's) for these metals are: Cd = 0.005 mg/L (ppm), Cu =1.3 ppm, Pb = 0.0 ppm, Zn =5.0 ppm, and Cr = 0.100 ppm

Cd levels were found to be below MCLG's in samples from sites 5, 8, 10, and 11. Cu and Zn in all samples were observed and also found to be below MCLG's. Samples with metal concentrations found to exceed EPA's national MCLG's contained Cd, Cr, and Pb. Cd concentrations were greater than MCLG's (> 0.005 ppm) in before and after treatment water obtained from the Lilbourn water treatment plant, and from homes at sites 4, 6, 7, 9, 11, and 13. Toxic Cd levels detected exceeded MCLG's by 0.003 to 0.022 ppm.

Concentrations of Cr were also found to exceed EPA's national standards with concentrations greater than (> 0.100 ppm) in before and after treatment water as well as in tap water obtained from homes at sites 5, 6, 7, 11, and 13. Chromium levels detected in samples from these sites exceeded national goals by 0.001 to 0.077 ppm. Lead (Pb) concentrations ranged from 0.014 to 0.047 parts per million (ppm) in before and after treatment water. Samples from sites 5, 7, 10, and 13 were below detection levels. All other samples contained Pb levels from 0.102 to 0.269 ppm. The EPA national MCLG for Pb concentration in drinking water is zero. These results reveal that metal contaminants are continuing to be present

Soil Analyses

Soil samples were analyzed for DDT residues using a commercially available DDT in soil test kit. The analysis is based on the use of polyclonal antibodies that bind either DDT or a DDT-enzyme conjugate. The same number of antibodies is immobilized to the walls of the test tube. When DDT is present in a sample it competes with the DDT. When DDT is present in samples, it competes with the DDT-enzyme conjugate for a limited number of antibody-binding sites. The presence of DDT is determined by a colorimetric reaction in the test tubes that results in the formation of a blue solution. Based on the binding of the DDT molecules, a low concentration of DDT produces a dark blue solution, and conversely, a high concentration of DDT allows fewer DDT-enzyme conjugate molecules to be bound to the antibodies, resulting in a lighter blue solution. Methanol extracts of 11 soil samples were tested. Nine of the samples showed a level of 0.2 ppm or greater of p''-DDT. Only two samples had levels below 0.2 ppm. Data indicates the presence of DDT in all soil samples collected from the three southeast Missouri communities. Three out of the eleven samples collected contained concentrations of DDT greater than 10 ppm. Two out of eleven samples contained concentrations of DDT lower than 1ppm. The site with the highest concentration was located in North Lilbourn, MO with a concentration of 16.8 ppm.

Impact of Study

Possible Community Impact. It is vital to understand the presence and possible effects of metals and organic chemicals in communities. Long term exposure to metals such as lead and cadmium can have devastating effects on human health. Environmental estrogens such as DDT may accumulate in the body in fatty tissues for prolonged periods of time. Once in the body, DDT can mimic the female sex hormone by triggering or blocking a response to the body's natural hormones. The mimicking effects of DDT can disrupt the normal estrogen metabolism in the body.

Some speculations can be made in regards to possible correlations between the presence of these chemicals in the environment and the incidence of lead poisoning among children in New Madrid County and other health effects that can be caused by some chemicals released into the environment. Based on the Environmental Protection Agency's most current data (www.scorecard.org) 500 houses in New Madrid County have a high risk of lead hazards. The percentage breast cancer rate for the county is 19.8% and the colon cancer rate is 22.3%. EPA data also indicate that 19,512 people in the county face a cancer risk more than 100 times the gals set by the Clean Air Act (www.scorecard.org). Chemicals in the environment may partially contribute to these rates.

To help the communities better understand the significance of the presence of possible toxins in their environment, the first workshops associated with the study, entitled: What's in My Water? A Water Quality Workshop was conducted during the fall of 2000 in Howardville, Missouri. Approximately **twenty adults** from the area participated in the workshop, which covered topics from major types of pollutants found in natural waters to water treatment and health effects of drinking water contaminants. This workshop made the participants more aware of the occurrence of various substance in drinking water. This "background knowledge" can be used to help in decision-making processes when issues concerning water quality need to be addressed in the communities.

Summaries of the t he 1999 population demographics for the three communities are listed below**.**

Howardville	
Adult Population	440
Children Under 5 years	62
Youth 5-17 years	188
Lilbourn	
Adult Population	1378
Children Under 5 years	126
Youth 5-17 years	341
North Lilbourn	
Adult Population	157
Children Under 5 years	20
Youth 5-17 years	99

Project Title: MOX-EIVAZI Pesticide and Degradation and Remediation by Soil Microbes Under Modified Field Conditions

Accomplishments and Results

A variety of methods, biological, chemical, and physical have been used for degradation and detoxification of pesticides. However, conventional clean up methods are costly and not always effective; therefore, a need exists for a low cost and simple method to reduce on-site pesticide pollution. The current research focuses on investigating the possible application of "biobed" technology to develop methods to promote the biodegradation of pesticides at points of contamination. Biobeds are modified soil environments that have potential to promote the breakdown of complex organic pesticide molecules. Experiments will be conducted to investigate the various components of biobed technology (e.g. organic matter, available carbon, soil enzymes, mineral nutrients, microbial enrichment, moisture content, temperature, etc.) on their ability to promote rapid degradation of common pollutant pesticides. Pesticides used in this study will include the major agricultural pesticides identified in a screening of target locations as contaminants in the soil. Once the pesticides have been identified and selected for inclusion in this study, the rate of degradation of these pesticides will be evaluated using variations of the biobed technology under controlled conditions. The resulting model will be field tested on farm at appropriate locations to determine the ability of the biobed components to reduce pesticide residue contamination, and to determine it's potential for remediation of existing pesticide contamination.

The overall goal of this study is to develop a natural system to contain, treat and dispose of pesticide wastes on farm and at other production and handling sites for the selected pesticides. Another goal is to gain a better understanding of biobed technology and its potential application in bioremediation of pesticide contaminants.
Specific objectives of the proposed study are to:

1. Determine agricultural pesticide pollutants in soil samples taken from five farms in Central and Southeast Missouri (Bootheel).
2. Determine biobed conditions for enhanced specific pesticide degradation.
3. Identify the microbial consortia that will evolve in the biobeds
4. Use the most highly contaminated farm sites to test the concepts of the biobed technique

To accomplish the objectives, soil samples will be collected from commercial farms growing the major agronomic crops in the region-corn, soybean, cotton.. These samples will be analyzed for common agricultural pesticides to determine the identity and extent of contamination of these pesticides A comparison of biodegradation rates of the above selected pesticides with various biobed soil amendments and environmental conditions will be made. The first phase of the project will use laboratory/greenhouse studies that will employ small scale containers, e.g. stainless steel trays that will not absorb pesticide residues and simulate top few inches of field conditions where most microbial activity occurs. Varying physical (soil texture and chemical characteristics, composition of materials, etc.) and environmental

conditions (moisture, temperature, etc.) will be studied to determine possible impacts on pesticide degradation.

The microbial degradation of pesticides and other organic compounds frequently requires a consortia of microbes which sequentially breakdown the various bonds that comprise a pesticide molecule. Traditional plating of microbes do not identify this complex consortia because of growing media restrictions, rapidity of cell division, aerobic versus anaerobic conditions, and interactions among microbes The technology of GC-FAME analysis allows for the "fingerprinting" of microbes within soil communities, comparing heterogenous soil samples. Comparison of fingerprints of microbes from biobeds that promote rapid pesticide degradation with microbes derived from biobeds that do not promote rapid pesticide degradation permits the identification of microbial groups that are associated with this rapid degradation.

Impact of Study

Development of a model using the biobed concept to degrade point sources of pesticides will assist in the remediation of pesticide-contaminated sites. A practical model will provide an option that will help to reduce pesticide pollution in the environment. Managing pesticide waste often is not a major concern of farmers and other chemical applicators consequently, many farm sites have been point as well as non-point sources of soil, groundwater and surface water contamination.

Federal Funding Source

Evans-Allen

1862 University Outreach and Extension — University of Missouri System – Goal 4

Key Theme — Agricultural Waste Management; Air Quality; Land Use; Natural Resources Management; Soil Quality; Water Quality

a. Program Description: Environmental Quality/Waste Management Education

Livestock manure management covers a variety of approaches for working with water and air quality concerns created by livestock manure. Programming efforts for Extension specialists and other agency personnel has become a major component of developing a holistic approach to proper livestock manure management. The concept of private individual consultations is still very important but interagency cooperation and educations are mandatory if livestock manure management is to have statewide success.

In Missouri, livestock production represents approximately 50% ($2.4 billion) of the

income from agricultural commodity sales. A major producer of livestock, Missouri ranks 7th in swine, 11th in poultry, and 2nd in cattle production. The number of confinement operations and Missouri's diverse topography can create water quality concerns from over application of livestock manure.

The Missouri Department of Natural Resources (MoDNR) has several water bodies listed on the state 303 (d) list as being impaired because of nutrient overloading from livestock manure. The 303 (d) list has also identified several water bodies in the state with nutrient loading from unknown sources. This influx of nutrients such as phosphorus and nitrogen comes from many sources, livestock production and land application of manure being a critical source.

The Interagency Technical Working Group (ITWG) was formed with personnel from University of Missouri Extension, Natural Resources Conservation Service and the Missouri Department of Natural Resources. The group reviews literature and information on manure management issues so the agencies are presenting approved information that meets the states environmental goals for conservative manure utilization.

The economic viability of Missouri's livestock industry is at stake if social and environmental issues are not addressed. Confined livestock operations have been listed as a major environmental and health concern from odor and mishandling of manure. UOE understands the importance of protecting the economic viability of Missouri agriculture but also understands the need for maintaining a safe and healthy environment.

University Outreach and Extension (UOE) provides partnering agencies and producers with information on land use management, application equipment, and approved management practices for maximum manure utilization and reduced environmental degradation.

Missouri is a major livestock producer, ranking seventh in swine, 11th in poultry and second in cattle production. Many operations are highly concentrated and located in areas where soil conditions aren't suitable for heavy land application of livestock manure. The economic viability of Missouri's livestock industry is at stake if social and environmental issues are not addressed. Confined livestock operations have been listed as a major environmental and health concern for odor and mishandling of manure

The Interagency Technical Working Group (ITWG) has been formed with personnel from University of Missouri Outreach and Extension, Natural Resources Conservation Service and the Missouri Department of Natural Resources to ensure that information that meets the states environmental goals for conservative manure utilization.

The "Comprehensive Nutrient Management Planning" and "Livestock and Poultry Environmental Stewardship" curriculums have been developed.

Training courses provided more than agency personnel and extension specialists with information on comprehensive nutrient management planning procedures for producers. The program has been delivered to 900 producers.

An analysis by University engineers assisted the EPA in re-evaluating cost estimates for manure management on farms; proposed regulations on confined animal feeling operations now reflect the average costs for full compliance.

For additional program information see: Environmental Quality
(http://www.eq.missouri.edu/)

b. Program Impact:

Missouri livestock producers are developing manure management plans to reduce the risk of run-off into water supplies. Greater numbers of participants are participating in Farm Service Agency and Missouri Department of Conservation programs that limit livestock access to streams and water bodies, and increase buffer zones along streams and property boundaries. Personnel from the University Outreach and Extension assisted with the development of the USDA/EPA sponsored Livestock and Poultry Environmental Stewardship curriculum and the Waste Facilities Handbook for the Midwest Plan Service. The curriculum offers a set of lessons on livestock manure management that is environmentally and economically achievable.

