Annual Report of Accomplishments and Results

Kentucky

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University of Kentucky
Kentucky State University

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Cooperative Extension Service (1862)
Agricultural Experiment Station (1862)
Cooperative Extension Program (1890)
Agricultural Research Programs (1890)

Accomplishments and Results for CSREES Goal 1

Goal 1

An agricultural system that is highly competitive in the global economy. Through research and education, empower the agricultural system with knowledge that will improve competitiveness in domestic production, processing, and marketing.

Overview

The Kentucky Cooperative Extension Service made 1,003,435 contacts (including duplications) with clientele related to improving production, processing, and marketing. An additional 216,871 contacts with clientele related to the adoption of resource management technologies. 213,006 contacts related home gardening and landscape. Kentucky State University's Small Farm Program made 14,784 contacts with limited resource farmers. Twenty-eight percent of these contacts were with women.

These efforts resulted in 21,452 farmers adopting one or more production practices recommended by Extension. Adoption of these practices resulted in $18,307,159 of additional profits to farmers. 11,406 producers utilized new marketing opportunities and 38,276 individuals reported changes in knowledge, opinions, skills, or aspirations related to the impact of public policies on agriculture and the environment.

Small Farm diversification and the search for alternative crops remains the central focus of the research conducted at Kentucky State University. Kentucky State University currently supports six research projects focused on this goal, two of which are reported on in the sections which follow. These projects focus on the development of pawpaw as a new commercial crop and the nutrition, culture and field trials of red claw crayfish. Interest in these developments is at an all time high. Participants in Kentucky State University field days and meetings represent an increasingly diverse client base.

The Kentucky Agriculture Experiment Station supported 73 research projects related to this goal.

Expenditures	Federal Extension Funds (UK and KSU)	$2,700,000
	Federal Research Funds (UK and KSU)	$3,485,000
	State Contribution	$17,000,000
FTEs	Extension (UK and KSU)	150
	Research (UK and KSU)	56

Key Theme - Managing Change in Agriculture