Two University of Missouri web sites provide agencies and private citizens with information about manure management. The Missouri Manure Management Action Group (MoMMAG) http://outreach.missouri.edu/mommag and the Agriculture Electronic Bulletin Board (AgEbb)/Commercial Ag site provide updated information on management practices, laws and regulations, and links with other states with similar livestock manure issues.

A series of guide sheets on manure management, both species specific and non-species specific, are being produced to assist producers in understanding the environmental, economical and social implications of livestock manure management.

1) 120 agency and Extension personnel became more knowledgeable of nutrient management practices and how excessive nutrient run-off creates water quality and environmental problems.
2) 85 agency personnel have increased their skills at developing producer driven nutrient management plans.
3) 500 livestock producers have increased knowledge of best management practices (BMPs) for livestock manure management.
4) 500 livestock producers have adopted nutrient management plans to reduce livestock nutrient run-off.
5) 2002 version of the Department of Natural Resources 303 (d) list showed no increase in degradated waterbodies due to livestock nutrient run-off. This

demonstrates an improved environment in rural areas where livestock production is highest.

6) EPA has re-written their proposed CAFO regulations to more closely reflect the average cost to producers for complete compliance. This will prove to be an economic and social benefit for livestock producers and rural economies.
7) University of Missouri is part of the NCR 189 committee that is working on livestock manure odor issues. In cooperation with North Carolina, Indiana, Iowa, Oklahoma, Illinois and California, odor assessment equipment is being installed at a major swine facility to obtain base line figures on odor and air particulate.

c. Source of Funds: Smith-Lever, EPA, Natural Resource Conservation Service, State

d. Scope of Impact: Missouri, Indiana, Minnesota, Iowa, Ohio, Oklahoma, Illinois

Key Theme — Hazardous Materials; Water Quality

a. Program Description: On-site Sewage and Solid/Household Waste

With increasing population and changing land-use trends, waste disposal practices associated with private property can be a source of pollution problems. Private landowners, rural residents and county officials need assistance in making management decisions about on-site sewage construction and maintenance, and proper solid and household waste disposal to insure water quality. Recent changes in the Missouri Department of Health regulations for on-site sewage set new limits on private landowners. Additionally, individual county health codes, which surpass state regulations for on-site sewage, accelerated the need for educational programs that meet the diverse land cover.

Through a series of programming efforts, University Outreach and Extension trained on-site sewage installers to identify correct ways to perform soil percolation tests for on-site sewage systems. State and regional specialists have sole responsibility for offering this training to private and commercial on-site sewage installers. Since 1998, more than 1,600 installers have attended the two-day course for soil percolation testing. Class participants must pass a certification test with a score of 80 percent or better to obtain certification. In four years, more than 1,500 installers completed the course and passed the certification test.

In Warren County, University Outreach and Extension offered a series of classes on farm pesticide and household hazardous waste. Participants were motivated to write a grant to conduct farm pesticide collection.

In Jefferson, Texas, Hickory and Webster counties, University Outreach and Extension held classes for on-site sewage systems and disposal of solid and household waste. In Saline and Cooper counties, educational programs were conducted using the Farmstead Assessment System (Farm-A-Syst) to help local landowners and rural residents identify potential water quality problems associated with on-site sewage

systems, on-site solid waste disposal, drinking water well condition and hazardous waste management. All participants indicated they would make changes on their personal property.

Through the educational programming efforts, participants will do the following:

- ♣ Adopt disposal practices that are environmentally safe and protect human health.
- ♣ Make decisions based on the information learned to meet new regulatory standards.
- ♣ Implement practices that are economically and environmentally sound.
- ♣ Control, reduce or eliminate on-site solid waste disposal.

For additional program information see: Water Resource Information (http://www.fse.missouri.edu/waterquality/) and Missouri Watershed Information Network (http://outreach.missouri.edu/mowin/)

b. Program Impact:

Citizens in Warren County held an agriculture pesticide collection day to reduce the chance of water quality degradation from on-site pesticide and solid waste disposal. The December 2001 collection netted:

- 416 gallons of agricultural chemicals
- 134 pounds of agricultural dust-powder
- 512 gallons of lead-based paint.

The collection was a cooperative effort of University Outreach and Extension, Solid Waste Commission and Warren County commissioners. Local newspapers, agency newsletters and the local radio station advertised the event.

In Texas County, more than five trailer truckloads of scrap metal were collected for recycling from farm dumps.

Southwest Missouri local government made changes in on-site sewage system policy to require soil morphology reports before approval of on-site systems can be issued. This created a healthier environment.

In Hickory County, county policies changed to include a rural water district and to consider a rural wastewater district. Due to the high increase in county population (20 percent each year for the last two years), Hickory County residents have constructed a new public drinking water supply for Pomme De Terre Lake area residents. A source water protection plan is being designed to respond to local concerns of the increased number of on-site sewage disposal systems.

Jefferson County has adopted the highest on-site sewage standards in the state. Water quality protection has been a main reason for the increased regulations.

Environmental protection and secure property values are outcomes of a farm dump clean-up project in Texas County.

Increased awareness on water quality and family issues associated with healthy home environments have led rural residents to contract solid waste hauling with local firms and have reduced the use of burn piles and dumping on property. In Callaway County, increased awareness has caused solid waste disposal companies to increase their business while reducing open trash burning.

The following products have been developed:

- ♣ Individual Waste Water Systems – Implications for a New Rural Generation, CD and Resource Notebook
- ♣ Environmental Assessment for Real Estate Professionals
- ♣ Closing Farm Dumps (video)

Missouri Department of Health sent personnel to Extension sponsored programs on on-site sewage and the "Health and Safety Issues in the Home Environment" trainings. These training sessions received very high evaluations and were listed as being some of the best training they had received in that area.

c. Source of Funds: Smith-Lever, State

d. Source of Impacts: State specific

Key Themes — Land Use, Natural Resource Management, Water Quality

a. .Program Description: Water Festivals – Water and Natural Resources Education for Youth and Educators

A 1999 University Outreach and Extension needs assessment in Missouri's 114 counties revealed a strong need for programs and tools to protect water resources and provide environmental education. Ninety counties listed environmental quality, watershed management or natural resource conservation as a program theme, and 104 counties listed environmental issues education as a local need.

Water resources are one of Missouri's most valuable commodities for industry, tourism and agriculture. The goal of the Water Festivals program is to provide educators with materials and increase awareness of water quality issues.

University Outreach and Extension is part of a multi-agency team providing educators with environmental curricula that can be incorporated into day-to-day teaching activities. Student learning is enhanced by educational/informational lessons to support in-class teaching activities

University Outreach and Extension worked with 27 partners to create the Missouri Watershed Information Network (MoWIN). MoWIN is a public access program that

offers watershed information through a web-site, toll-free number, email or direct personal contact. MoWIN has continued to grow to provide watershed information.

For additional program information see: Water Resource Information (http://www.fse.missouri.edu/waterquality/) and Missouri Watershed Information Network (http://outreach.missouri.edu/mowin/)

b. Program Impact:

More than 150 teachers have participated in training activities, and more than 2,200 students have participated in water festivals and related activities.

The Water Quality Education Class had 90 educators complete the training. Participants answering a follow-up survey said:

- 89.5 percent are using the information as part of their classroom curriculum
- 57 percent are using information from the course six to 15 times during a school year.
- 46 percent have done a family or community project relating to water quality since completing the course

Eighty-seven percent of teachers indicated that all information they need for classroom use was adequately covered in the course.

Seventy students attending a camp, "Keep My Water Clean," were given pre- and post-tests to determine knowledge of water quality issues. The mean average of answers missed on the pre-test was 6.16 while post-test scores had a mean average of 3.48 questions missed.

A teacher and students at Reeds Spring School District developed a vessel composting system to recycle waste in the school district. The project will save approximately $15,000 annually in cost of transporting the waste material to a landfill, save the environment by reducing the landfill materials, and generate compost sales of approximately $12,000 per year.

A teacher at Conway started a Stream Team to help students understand the issues and personal responsibility needed to protect water quality and to learn about water quality testing.

After attending a teachers training session, one Marshfield teacher encouraged a student to work with University Outreach and Extension to develop water testing information for her science fair project. The student received the top award in her class for her project and an award at the regional science fair.

A publication highlighting the educational benefits for youth and adult learners participating in water festival activities was published: EQ 1001 – Change

Environments. Educational products developed include a Build Your Own Watershed Model and "Using Topo Maps to Teaching About Watersheds."

Teachers are using water education materials and resources from Project WET, Wild, Learning Tree and the festival approach to enhance curricula and integrate multiple disciplines using water as a unifying theme.

c. Source of Funds: Smith-Lever, EPA, State

d. Scope of Impact: State specific

Key Theme – Pesticide Application

a. Program Description: Pesticide Applicator Training

There are approximately 6,000 commercial and 35,000 private (farmer) pesticide applicators in Missouri. Anyone who applies any type of pesticide for commercial purposes must be certified by passing a mandatory initial exam. Missouri statutes require that these applicators be re-certified, by training, before being re-licensed on a three-year cycle for commercial and a five-year cycle for private applicators. Environmental and health concerns about pesticides, the changing field of pesticide development, new laws and regulations, and registration make a responsive and intensive training program essential. The private applicator-training program reaches into essentially all of Missouri's counties.

MU Extension provides educational programs to help those aspiring to obtain certification for commercial purposes. The program attracts nearly 500 attendees each year. Program attendance figures indicate that nearly 1,000 private applicators attend initial training, and approximately 7,000 attend for re-certification purposes. Public access to the Pesticide Applicator Training Program may be obtained through the World Wide Web at http://ipm.missouri.edu/pat/.

University Outreach and Extension regional specialists conduct private applicator programs. Commercial applicator training is conducted in five locations during January. Instructors who serve the program represent the Missouri Departments of Agriculture, Conservation, Natural Resources and Transportation; University Outreach and Extension; Oklahoma State University; and private industry.

b. Program Impact:

Applicators have been surveyed in recent years immediately following completion of a training program. Results of the commercial training program reveal that more than 90 percent of the 10,000 annual training attendees will take extra time to properly identify pests, be more likely to use protective equipment and to take more time to ensure that application equipment is properly calibrated. Private applicators reveals

that:

1) 91 percent of those surveyed indicated that they would take additional measures to have a pest properly identified before selecting a control procedure.
2) 92 percent of those surveyed are more likely to use protective equipment such as nitrile gloves and coveralls.
3) 92 percent of those surveyed will take more time to ensure that their application equipment is properly calibrated.
4) 77 percent of those surveyed are very likely to improve or upgrade their present pesticide storage facility

Society demands a cleaner and safer environment. Pesticide applicator training programs educate producers in making environmentally sound decisions regarding the use of pesticides.

b. Source of Funds: Smith-Lever, EPA, state

c. Impact: State Specific

Key Theme — Water Quality; Soil Erosion; Land Use Planning; Natural Resources Management; Riparian Management

a. Program Description: Watershed Resource Education

In Missouri, private individuals own 93% of all land. Potential pollution sources from agriculture, industry, on-site sewage and water based recreation are assessed for their economic, environmental and social impacts relative to the communities involved.

The Missouri Department of Natural Resources is mandated to establish Total Maximum Daily Loads (TMDLs) in areas that have identified water quality degradation. Local watershed communities must look at the social, economic and environmental benefits offered by different management decisions to determine the feasibility of their plans. Watershed committee members need to receive education and instruction on the scientific principles involved and assistance in implementing watershed management strategies. The process takes significant time but the final product, the water quality management plan, is one that is highly useable and acceptable with local watershed citizens.

Source Water/Watershed Protection and Watershed Design Planning program has been designed to integrate public participation and community capacity building with best management practices implementation for water quality protection. Individual watersheds/communities work directly with local resource agency personnel to develop and implement a watershed plan that reduces potential water quality problems. Science based assessment and ongoing monitoring projects are being used to provide objective information for locally led decision making. State and regional Extension specialists assisted community/watershed leaders in coordinating group

meetings to discuss water quality issues and locally agreed upon management practices that could be implemented by area producers. Demonstration/research projects are being used to show local producers how they might benefits from alternative conservation practices.

b. Program Impact:

1) Approximately 800 people have been involved with the different watershed management projects in the state.
2) Locally developed water quality management plans and source water protection plans for different watershed communities in the state. These include Vandalia, Monroe City, Long Branch Lake at Macon, Lamar, Concordia and Shelbina.
3) We have seen a significant increase in knowledge of environmental concerns within the watershed areas. Different watershed/community groups have met to discuss ways in which they can work together and help others within the watershed community to understand the current conditions.
4) Groups have responded differently to what they felt was the most effective way of dealing with public delivery, private property use, and personal responsibility. The Smithville Watershed Group has applied for non-profit status as a 501 C 3 organization. The Shelbina community produced the City of Shelbina Water Resources Management Plan. The plan covers both rural and urban land use that affects their drinking water reservoir. The Long Branch committee used the information from various assessment projects and an Extension led action-planning process to write a Water Quality management plan.
5) Vandalia, Lamar and Union implemented Water Quality Management Plans or Source Water Protection Plans that have reduced pesticide levels in drinking water reservoirs. By reducing raw water loading, there is less cost associated with pesticide removal. This reduces the amount of funds needed by the water utility companies to provide safe clean water. Lower treatment cost allows more funding for system upgrade, higher return on investment and better quality service.
6) Long Branch Lake watershed enrolled 5,700 acres in the Missouri Conservation Reserve Enhance Program. This will be instrumental in decreasing the amounts of soil erosion, pesticide run-off and nutrient loading occurring in Long Branch Lake. The Long Branch Watershed committee also received preliminary approval for a Corps of Engineering Water Resource Development grant (section 1135 to assist with turbidity and shore line stabilization).
7) A refereed journal article on DNA source tracking was published by Dr. Andy Carson from the work done in part at the Long Branch Lake watershed.

For additional program information see: Water Resource Information (http://www.fse.missouri.edu/waterquality/) and Missouri Watershed Information Network (http://outreach.missouri.edu/mowin/)

c. Source of Funds: EPA/DNR; USDA/Missouri Environmental Quality Incentive Program, ARS, State

d. Scope of Impact: State specific

Goal 5: Enhanced Opportunity and Quality of Life for Americans

State of Missouri Youth, Families and Communities

University of Missouri Outreach and Extension's leadership in the development of the Missouri Kids Count report and the development of the **Error! Hyperlink reference not valid.** examines trends in family life, children at-risk, housing, personal finance and other measures of well-being. The Office of Social Economic Development Data Analysis has compiled extensive information on trends in economic and community vitality and provides extensive reports on factors affecting Missouri communities. Key indicators on youth, families and communities for every county and the city of St. Louis are available.

Three major program teams in Missouri are focused on improving the well-being of youth, families and communities. A major focus for the youth programming is through the **Error! Hyperlink reference not valid.** program that helps communities create opportunities for young people to be valued, contributing members of their families, schools, and communities. 4-H connects kids with caring adults for learning-by-doing experience in organized clubs, enrichment programs, special-interest groups; camps and school-aged child care programs. There has been a special emphasis on targeting communities in St. Louis, Kansas City, and the Bootheel with programs that address the unique social and educational needs of children and adolescents living in impoverished communities. Also, there has been special program emphasis on the prevention of adolescent pregnancy and mentoring of teen parents who are especially vulnerable.

Program teams in the family area are organized to deliver a variety of programs on issues involving financial management, housing, child care and aging. This year there has been special emphasis on developing a web-based educational program delivery system (**Missouri Families**) that provides quick and easily accessed information in a timely and cost-effective manner. Programming also has been focused on the particular needs of working poor families and Black parents who have often been underserved. Child care needs of Missouri families are of paramount importance. The Child Care program group has worked jointly with a wide-range of state partners to improve the quality of child care by strengthening the basic knowledge and skills of new child care providers. As the older population in Missouri continues to grow the Aging program group has focused on helping middle-age adults to prepare for the social, financial, health and housing changes that they will need to make in order to successfully age.

The well-being of youth and families cannot be sustained without citizens who are engaged in community sustainability and revitalization efforts. Community Development faculty have been actively teaching the skills necessary for effective community decision-making, planning and policy development. There has been special program emphasis on creating inclusive communities to particularly address the rapid in-migration of Hispanic families into Missouri. Leadership development in local community efforts through the Community Development Academy has demonstrated many positive impacts in communities across the state.

KEY THEMES:
Community Development: Building Inclusive Communities, Community Decision Making, Community Emergency Management, Community Leadership Development
Human Environmental Sciences: Affordable Housing, Family Financial Management, Child Care Programs, Building Strong Families, Parent Education, Family Strengths/Adolescents at Risk, and Older Adults

4-H Youth Development: Character Education; School-age Care and Out-of-School Hours; Science and Technology Education; and Volunteer Leadership Development

MAJOR OUTCOMES:

Building Inclusive Communities

- Internationally, a partnership between the University of Missouri, University of Pretoria and Medunsa University is playing a critical educational role in shaping the future of development South Africa. The University of Pretoria is incorporating aspects of the curriculum into a master's degree program. The Guyana Non-Government Organization Forum has also integrated the Community Development Academy curriculum. Unions, community development organizations and non-government groups are using it to address social issues.
- As part of the Alianzas Program, a new organization for multicultural issues and opportunities has been formed in Southwest Missouri, and more residents are aware of the challenges and opportunities of the Hispanic population influx. A grant proposal to United Way in Kansas City was funded for $8,000 to assist with a reading program in an elementary school.

Community and Economic Planning

- In Northwest Missouri, the Rural Community Action Program is using principles taught at the Community Development Academy to help small communities become self-sufficient and self-sustaining, while maintaining their unique flavor. The program has provided a compass to guide the Nodaway County Community Solutions for Rural Health. The Holt County Community Development Strategic Action Planning Program involved more than 100 residents representative of the diversity of the community in developing vision and mission statements, goals, and an implementation plan.

Community Decision Making

- In Chesterfield, Missouri, middle school students who participated in the Local Government CECH-Up program researched and helped draft Missouri's first bicycle safety ordinance, which was adopted by the city council.
- In 2001, a statewide impact assessment of the Building Communities through Public Deliberation Program was conducted. More than 90 percent of the participants indicated that all opinions were heard and that each issue "choice" got fair and equal treatment. Sixty-one percent rated the issue forum as 7 or higher on a 10-point scale.
- An evaluation of the public issue forum series on local land use in Saline County indicated an increase in knowledge about the issue. As a result of the forums, county commissioners will put a planning and zoning issue on the public ballot in 2002. Additionally, the county has adopted a "Good Neighbor Policy."
- In Jackson County, volunteers have been trained and they, in turn, have led public issue forums on five different topics in the past year.

Community Emergency Management

- In northeast Missouri, extension specialists participated in training on disaster planning and recovery, updated office evacuation plans and installed NOAA weather

radios. A community interagency disaster organization is being developed as a pilot project.
- Following the events of Sept. 11, a website on Home and Community Security was established. The website is a starting point for future web development.

Community Leadership Development
- In 2001, an evaluation of participants of leadership programs conducted from 1992-99 indicated that participation resulted in personal growth and self-efficacy, community commitment, a shared future and purpose for the community, community knowledge, and civic engagement.
- Over the past 15 years, the nearly 3,200 participants in the Experience in Community Enterprise and Leadership program are (from message map)

Character Education
- In a study of Missouri 4-H members, 86% agreed with the statement: 4-H teaches me to be responsible for my own actions.
- 11,853 youth and adults participated in 4-H community service learning activities.

Science and Technology Education
- UOE faculty taught science education to 59,186 students through the Hatching Chicks in the Classroom school enrichment program.
- UOE faculty collaborated with local school districts to open 16 after-school computer labs.

Volunteer Leadership Development:
- 16,739 youth and adults worked with 203,099 youth as "recognized" 4-H volunteers.

1862 Agricultural Experiment Station Research — University of Missouri-Columbia – Goal 5

Key Theme: Impact of Change on Rural Communities

* The Food and Agricultural Policy Institute (FAPRI) consortium of universities develops and mains operational econometric, representative farms and environmental models that are designed to provide policy makers at the national, state and local levels with quantitative analysis reflecting the expected consequences of policy options prior to legislative decisions. FAPRI has provided information to the Senate and House that has resulted in many changes in proposed legislation to avoid potential problems and achieve the desired results in the 2002 Farm Bill. The best example is the shift in the official government estimates on the cost of farm program proposals by the Congressional Budget Office subsequent to information provided to CBO analysts. The dairy analysis conducted by FAPRI was the only work available to policy makers. The unit also helped deal with concerns at the interface between agriculture and the

environment with work on evaluating the implications of shifting to phosphorus standards in the state as well as the effects of EPA's proposed revision of the CAFO regulations. Comments to EPA were quoted extensively in the Notice of Data Availability (NODA) in the Federal Register. FAPRI is collaborating with colleagues from 14 European countries to develop a European agricultural policy analysis system. Some of the work has already been utilized by the European Commission.

Key Theme: Impact of Change on Rural Communities

* David O'Brien's book on Rural Reform in Post-Soviet Russia

Published book, Rural Reform in Post Soviet Russia, that resulted from collaborations with the Kennan Institute, Woodrow Wilson Center. The volume is a product of several symposia of experts on agriculture reform and change in rural Russia since the collapse of the Soviet Union. Most of the chapters report on original field research on what is actually transpiring in reform and new markets and levels of private farming. It will be useful to agribusinesses trying to work in Russia to understand the ground level. Scholars studying reform will also use this book.

Source of Federal Funds: Hatch, Grants

Scope of Impact: Multi State, International

1862 University Outreach and Extension — University of Missouri System – Goal 5

Key Theme — Child Care/Dependent Care

a. Program Description: Child Care

The University of Missouri, Outreach and Extension is striving to relieve Missouri's "silent crisis" in child care through multiple program efforts. Missouri's GEMS (*Growing through Education Means Success*), an educational program, will soon offer newly-hired, providers the preparation necessary for providing quality child care and will also serve as the first step towards a career in child care. OPEN (*Opportunities for Professional Education Network*), Missouri's career development initiative for child care providers, recently began implementing a strategic plan addressing quality control in child care training, career development pathways and career counseling, articulation between institutions of higher education, and financing and compensation. *Making the Business Case for Employee Child Care Benefits*, a collaborative effort between UO/E and Missouri's Child Care Resource and Referral Network, addresses securing affordable, reliable, and quality child care through a variety of options, including child care information for parents, workplace policies, financial support, and

creating and supporting child care services. Additionally, because the Missouri Department of Health, Bureau of Child Care requires child care workers to complete 12 clock hours of training annually, UO/E regional faculty routinely provide relevant educational opportunities for child care workers statewide.

Child care impacts most aspects of daily life for Missouri citizens. Because 64.5% of mothers with children under age 6 and 77.3% of mothers with children ages 6 to 17 are members of Missouri's workforce, child care participation has become the norm for Missouri children and families. Research indicates that the quality of children's child care experiences contributes to their immediate and long-term well-being. Moreover, child care provider preparation and education are the best predictors of quality early education. However, national assessments depict a system of mostly poor to adequate child care programs, due in part to alarming rates of provider turnover. Turnover rates remain high because wages are low, benefits rare, and opportunities for professional advancement limited. Missouri cannot recruit and retain a well-prepared child care workforce, support families' workplace success, and promote healthy child development without addressing the problem from multiple perspectives.

b. Program Impact:

The large majority of child care provider educational programs and workshops are evaluated at the "short-term" outcome level. For instance, of the 11 students who completed *Growing through Education Means Success* (GEMS), students reported the following short-term evaluation outcomes: Content: 2.87/3.00; Instruction: 4.82/5.00; Effectiveness: 4.61/5.00. Likewise, of the 22 participants in Making the Business Case for Employee Child Care Benefits, their average satisfaction rating and increase in knowledge and skills was 4.6/5.0.

Child care provider educational workshops are typically evaluated by University of Missouri Outreach and Extension regional faculty. Although all of the results are not quantifiable, anecdotal evidence suggests that child care providers value UO/E's child care programs and typically report acquiring new knowledge and skills from participating.

One University of Missouri Outreach and Extension child care relevant program- *Growing through Education Means Success* (GEMS)- gathered behavior-based, pre- and post-program data from participants. In February 2000, a total of 84 child care providers agreed to participate in the program evaluation study (43 center providers and 41 home providers; 42 program group and 42 control group). Participants completed an extensive written survey and were naturalistically observed in their child care programs prior to and after the educational program. By the end of the project (November, 2000), 34 child care providers remained (11 program and 23 control). Data analyses indicated that child care provider beliefs about childrearing, activity planning, and children’s nutrition were unchanged in both the program and the control group. However, provider practices, specifically personal care routines with children

and developmentally appropriate activity planning, improved significantly from pre- to post-program for the program group and remained the same in the control group.

c. Source of Funds: Smith-Lever, State, Kauffman Foundation

d. Scope of Impact: State specific.

Key Theme — Child, Youth and Families at Risk

a. Program Description: Building Strong Families

Demographic trends indicate that family well being is a matter of concern. In 2000, there were 17,382 deaths due to heart disease, 12,127 deaths due to cancer, and 1,458 deaths due to diabetes in Missouri. Nearly 6,000 low-birth weight babies were born in 2000 and 12,279 births were to teen parents. These infants are at great risk of having experiencing health and learning problems in their lives. Although the average income of Missourians grew during the 1990s,the number of children living in poverty, one in five, did not change. Many homes are unsafe and lack attention to repairs and other hazards that put adults and children in danger, and 1 out of 5 families find the cost of housing to be more than they can manage.

A 13-module curriculum has been designed to help families find their strengths, face challenges and make choices. In addition to extension faculty, 64 individuals from partner organizations were trained to facilitate the program in their communities. Curriculum was designed to be taught to either adult family members or to parents and children together. The curriculum is structured so that a series of four to six sessions can be taught that focuses on the particular needs of families. Supplemental materials have been developed for lower-level readers and a parallel curriculum for young people is being developed.

The progress of 50 family members who participated in 2000 is being followed. More than 90 percent report making at least one significant change in the way they manage their family, and many say they are making more than one change.

b. Program Impact:

This program is still in the early stages of implementation, but the early finding indicate that family members are benefiting from this program. Overall, a large percentage of the adults participating in this program report that they are incorporating recommended practices into the daily lives of the families. For example:

> Overall, 95% of participants who complete end-of-session evaluation forms after each workshop session state that they have gained new information or learned a new skill. Seventy-five percent say they will try the new skill or use the information with their families.

Most participants who responded to a 3-month follow-up survey are making changes

as a result of setting goals at this program. Although they may not be making changes in every goal area they set, 47 out of 50 respondents checked "yes" to at least one area in which they were making changes. Many, in fact, mentioned several areas in which they were making changes.

In Cape Girardeau County, 84 percent of participants report are setting up meaningful time with their children and 70 percent are spending quality time with them. Participants also report making better discipline decisions (59 percent) and using better communication skills (79 percent).

Long-term impact has not been evaluated, although short- and medium-term outcomes would indicate Building Strong Families curriculum will assist families in making sustainable changes that significantly improve their ability to live safer, healthier and better lives.

For additional program information see: Missouri Families (http://www.missourifamilies.org/); Center on Adolescent Sexuality, Pregnancy and Parenting (http://outreach.missouri.edu/hdfs/caspp.htm) and Family and Community Resource Program (http://outreach.missouri.edu/fcrp/).

c. Source of Funds: Smith-Lever, State

d. Scope of Impact: Missouri and Nebraska

Key Theme — Children, Youth and Families at Risk

a. Adolescents At-Risk Program

The troublesome adolescent years have been a source of societal concern for centuries. The years from puberty to early adulthood-has been viewed as risky and problematic. The behavior of contemporary American youth indicates a wide variety of problems. Based on the Youth Risk Behavior of Missouri teens in 1999, it was found that in any given month about 16% of high schools students had been drinking alcohol, 30% had been engaged in binge drinking, and 26% had smoked marijuana. Large percentages of youth also smoke, carry guns and have been involved in fighting.

Sexual activity is another area of significant concern. Although the birthrate for teens has been declining in Missouri for the past decade, there were still over 12,000 babies born to teen mothers in 2000. When asked about sexual behavior, 57% of high school students report having sexual intercourse and 42% are sexually active on a regular basis.

The 4-H Youth Development and Human Development Programs are engaged in a variety of programs designed to prevent youth from becoming involved in risky adolescent behaviors. Providing alternative youth activities and supervised after school care programs are two important ways in which UOE prevents youth from becoming involved in problem behaviors. In addition to these efforts the Center on

Adolescent Sexuality, Pregnancy and Parenting has developed several major programs that are designed to prevent teen pregnancy and provide support to new adolescent parents.

For additional information see Adolescents oftline(http://www.missourifamilies.org/adolescents/index.htm) and Missouri 4-H (http://mo4h.missouri.edu/).

b. Program Impact:

Adolescent At-risk programs had 84,423 contacts with youth and adults in 2001.

The Resource Mothers mentoring program for teen mothers started in 1996 is now operating is 22 counties in Missouri. In an evaluation study of the mentoring program teen mothers who received the program (N= 30) were compared with those mothers who did not receive the program (N=43). The findings indicate that the mothers in the mentoring program had lower parental stress. Only 10% of the teens that were mentored were severely isolated from supports systems while 28% of the mothers not in the program were significantly isolated. An important outcome for this program is the health of the babies born to the teens. Findings in regards to healthy birth weights and hospitalizations of babies indicate that the babies of the mentored teens were better off than the babies of moms who did not participate in the program. Only 14% of the babies in the program had low-birth weights, but almost half (46%) of the babies in the comparison group had low-birth weights. Likewise, in the first year of life only 46% of the babies in the mentoring group needed hospital care while 70% of the comparison group required hospital care for their babies. Teen mothers have reported many positive consequences are as result of this program. Here is what one teen mother wrote, " …I received the best thing that could happen to me—support…with the help of the mentor I made it through the hardest moments in my life."

c. Source of Funds: Smith-Lever, State

d. Scope of Impact: Missouri, Hawaii, New York, New Mexico

Key Theme — Children, Youth, and Families at Risk

a. Program Description: School-Age Care and Opportunities for Youth During Out-of-School Hours

The need for School-Age Child Care (SACC) education that provides a safe and nurturing environment for children of working parents is one of the most critical issues facing American society. At the same time, quality SACC programs provide effective prevention programming that reduces risk factors and promotes healthy development. Children enrolled in after-school and summer school-age child care programs spend

time equivalent to a school year in the non-formal educational setting. Quality SACC programs have demonstrated the ability to enhance academic and social skills necessary to be successful in school.

For the past seven years, Missouri 4H/YD Programs provided state and national leadership in the field of SACC education. In 1988, Missouri 4H/YD Programs was provided funding to establish the national extension center for SACC. Under the guidance of Missouri youth staff, the center created a coalition of (11) states to develop program development materials, curriculum, training, and evaluation designs necessary to promote a nationwide program. In 1990 a $230,000 grant from the W. K. Kellogg Foundation and the National 4-H Council provided funding for a national center for SACC education to provide technical assistance to thirty-five communities across the nation who had received approximately $4 million, from the Cooperative Extension Service, to start SACC educational programs. In 1993 the national center, again with the guidance of Missouri 4-H staff, expanded to include fourteen land grant institutions as well as to provide a broader range of child care education and services.

In addition, since 1988 4H/YD Programs provided statewide leadership in facilitating the establishment of SACC programming to provide professional training and to implement research. The 4-H Adventure Club SACC Program is currently in fourteen schools that are part of two school districts. This 4-H SACC program provides living laboratories for development of programmatic expertise and research sites. Since 1987 fourteen 4-H Adventure Club programs have been systemically turned over to the management of school districts.

From 1988-1992, in partnership with Missouri Department of Elementary and Secondary Education, 4H/YD Programs provided technical assistance to nearly 100 schools across the state that had received state grants to start SACC programs. The faculty leader of this program built a national reputation of excellence and now serves as the national youth-at-risk liaison for thirty SACC project sites, working with Wellesley College on its SACC project of national accreditation, and serving as a member of the advisory board for the Child Care Action Campaign. Another state faculty member serves on the state SACC Advisory Committee of the Missouri Department of Elementary and Secondary Education. She has held officer positions with the Missouri School-Age Care Coalition and serves as a Board of Director for Missouri Accreditation of Childhood Education and School-Age Child Care Programs.

b. Since the beginning of 4H/YD's initiative on SACC educational programming, the quality of programming and the excellence of dedicated staff has made it possible to obtain public and private support amounting to $1,024,000.

Missouri 4-H Youth Development also provides leadership for Extension's National Network for Child Care (NNCC). Professionals from across the country have a vision of safe, caring, accessible child care for all children. NNCC offers information via the Internet and the World Wide Web, technical support on an array of child care topics, a data base with fact sheets, curricula, research abstracts and newsletters and other

learning opportunities.

c. Source of Funding: Smith-Lever, State, Grants

d. Scope of Impact: State Specific

Key Theme — Community Development

a. Program Description – Alianzas: Building Inclusive Communities

Missouri's Latino population has grown from 61,702 residents in 1990 to 118,592 in 2000. This represents a 92.2 percent increase while the total population of Missouri increased only 9.3 percent. In six Missouri counties (Moniteau, Pettis, Saline, Barry, Lawrence and McDonald), the increase has been 400 percent or more. With such rapid growth, immigrants and communities face many challenges. Immigrants face discrimination; low-pay employment; inadequate health insurance; difficulty in finding adequate, affordable housing; and communication problems. Schools must refocus resources to non-English speakers. Social services must find food and shelter for the new families. Community residents encounter communication and cultural understanding difficulties. The Alianzas project involves multi-campus representatives from the four University of Missouri campuses, University of Missouri-Lincoln, University Outreach and Extension, and community partners, applying the co-learner model and facilitating the creation of a learning community at the statewide level. The goal of this project is to enhance the ability of communities to collaborate with the growing immigrant Latino populations through a Latino, university, and community partnership utilizing the community-based co-learner approach.

Three UO/E regions (Central, Southwest and West Central) were selected as target areas for the implementation of this project. The three areas were selected because of the increase in immigrant population over the past few years. It should be noted that area service providers believe that the actual numbers of Latinos is even greater than what is reported in the Census, especially in those counties with a more migrant Latino population.

Educational materials have been created or translated, including a Spanish resource manual for health professional and medical interpreters; a directory of Latino organizations and contacts in Kansas City; extension nutrition guidesheets; a tornado safety sheet in Spanish and English; and a resource/referral manual on domestic violence. Spanish information capsules on health air on Spanish radio in Kansas City. A website at Missouri Southern State college highlights Latino issues: http://www.mssc.edu/missouri/index.htm

A Latino 4-H Club has been formed in Southwest Missouri, and four festivals highlighting Latino culture took place last fall. Extension faculty are taking conversational Spanish and Mexican culture classes to enable communication with

Latino immigrants. A program emphasizing literacy in the home for parents and young children is taking place in Central Missouri. A Listserve has been established for the Ozarks Regional Alliance and *Alianzas members*. Alianzas staff are on the planning committee for a statewide conference, "Cambio de Colores: A Call to Action," March 2002.

A grant was written to hire Latinos to assist extension personnel, communities and Latino families with cultural competency, language and nutrition education. As a result, three new positions in the region are assisting with the needs of the Latino population. A Coalition of Hispanic Organization Center was established on the UM-Kansas City campus.

A partnership has been established with the government of Mexico to open three educational centers (one each in Missouri' West Central, Central and Southwest Regions). Mexican citizens will be able to get secondary education, officially validated in Mexico, via distance learning.

For additional program information see Alianzas (http://www.uoealliances.com/)

b. Program Impact:

A new organization for multicultural issues and opportunities has been formed in Southwest Missouri, and more residents are aware of the challenges and opportunities of the Hispanic population influx. A grant proposal to United Way in Kansas City was funded for $8,000 to assist with a reading program in an elementary school.

Alianzas has been in existence for one year; long-term outcomes are not yet available.

c. Source of Funds: Smith Level, State, Local County Extension Councils

d. Scope of Impact: State Specific

Key Theme — Community Development

a. Program Description: Community Development Academy

Many Missouri communities struggle to address large-scale social, economic and environmental issues that affect quality of life. These issues include land use, economic development, affordable housing, education and health care. Because of their complexity, communities require processes to help people better under the issues confronting them and tools for organizing citizen participation.

The Community Development Academy provides a conceptual base and skills for successfully bringing people, often with diverse views and opinions, together around common issues, helping them learn how to deal collectively with their issues of concern, and giving purposeful direction to their own futures.

Through a series of three intensive, experiential, five-day courses (for noncredit or for three hours undergraduate or graduate credit), participants explore ideas and develop practical skills for those engaged in involving and empowering local citizens and leaders in community-based efforts. The courses combine leading edge thinking with practical application to enhance the capacity of people to work effectively with a broad range of community issues.

The Academy has attracted diverse participants from across Missouri, the U.S. and eight other countries, while enriching the experience and learning for all. The educational experiences provide interactive, hands-on learning and includes the newly emerging concepts and methods of working effectively with communities and groups.

For additional program information Community Development Academy
http://www.ssu.missouri.edu/commdev/cda/cda.htm

b. Program Impact:

Nearly all survey respondents claim they have incorporated course material into their community development programming and have increased their professionalism by taking the course.
Evaluations completed by participants at the end of the course and a few months following have indicated the courses are well designed and presented and that significant learning and opportunities for application are being realized. Informal follow-up contacts and reports have indicated this to be the best training, and of most impact, that many participants have ever attended.

Those who have completed the program are engaging in development of new and expanded local leadership training, involvement of citizens in planning and implementation of community wide programs, adoption of community-based approaches in all aspects of outreach and extension work, cooperative and partnership efforts to achieve community success. New partnerships – both formal and informal – have formed internally within Extension and with external groups to work on issues of importance to citizens.

In Northwest Missouri, the Rural Community Action Program is using principles taught at CDA to help small communities become self-sufficient and self-sustaining, while maintaining their unique flavor.

Internationally, a partnership between the University of Missouri, University of Pretoria and Medunsa University is playing a critical educational role in shaping the future of development South Africa. The University of Pretoria is incorporating aspects of the curriculum into a master's degree program. The Guyana Non-Government Organization Forum has integrated CDA curriculum. Unions, community development organizations and non-government groups are using it to address social

issues.

c. Source of Funds: Smith-Lever

d. Scope of Impact: State Specific

Key Theme — Community Development

a. Program Description: Community Emergency Management Program

Emergencies and disasters – both natural and man-made – affect every aspect of rural and urban communities. Emergency management is continuing to develop rapidly as disasters and major emergencies become more frequent and the response becomes more complex. Following the terrorist attacks of Sept. 11, community-based emergency management programs have become a high priority and will remain so for years to come. Research has shown that communities and families that prepare for emergencies recover more quickly and with fewer adverse physical, emotional and economic effects.

Two continuing education specialists in emergency management have been hired to plan, schedule and conduct educational programs in disaster mitigation, preparedness, response and recovery.
Extension is a full member of the Governor's Disaster Recovery Partnership, providing research-based disaster management, preparedness, technical and recovery information. UO/E is a partner agency in the State Plan for Drought. Linkages have been established with the State Emergency Management Agency and other organizations that respond to emergencies and disasters, including the American Red Cross.

In northeast Missouri, extension specialists participated in training on disaster planning and recovery updated office evacuation plans and installed NOAA weather radios. A community interagency disaster organization is being developed as a pilot project.

Following the events of Sept. 11, a website on Home and Community Security was established. The website is a starting point for future web development.

For additional program information see http://www.ssu.missouri.edu/commdev/

b. Program Impact:

As a new program, long-term outcomes for Community Emergency Management are not available.

c. Source of Funds: Smith-Lever, State

d. Scope of Impact: State specific

Key Theme — Community Development, Leadership

a. Program Description: Building Community through Public Deliberation

The Building Community through Public Deliberation Program provides Missouri citizens, local leaders and communities with collaborative support as they identify and make decisions about high-priority and controversial public issues. Through ongoing state-wide education and evaluation efforts this program develops and sustains the use of public issue forums as a deliberative tool that yields increased local knowledge, communication, leadership and citizen engagement for community enhancement and empowerment at the local level. The program provides training, mentoring and support to Extension faculty and interested citizens.

Citizens, local leaders, and community groups throughout the state are the targeted audience. Public deliberative moderation training has to-date primarily included state and regional University Outreach and Extension faculty.

A major survey of nearly 17,000 Missouri citizens in 1994 indicated that nearly all identified “desired community outcomes” as issues that could be addressed only through public decisions and actions. Recently, local government official and community leaders/groups have requested decision assistance and support from University Outreach and Extension. Current research suggests that such support is effectively provided through the use of community-based decision-making methodologies. As a result, this program was adopted and developed as a means to provide Extension faculty and others with the concepts, methods and materials necessary to engage people at the community-level.

In the short-term, Missouri learners need to increase their knowledge about their community, their local governing process and their empowerment opportunities as a group. They need to identify the specific local issues they wish to address, recognize the capabilities and assets within their communities, and become familiar with the challenges they face at the local level. Additionally, the need to learn specific community-drive methods that allow them to come together, foster productive communication, identify common ground, and take action in ways that support collective issue resolution. In the medium-term, Missouri learners need to put their knowledge into action by employing the methods of deliberation just described. In the long-term, they need to develop a “habit” of deliberation and community-driven problem solving. This will directly result in enhanced and enriched communities throughout the state, greatly improving the lives of Missouri learners. Local communities will become empowered and able to proactively affect change, direct their future growth and successfully address priority issues within their community base.

In a typical year, the Public Policy Institute (PPI) training course is offered every three to six months. The PPI is a two-day course that provides training in the applied use of deliberative issue forums as a community-based decision support tool and includes instruction in convening, moderating and recording issue forums. Beginning in 2000, a companion course in issue forum framing was developed and adopted for use. This course consists of three separate three-day meetings, which support participant teams as they identify high-priority issues and develop localized issue booklets to be used for issue forum series efforts in a targeted community.
\fs24line For additional program information, see Community Development (http://www.ssu.missouri.edu/commdev/) and CPAC (http://www.cpac.missouri.edu/)

b. Program Impact:

In 2001, a statewide impact assessment was conducted. It surveyed 118 Missouri citizens who had participated in at least one Public Issue Forum using the deliberation process. More than 90 percent of the participants indicated that all opinions were heard and that each issue "choice" got fair and equal treatment. Sixty-one percent rated the issue forum as 7 or higher on a 10-point scale.

Evaluation results indicated some medium-term outcomes resulting from the project. 60.9% reported that contact had been made with office-holders about the issue(s), 59.3% indicated additional forums had been planned or conducted, with 38.1% reporting that the issue was "now on the table" in the community.

An evaluation of the issue forum series on local land use in Saline County indicated an increase in knowledge about the issue. As a result of the forums, county commissioners will put a planning and zoning issue on the public ballot in 2002. Additionally, the county has adopted a "Good Neighbor Policy."

The evaluation data indicate that the deliberative process works well, however, long-term outcomes must be measured over time. However, events reported in Jackson, Johnson, Saline and St. Louis Counties suggest that initial indicators of impact are emerging. These include:

- Local governing decisions were made in Saline County that will put a planning and zoning issue on the public ballot as a result of deliberative public issues programming.
- Decision-making is being democratized as communities adopt deliberative strategies to address issues.
- Shared leadership is being fostered as University Outreach and Extension expanded use of community-based and co-learner programming.
- Deliberation programming related to diversity has increased in several counties.

- Repeated use of issue forums is seen in Jackson, Johnson, Saline and St. Louis Counties.
- Jackson County citizens received training and have moderated forums on 5 different topics in their community.

a. Source of Funds: Smith-Lever, State

b. Scope of Impact: Missouri and Oklahoma

Key Theme — Community Development; Youth Development, Leadership

a. .Program Description: Missouri Local Government CECH-UP

One of the primary goals of education is to prepare students to become more informed, active and responsible citizens. Citizenship education challenges students to practice civic participation and address problems in their community. By applying academic learning to real-life issues, students strengthen their civic attitude, skills for active citizenship and work-force skills.

A Missouri Local Government CECH-Up handbook has been developed, along with a video, website and Listserv. Educational materials meet Missouri Department of Elementary and Secondary Education curriculum standards.

In a three-part unit, middle-school students in Independence learned about local government organization and finances, and community history. Arcadia Valley students attended city council meetings as part of their local government class. Willow Springs students used a software simulation game to create virtual towns and toured the Howell County government offices.

St. Francois County North students studied aerial maps of Bonne Terre; used computer simulations to understand local government management and create model cities and counties; and researched the history of their county.

Two youth government days were organized for DeKalb County high school students. In Boone County, computer simulations were used to increase participants' knowledge of their citizenship role and the community in a 16-week program for underserved youths.

For additional program information see CeCH-UPain
(http://www.umsl.edu/divisions/education/cech_up/other/other.html)

b. Program Impact:

In Chesterfield, students researched and helped draft Missouri's first bicycle safety ordinance, which was adopted by the city council.

Since CECH-Up is only in its third year and involves primarily middle-school students, long-term outcomes have yet to be realized. These outcomes include higher voter participation, more people preparing for and entering public service, and greater involvement in community and local government issues.

c. Source of Funds: Smith-Lever, State

d. Scope of Impact: State specific

Key Theme — Family Resource Management

a. Program Description: Family Financial Management

Increasing the financial literacy of Americans has become a national priority of the past 5 years. In spite of the healthy economy of the late nineties, many families are showing signs of financial stress during the current recession. Higher rates of unemployment resulting from lay-offs and plant closures, tighter job markets for new graduates, and losses and lower returns from financial markets have left some families struggling. Bankruptcy filings in 2001 increased 19% from 2000, reaching almost 1.5 million. This increased is blamed in part to record levels of consumer debt and the economic downturn.

Most financial experts and educators agree that young people need access to financial management education at a young age in order to develop the skills they need to be successful money managers as adults. Recent studies and surveys indicate the young people today have access to and spend a significant amount of money. Having access to money does not translate to the ability to make wise financial and spending decisions.
To meet these needs, educational programming should continue to focus on specific financial management topics such as money management, insurance, credit, etc. In addition, we need to do a better job of helping people access their financial values, attitudes and believes and how they influence their financial management behavior.

Family financial management programs provide participants with the knowledge and skills necessary to establish and maintain economic stability and security, manage human and material resources, and increase consumer proficiency in the marketplace. To accomplish this, educational programs during the past year have focused on basic money management, responsible credit use and debt management, the basic of savings and investing, building financial literacy in youth, insurance, retirement planning, saving for a child's education, and consumer decision making

For additional program information see Personal Finance (http://www.missourifamilies.org/learningopps/learnfinance/index.htm); Consumer and Family Economics (http://outreach.missouri.edu/hes/money.htm); and, Consumer Economics Update (http://outreach.missouri.edu/ceupdate/money.html)

b. Program Impact:

Eighty-three participants in a financial management class for probation and parole clients developed at least one realistic financial goal by the conclusion of the short course. Seventy-nine percent planned to have an emergency fund and to save regularly.

Participants in the Women's Financial Information Program have, over time, consistently reported positive behavior change.

Participants in McDonald County reported that after 3-months, 6 of 36 participants had increased the amount of money they were saving or investing.

c. Source of Funding: Smith-Lever, State

d. Scope of Impact: State specific.

Key Theme — Leadership Training and Development

a. Program Description: EXCEL (Experience in Community Enterprise and Leadership)

Community leaders are the central force in effectively mobilizing people to address local issues. Effective citizen leaders translate knowledge and commitment into hands-on action to engage in building community networks, make well-informed community decisions and find real solutions to real problems. Ongoing leadership development ensures that communities have the capacity to move forward as current leaders retire from public life.
A handbook, "Community Leadership Development: The EXCEL Approach" has been revised, and training was provided to extension specialists.

One-third of Missouri's counties and communities – nearly 3,200 people – have participated in locally driven leadership programs. In Barton County, citizens are developing a second leadership class focused on character training and awareness.

Effective citizen leaders translate the knowledge they've gained and commitment they feel into hands-on action with participation in meeting the challenges facing their communities. They can convert words and ideas into action – instinctively talk the talk and walk the walk. They use insights and skills learned in community leadership programs like EXCEL to engage in building community networks, make well informed community decisions and find real solutions to real problems.

Accomplishing EXCEL's purpose means that University Outreach and Extension works collaboratively with the local community and its leaders. Frequently, community leaders wonder how to achieve the kind of success they dream about and recognize that they cannot be successful alone or without greater personal capabilities.

For additional program information see Community Leadership Development (http://www.ssu.missouri.edu/commdev/cld/cld.htm).

b. Program Impact:

The EXCEL program has been demonstrated effective in achieving its community development. The program provides a flexible design that any community can use effectively.

The effectiveness of the EXCEL program has been documented in an evaluation study completed in 2001 (evaluation study involved programs implemented in twenty-five communities between 1992 and 1999). Over 90% of participants indicated they considered their participation to have been worth their time and effort. Additionally, over 95% of the participants stated they felt their learning experience was worth the resources that Extension expended to support the program in the community. This is a strong endorsement of our efforts to meet the needs of Missouri's citizens and communities.

The evaluation study demonstrated that the elements and outcomes of the EXCEL program did not depend for its success on the characteristics of the participants or on the unique features involved in different locations. Participants from different genders and ethnic backgrounds experienced the same kinds of benefits, as did those with different levels of education and income, length of residence of family ties in the community.

c. Source of Funds: Smith-Lever, State

d. Scope of Impact: Program has multi-state collaboration in that State Community Leadership Development Extension Specialists is a member of the leadership team within the North Central Region of Extension

Key Theme — Parenting

a. Program Description: Parenting Education Programs

Children whose parents are getting divorced are at significant risk of experiencing emotional, educational and social difficulties. In Missouri in 2000 over 20,000 children were living in families in which their parents got divorce. Research has demonstrated that if parents in divorcing families can provide consistent and firm parenting and reduce the amount of conflict that children are exposed to, then the children have a greater chance of healthy and normal development.

Since 1996 the University of Missouri with leadership by the Human Development faculty have been providing the Focus on Kids program to divorcing parents which emphasizes conflict management and co-parenting strategies that will assist children in dealing with their parent's divorce. The program is now court-mandated in Missouri and the Human Development faculty deliver this program in 29 counties.

For additional program information see ParentLink (http://outreach.missouri.edu/parentlink/) and Missouri Families (http://www.missourifamilies.org/).

b. Program Impact:

Focus on Kids programs involved over 4,000 parents in 2000. Immediate post-test evaluation results indicate that over 90% of the parents indicate that better understand the benefits of cooperating with the other parent in support of their children, understand more about the ways in which parental conflict can harm children and indicate that they plan to avoid arguing or fighting in with the other parent in front of the children. Numerous positive comments have been received from both parents and court personnel about this program. One court administrator wrote, "The professionalism, experience and empathy of the Focus on Kids instructors are key factors in the overwhelmingly positive response that has been received from 90% of the parents who have attended the Focus on Kids program." Here is a typical parent comment—"The program helped me understand the benefits to my children if my former spouse and I can work cooperatively with each other."

In a six-month follow-up of 143 parents who had participated in the program the following impact was found. Over 90% of the continued to report that the program helped them to understand the impact of divorce on their children and 94% indicated that the program influenced the decisions they made about handling their children. Almost 92% agreed with the statement that "As a result of the program, I plan to make a stronger effort to work with my ex-spouse for the children's sake." Sixty-three percent reported that they were more cooperative with their ex-spouses as a result of the program and 78% indicated that they were acting in ways to assure that their ex-spouse continued to have a positive and ongoing relationship with the children. Overall, these results suggest that the Focus on Kids program has a positive impact on

divorcing parents and encourages them to engage in actions towards their former spouses that will benefit their children.

c. Source of Funds: Smith-Lever, parent fees

d. Scope of Impact: State specific

Key Theme — Parenting; Children, Youth and Families at Risk; Community Development

a. Program Description: Effective Black Parenting

In a recent review of the scientific literature on the protective factors that prevent children from becoming involved in risky and dangerous activities such as use of drugs and alcohol, engaging in early sexual activity and getting involved in delinquent activities, the single most powerful factor was being cared for by a loving, yet firm adult. In Missouri there are a large number of African-American parents who are frequently not served by traditional parenting programs and many of these parenting programs do not consider the unique cultural issues that affect Black children. In Missouri it is estimated that there are over parents and grandparents who are the primary caretakers of children.

The Human Resource faculty at Lincoln University identified and adapted a Black Parenting curriculum that addressed basic needs, safety, guidance and the unique challenges faced by Black children including dealing with issues of racism. The program has been conducted in those areas of Missouri in which there are significant numbers of Black grandparents and parents caring for children. Faculty have also developed some special activities to involve fathers in the program, especially non-custodial fathers.

b. **.**Program Impact:

The Black Parenting Program had 338 contacts with adults in 2001. Almost 40% of the program participants were fathers or grandfathers. The number of fathers reached by this program is especially important because this is an audience that is very difficult to engage in parenting programs. This is about twice as many fathers as is typically involved in parent education.

In a follow-up survey of 21 past participants in the Black Parenting program, a 20-item parenting inventory was administered. Answers to questions on this inventory provide information about knowledge of parenting behaviors that have been shown to be linked to positive child development. For example, parents over 95% of parents reject the use of physical punishment in handling discipline and 86% endorse the idea of showing children affective and affirmation when they behave in a positive manner. Eighty-five percent of the mothers reported understanding that drinking and smoking during pregnancy would be detrimental to the developing child. There was also

evidence that parents understood more about the normal developmental course of children and can provide better safety to children. For example, 95% reported knowing that children under 3 years of age should not be left alone to care for themselves.

Immediately after the program and during the follow-up parents regularly report positive responses to this program. Recently, one parent wrote the following note about what she learned as a result of participating in the program "Instead of yelling at my child I've learned how to talk to him and listen to what the problem is. Not yelling, using the firm approach, stand firm, look straight in the eye and say what I "need" and mean it."

c. Source of Funds: Smith-Lever, State

d. Scope of Impact: State Specific

Key Theme — Promoting Housing Programs

a. Program Description – Affordable Housing and Housing and Community Issues

Affordable housing is essential to the long-term health of rural and urban communities. When community members cannot afford housing or when they fail to maintain housing, this is often accompanied by declines in the viability of the community and frequently leads to increased social and health problems for residents. Although homeownership has risen for the past decade in Missouri, the percentage of Missourians who are burdened by the cost of renting or owning has remained at about 20%. In other words, about 1 out of 5 Missouri households are paying more for housing than they can afford. In addition to the cost of housing there is frequent mismatch between the availability of housing and the type of housing desired by residents. In a study of several communities in the northwest part of Missouri it was found that there was a severe lack of modestly priced homes that most residents could afford.

Faculty in the Environmental Design Program area have created a statewide program that emphasizes teaching finance and housing maintenance skills to potential first-time homebuyers and to new homebuyers of low and moderately priced homes. This target audience has been found to be receptive to this information and research has shown that these homebuyers are most likely to lose their housing investment if they fail to learn the necessary financial and maintenance skills to protect their investment.

Additionally, a unique community revitalization project has been initiated that has brought together community leaders, developers, residents, bankers, builders and realtors to develop a model rural affordable housing plan in this Northwest community. This plan combines the use of global information systems about natural resources and environmental hazards with information about the unique family needs of potential first-time homebuyers to create more attractive and affordable housing

that can promote sustainable community and economic development. For additional program information see Missouri Housing Partners (http://outreach.missouri.edu/mhp/) and HomeWorks (http://outreach.missouri.edu/edninfo/homeworks/index.htm)

b. Program Impact:

During the past year Missourians were involved in over 9, 799 educational contacts. Through the use of a web-based loan application process combined with the homebuyer education for a sample of 1,298 residents, it is estimated that that 21.3% (N= 276) of these Missourians were able to purchase a home for the first time. In a six-month follow-up study of participants in a home maintenance workshop in it was found that almost 50% had new safety or energy improvements to their homes.

In the first stage of the rural Northwest community revitalization process, a taskforce of community leaders, residents, members of the financial industry and local housing developers have taken the initial steps to collect information for planning affordable housing developments. These first steps have already improved attitudes about the community and there is a growing sense of community empowerment to create positive change.

c. Source of Funds: Smith-Lever State

d. Scope of Impact: State specific

Key Theme — Youth Development

a. Program Description: Workforce Preparation/Information Technology Education for Youth and DESE After-school Computer Labs

The Missouri Department of Elementary and Secondary Education identifies technology education as critical to attaining educational and employment objectives, fulfilling citizenship responsibilities and pursuing meaningful leisure activities. Assessment data demonstrate the need the science and technology education. In Missouri, 73.6 percent of fourth-graders are proficient in math; 36.6 percent are proficient in science. By 10^{th} grade, only 10.3 percent of students are proficient in math, and 5.6 are proficient in science. The DESE website states" "The overarching mission of Technology Education in Missouri is to build citizen understanding of, and capability with, technology. This enables students to attain appropriate education/employment objectives, fulfill citizenship responsibilities, and pursue meaningful leisure activities in a technological society.

University Outreach and Extension's Information Technology and Science Education for youth include computer and technology literacy strives at infusing technology education into 4-H club programs, including project work, competitions and administration.

DESE After-school Computer Labs provide technical assistance to schools to establish after-school computer labs.

4-H Tech Team identifies, train and support youth and adult teams that work to integrate technology into all aspects of youth development programs. The team's planned projects include fixing up surplus computers and placing them at community computer sites, developing Web sites, teaching computer use, helping volunteers use computers in 4-H projects and organizing computer-related sessions at 4-H events.

Working with local school districts, 16 after-school computer labs were established with funding from the Missouri Department of Elementary and Secondary Education. At St. Francois North Middle School, 10-workstation computer lab provides students with after-school access three days a week. As a result, the school district is reallocating resources to expand its computer facilities so more students can participate in after-school programming.

Sarcoxie elementary and middle schools operate after-school computer labs for approximately 90 children. In addition to integrating technology into the school curriculum, the program complements classroom learning through fun, hands-on activities.

A technology camp in Audrain County, gave youths the opportunity to see how technology has become important to everyday life.

4-H Aero-space Education offers state and national educational trips for young people who are interested in aerospace and science. For additional information see Aerospace Camp (http://www.umr.edu/~conted/aerospace/camp2002.html).

4-H science curriculums reached approximately 60,000 Missouri school children. Extension faculty and local science teachers delivered “Field of Genes,” a biotechnology curriculum to 982 students. “Hatching Chicks in the Classroom” reached 59,186.

For additional program information see Workforce Development/Career Options (http://outreach.missouri.edu/career_options/)

b. Program Impact:

A focus on workforce preparedness has been introduced in the 4-H recognition system, with teen applicants developing a resume and participating in interviews as part of the selection process.

During a meeting in St. Louis, team members developed a PowerPoint presentation about the National Technology conference and assisted the West End Center Leadership team in preparing a PowerPoint presentation about their group. The tech team also upgraded computers at the center and installed software for the leadership team to use at a day camp.

In Spring 2002, Missouri 4-H will complete two state-level studies of short-term outcomes for learners in the following programs: Science education (Hatching Chicks in the Classroom) and After-school computer labs.

Aerospace Explorers is a four-part after-school program that provides West Plains students with the opportunity to explore the technologies used in rocketry, air flight and robotics. The program's success spurred to the community to create scholarships to attend a summer aerospace camp at the University of Missouri-Rolla.

Assessments of 4-H science and technology programs will be completed in spring 2002.

4-H After-school Computer Lab program results include:

- Middle school students are becoming self-directed learners as well as technology trouble-shooters.
- Students are excited to be in the lab, evident by their attention span when there, as well as comments to one another.
- Lab is providing a chance to get homework assistance.
- ♣ Lab has become a place for youth to be who have no other opportunities after school
- ♣ Community support and involvement in lab.
- ♣ School Board support of program.
- ♣ District received over $16,000 to support staff, purchase equipment and enhance student experiences and learning opportunities.

c. Source of Funds: Smith-Lever, State

Scope of Impact: Indiana, Iowa, Missouri, Kentucky, North Dakota, Minnesota, Arizona, Illinois, Washington, Kansas, and Nebraska.

Additionally, Missouri is a member of the 4-H Cooperative Curriculum that has 40 member states (not included are Connecticut, Massachusetts, New Jersey, Rhode Island, Arkansas, Nevada, New Mexico, Georgia, Oklahoma, South Carolina, and Tennessee).

Key Theme — Youth Development/4-H, Leadership

a. Program Description: Building Character through Community Service Learning (Show Me Character All Stars, CHARACTER COUNTS! and Community Service Learning)

Character education is a high priority for Missouri citizens and lawmakers. The Missouri 2000 Student Survey conducted by the Departments of Mental Health and Elementary and Secondary Education was administered to 10,000 students in grades

6,8,10 and 12. The study identified potentially "modifiable" risk and protective factors that may prevent or reduce alcohol, tobacco and other drug use among Missouri youth. Nine protective factors were assessed, including "belief in the moral order." Students who rated themselves highly on this factor were 4.2 times less likely to have used alcohol in the past month and 4.7 times less likely to have used other illicit drugs in the past month. Thus, character education can represent a significant protective factor in preventing alcohol and other drug use. The study also shows that character education programs are needed that target middle-school and high-school age youth, with the percent of youth reporting a "belief in the moral order" dropping from 90.5% for 6th-graders to a low of 63.7% for 10th graders.

HB1625 introduced in the Missouri General Assembly in January 2002 calls for a state-funded grant program to support character education programs for at-risk students that are designed to develop responsibility, honesty, citizenship, respect, self-discipline, acceptance of people of other races and ethnic backgrounds or any similar positive character traits.

Character COUNTS!, a character education curriculum has been infused into 4-H club programs and is providing assistance to schools, child care centers and community programs. Show-Me Character All-Starts enlists teens to teach character education to younger children. A "Show-Me Character Good Ideas" book and "Ethics in the Workplace" guide supplement the curriculum.

The 4-H Community Service Programs provides opportunities for 4-H groups to carry out community service activities that benefit their community. 4-H clubs generated $19,545 in local matching funds and in-kind services to carry out community service projects.

In St.Clair County, more than 100 Head Start employees were trained in the six pillars of character and provided activities to be used with preschool children.

Youths, ages 13-18, from Butler, Cape Girardeau, Madison, Perry Reynolds, Scott, Stoddard and Wayne counties were trained to deliver Character COUNTS! to pre-teens in their community.

County UOE plans of work developed by county advisory groups call for programs that help young people develop the traits of responsibility, fairness, citizenship, trustworthiness, respect and caring.

For additional program information see Missouri 4-H (http://mo4h.missouri.edu/) and Character Education (http://mo4h.missouri.edu/kids/character/index.htmrsltthttp://mo4h.missouri.edu/kids/character/index.htm).

- Program Impact:

Missouri 4-H began its character education work in 1997. Character education has been infused into all aspects of the 4-H club program. Two studies suggest that this work impacts 4-H club members' attitudes on character and service.
In 2000, Missouri 4-H conducted an impact study. 920 4-H members were surveyed, using a stratified random sampling process. The following outcomes were reported by the youth:

86% agreed 4-H teaches me to be responsible for my own actions.
91% agreed 4-H teaches me to be involved in my community.

In 2000, the Josephson Institute of Ethics conducted the "Report Card Survey of the Ethics of American Youth." Conducted every two years, the 2000 Report Card Survey is the second nationwide poll that studies the ethics of young people. The survey was completed by approximately 16,000 middle and high schoolers. As a CHARACTER COUNTS! coalition member and as one way of evaluating the ethics of Missouri 4-H'ers, Missouri requested to be part of the 2000 Josephson Institute of Ethics "Report Card Survey of the Ethics of American Youth". The survey provided by the Institute was sent to all Missouri 4-H members 12 to 18 years old. There were 227 useable surveys received.

Following the Sept. 11 terrorist attacks, Missouri 4-H'ers raised more than $17,000 in less than a month for the New York 4-H Foundation through 4-H Kids Helping Kids campaign. Funds were used to provide programs, support and services to young people from the New York and Washington, D.C., areas.

Jasper County 4-H members have a greater acceptance of people with disabilities and understand the value of helping others. Members of the club have sewn more than 70 weighted blankets and vests for local children. The weighted items are used to soothe children with autism when they become upset or agitated. Through a 4-H community service grants and local donations, club members are able provide the otherwise costly items at no charge. A step-by-step video will provide opportunities for 4-H clubs and others across to nation to replicate the project

During FY 01:

- 2900 Youths enrolled in Show-Me Character Education (A13).
- 3626 youths enrolled in school-based Show-Me Character Education Programs (S13).
- 1045 youths enrolled in 4-H Community Service activity (A12).
- 11,853 youth and adults participated in 4-H community service learning activities.
- 4-H clubs submitting logs reported 510 Community service-learning activities.
- 32 4-H clubs secured Missouri 4-H Foundation Community Service grants.

a. Source of Funds: Smith-Lever, State, County/Local (Kemper Foundation and Pioneer Hi-Bred)

b. Scope of Impact: Character COUNTS! Involves almost all state 4-H programs. Strong collaboration exists with the 12 North Central States (Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin). Specific partnerships include Illinois, Louisiana, Wisconsin (community service learning).

1890 (LU) Cooperative Extension Service — Lincoln University – Goal 5

Key Themes — Aging, Character/Ethics Education, Children, Youth and Families-at-Risk, Community Development, Leadership Training and Development

HUMAN RESOURCE DEVELOPMENT

Program Description

Making ethnic and poor families more resilient and self-sustaining through good parenting and community education. The decision to focus on this issue resulted from the deliberative process of surveying the needs of people in the state. The University of Missouri Outreach and Extension focus groups in Kansas City and St. Louis conducted the survey, and the Diversity Assessments conducted in the Southeast and East Central regions by the Diversity Task Force. A majority of the Communities for which needs were assessed identified child/youth, family and community development as a need. Of particular concern is the issue of parenting. Citizens believe that families will become more resilient and self-sustaining through good parenting and community education. The need for parenting and community education will be addressed through the implementation of an expanded version of the Effective Black Parenting (EBP) Curriculum. EBP is a comprehensive 15-session curriculum designed to address parenting of African American children from a historical perspective. The sessions include the opportunity to develop an awareness of the family/community relationship, and interdependency as related to sustainability.

Primary Audiences

The target audience is composed of people parenting ethnic minority children, and practitioners working with people who parent minority children.

Program Duration

The program is usually implemented in two-month intervals. The duration is ongoing because formal and informal groups are encouraged and formed. The groups tend to meet once a month with an Extension employee or volunteer as the facilitator.

Key Program Components

-A two-day Retreat designed to promote the sense of community and individual well-being
-A Field Trip designed to promote communitarian responsibilities of participants.
-Inclusion of community-based rituals in rites of passage programs - Kwanzaa.
-Inclusion of community-based programmatic efforts ¼ i.e. faith-based / community center computer laboratories.
-The recognition of the tenants of Diversity and Inclusion and programming with diverse audiences.
-Formation of formal and informal networking groups.

Accomplishments/Outcomes

125 families participate in Parenting African American and Other Minority Children Programming. The average class size is 15. The participants gain knowledge and skills that enable them to become more effective parents and contributors to their communities. Output indicators will include the number of families who complete the program, and pre-/post- program participation assessments. Outcome indicators will include measures of continued improvement in parenting skills and involvement in community reconstitution at one, three, and five years, following involvement in Lincoln University's parenting program.

Internal and External Linkages

The program involves representatives of state and local parent and community development organizations and agencies. Resources are provided from public and private entities. Research efforts will be initiated with the University of Missouri and Purdue University regarding "planned hopelessness" to determine the implications for minority parents.

TO ENHANCE ECONOMIC OPPORTUNITIES AND THE QUALITY OF LIFE AMONG FAMILIES AND COMMUNITIES

Program Description

Parents are finding a significant number of obstacles in raising their families today. The statistics for their children are alarming: one in four will spend part of their childhood in poverty; one in four will live in a single parent household; one in six will lack adequate health insurance; one in five will become a teenage parent; one in four will come home to an empty household most days; and one in five will become a problem drinker as an adolescent.
Other challenges include achieving adequate education, gainful employment, avoiding depression and suicide and developing a strong self-esteem and sustainable life skills. Existing education, community, health and childcare approaches are not meeting the challenge. The youth development program will assist families in development of life skills needed to be productive citizens and help them in their career development.

This will assist them in enhancing their economic opportunities and improve their quality of life.
In the global economy of today, the challenge of developing the skills needed to get and keep a job, youth need an opportunity to improve their knowledge and business skills. They need hands-on activities that provide the foundation for the skills and basic concepts needed to operate and become a success in business. Entrepreneurship training will provide this opportunity.

Primary Audiences

The audiences are inclusive of minority, economically and socially disadvantaged, handicapped, and underserved populations.

Program Duration

The programs will have a varying length depending on the nature and scope of the material used, funding provided, additional funding past the time of the grant, and other factors.

Key Program Components

The key components of the program are (a) joint design and implementation by Lincoln University, University of Missouri Outreach and Extension, business partners, industry, State Department of Education, Labor, Social Services agencies, and others as appropriate; (b) the duration of the program; (c) orientation and recognition sessions, and appropriate teaching and learning methods (externships, mentoring, job shadowing, field trips, etc.).
The key components of the program are (a) design and implementation by Lincoln University, adult professionals and volunteers interested in entrepreneurial programs for youth, business seminars and youth and practical hands-on experience; (b) the duration of the program; (c) skill development seminars, model programs, business exhibits, panel presentations, mentoring programs, and skill development seminars.

Performance Goal(s)

Eight (8) workshops, designed to provide development of Careers and Life Skills were conducted. The participants gained the knowledge and skills needed to promote economic opportunity for economically disadvantaged people in Missouri. Output indicators include the number of people completing the programs and immediate post-course evaluation. Each year, over 18 workshops provide youth the knowledge and skills to learn to be successful entrepreneurs. Youth have opportunities to gain information firsthand about model programs, meet other youth entrepreneurs and representatives of national organizations and agencies. There is pre and post testing evaluation output indicators.

Internal and External Linkages

Programs are conducted in collaboration with the Agriculture and Extension Information Center at Lincoln University, University of Missouri Outreach and Extension, Housing and Urban Development, Department of Elementary & Secondary Education, Linn State Technical College, businesses, labor, and industry. Others will be determined as the programs proceed; these might include the Private Industry Councils of St. Louis City and St. Louis County; Greater St. Louis Treatment Network; North-side Consortium; Missouri Department of Social Services; Ecumenical Housing; and Multimedia Training. Some of these collaborations are pending based on funding of a Welfare-to-Work Competitive Grant applied for related to Comprehensive Employment for TANF Recipients with Addiction (CETRA) Programs. Programs are also conducted in collaboration with the Agriculture and Extension Information Center at Lincoln University, business, labor, industry, and others as appropriate.

COMMUNITY AND ECONOMIC DEVELOPMENT

Program Description

Create innovative approaches to enhance the economic and community environment of stakeholders were implemented. Programs such as the Bootheel Community Development Corporation, Bootheel Construction Training Academy, New Housing for First-Time Homeowners, and community leadership development facilitated the activities of this program.

Target Audience

The target audience for the program is the six county Bootheel communities of Howardville, North Lilbourn, New Madrid, Wilson City, Wyatt, and Hometown.

Program Duration

The program duration is 1999-2005. The Bootheel Community Development Corporation, in cooperation with faculty affiliated with Lincoln University Cooperative Extension Service, will carry out the operations of the Corporation.

Accomplishments/Outcomes

Job training programs were developed and implemented to increase the employability and occupational skills, and job placement of low-income persons. Increased the self-sufficiency of poor and low-income persons by promoting entrepreneurship, home-based businesses and other micro-enterprise creation and expansion. Output indicators show an increase in the employability and occupational skills of participants in low-income families, and the number of participants in the Futures program that obtain and keep jobs

in order to become self-sufficient.

Internal and External Linkages

The Bootheel Community Development Project staff is supported by a ten member interagency task force whose members will provide advisory assistance and will also participate in many of the community organization and training functions. Two members of the task force (USDA Farm Service Agency and Missouri Housing Development Commission) have agreed to fund the construction of fifty new homes costing nearly $3 million. The Bootheel community Development Corporation will contribute matching funds to the project as requested by the U.S. Department of Housing and Urban Development.

The concentrated effort on enhancing economic opportunity for underserved, minority populations will produce the following impact: the number of minority youth finishing high school will be increased by 20 percent, the number of families completing Effective Black Parenting training will increase by 50% by the year 2004, African American families will be better able to take advantage of the available economic opportunities, and a significantly higher percentage of the minority population will possess the skills to be employable.

YOUTH DEVELOMPENT/YOUTH-AT-RISK

Program Description

Youth development is a primary national concern. Due to the absence of quality education and family and community support in many underserved areas of the state, poor life skills are persistent issues. The consequences of such situations are far reaching in their societal impacts. For example, many young people in these underserved communities do not receive the proper training or exposure needed to matriculate effectively in communities outside the ones they are currently in. Many are not even skilled enough to earn a sufficient living wages and take advantage of technology. Many young people in Missouri fall into the category of youth-at-risk and many of them need assistance and support provided by youth development programming. Lincoln University Cooperative Extension conducted programs such as Youth Build, Character Counts, 4-H TLC, Tutoring, Peer Mediation Program and more.

Primary Audience(s)

The individuals targeted in this program are individuals (young people) living the participating underserved communities.

Program Duration

The duration of the program is continuous and will last as long as it is cost effective, making quantifiable impact and adequate funds are available.

Key Program Components

The key components of the program include, and not limited to, the following: (a) continuation of higher educational pursuits (b) increased individual marketability (c) developing better citizenship (d) increased family and community awareness (e) increased youth involvement in positive school and community activities (f) improved people skills (g) leadership and professional development.

Accomplishments/Outcomes

In the Kansas City Urban Impact Center, the Summer in the Village Program participants displayed improved behavior and social skills over the 8-week program period. Prior to participating in the program 90% of the participants demonstrated behavioral problems. The After School Tutoring program in Kansas City reported that 30% of the project's participants increased their performance one grade level in math, and Mini-Society participants demonstrated and increase in self-confidence, self-esteem and improved behavior and social skills. More than 1000 Youth enrolled in Lincoln University Development/Kid's Beat program participated in activities that promote self-esteem, interpersonal relationships, leadership development, conflict resolution and assisted in the acquisition and application of knowledge and resources.

In St. Louis, Statewide peer mediation has a 58-93% success rate and mediation programs report that agreements are reached in mediation sessions approximately 90-95% of the time and the LU programs anticipates the same success rate. Over 500 youth will learn the skills and techniques of peer mediation to resolve conflicts.

Internal and External Collaborations (Linkages)

The internal collaborators include Lincoln University extension and University Outreach and Extension professionals. The external linkages include various community, civic, educational and private entities within the various participating communities.

Resulting Impact

Over 3,000 youth, adults and families state-wide, increased their knowledge and awareness of issues such as the importance of self-esteem, peer mediation, parenting, career development, high-risk behaviors and more.
Lincoln University Cooperative Extension programs strengthened the quality of life for the people of Missouri in low-income areas. The partnerships of state, federal and private foundations provide more resources and funding than ever to the newly formed Bootheel Community Development Corporation for the six (6) counties: Scott,

Stoddard, Mississippi, New Madrid, Dunklin, and Pemiscott.

Federal Funding Source

Smith-Lever

II. Stakeholder Input Process

University Outreach and Extension programming is based on the needs, aspirations and issues identified by the people in communities throughout the state. University Outreach and Extension program priorities are based on substantial stakeholder input. During 1998, a deliberative group process involved 7,012 citizens in 275 sessions in each of Missouri's 114 counties. This process culminated in 1999 and resulted in identification of issues, concerns and educational aspirations of Missourians.

- 10 percent of participants were youth under 18.
- Half were men, half women.
- 10 percent were minorities.
- 40 percent had little or no experience with extension educational programs.

The county outreach and extension council in each county reviewed program status and deliberative group process data. Council members worked with field-based regional extension specialists and drafted a county program plan.

Trend analysis was available to faculty, extension councils and stakeholders using the University Outreach and Extension Office of Social and Economic Data Analysis web site. http://oseda.missouri.edu/. Place-specific county data is continuously updated to be used for community decision making, program planning and monitoring change. See http://www.oseda.missouri.edu/countypage/.

Program plans include performance goals, indicators and expected learner outcomes. Each program identified key components, curricula, partnerships and targeted learners. All who participated in the deliberative group process circulated the draft county program plans for review and comment. All 114 county outreach and extension councils reviewed new input, made revisions and submitted final plans to University Outreach and Extension by June 1, 1999.

Campus faculty members were asked to review the county plans, identify trends within their areas of expertise and suggest new program directions to address the issues identified in the county plans.

During 2000-01, each content-based program area developed a 21st century program and resource plan in alignment with the organizational strategic direction and guided by stakeholder input from 1998-99 and including recent data from program evaluations, focus groups and surveys. Each plan defines priority programs, expected outcomes and indicators. Current content-based program areas include:

- Agriculture, food and natural resources
- Business and industry

- Community development
- Human environmental sciences
- 4-H youth development

Each of the eight University Outreach and Extension regions worked closely with county and regional extension councils to develop a regional program and resource plan that guides programming, staffing and allocation of resources. All of the planning is based on stakeholder input, continuous improvement, and results in organizational alignment for 21st century program development, implementation and evaluation.

In addition, ongoing stakeholder listening continuously occurs through the County Extension Council infrastructure, 4-H councils, advisory groups, partnership program teams, as well as through priority program evaluations, and survey information collected in program content areas. Efforts are made in all stakeholder input approaches to ensure that the stakeholders involved represent the population of the community involved. This includes representation of the total community of learners, ethnicity, geographic representation, family status, income level, age, gender, disability status and users/nonusers of existing educational programs. Continuous listening to learners and stakeholders creates an environment of continuous improvement and leads to the timely development of new programs to address local priorities.

The Missouri Agriculture Research stakeholder input process continues to be the same as reported in the 1999 POW. There are several advisory committees representing all regions of the state and having members from industry, government, academics and producers. Commodity group representatives met throughout the year. Two areas of the state (Delta region and Southwest Missouri) have asked for more help with horticultural programs. To date, a vegetable specialist was added to the faculty in Columbia and a horticultural research specialist was hired at the Southwest Center in Mt. Vernon. Southwest Center has amended its mission to include a sustainable agriculture program.

III. Program Review Process

Missouri made no significant changes in the merit review processes or scientific peer review program since their 5-Year Plan of Work.

IV. Evaluation of the Success of Multi and Joint Activities

This information is listed under each goal in section A.

V. Multistate Extension Activities

See attached Multistate Extension Activities form. Descriptions are in section A.

VI. Integrated Research and Extension Activities

See attached Integrated Research and Extension Activities form. Descriptions are in section A.

U.S. Department of Agriculture
Cooperative State Research, Education, and Extension Service
Supplement to the Annual Report of Accomplishments and Results
Multistate Extension Activities and Integrated Activities
(Attach Brief Summaries)

Institution University of Missouri
State Missouri

Check one: __X__ Multistate Extension Activities
__ __ Integrated Activities (Hatch Act Funds)
__ __ Integrated Activities (Smith-Lever Act Funds)

	Actual Expenditures				
Title of Planned Program/Activity	**FY 2000**	**FY 2001**	**FY 2002**	**FY 2003**	**FY 2004**
Goal 1 (3) Livestock Systems	$12,500	$12,500			
Goal 4 (2) Animal Waste Mgmt	$78,000	$78,000			
Goal 5 (7) Affordable Housing	$9,000	0			
Goal 5 (9) 4-H Youth	$126,000	$126,000			
Goal 5 (12) Leadership Development	$300,000	$300,000			
Goal 3 Nutrition and Health	0	$2,000			
Goal 5 Adolescents at Risk	0	$7,000			
Total	$525,500				

Director **Date**

Form CSREES-REPT (2/00)

Appendix C

U.S. Department of Agriculture
Cooperative State Research, Education, and Extension Service
Supplement to the Annual Report of Accomplishments and Results
Multistate Extension Activities and Integrated Activities
(Attach Brief Summaries)

Institution University of Missouri
State Missouri

Check one: ___ _ Multistate Extension Activities
__ __ Integrated Activities (Hatch Act Funds)
_X__ Integrated Activities (Smith-Lever Act Funds)

	Actual Expenditures				
Title of Planned Program/Activity	**FY 2000**	**FY 2001**	**FY 2002**	**FY 2003**	**FY 2004**
Goal 1 (A) Integrated Cropping Systems	$553,000	$553,000			
Goal 1 (B) Forages and Livestock	$170,000	$170,000			
Goal 3 Improving Human Nutrition and Health	$47,000	$47,000			
Goal 4 (A) Improved Water Quality	$42,000	$42,000			
Goal4 (B) Animal Waste Management	$144,000	$144,000			
Total	$956,000				

Director **Date**

Form CSREES-REPT (2/00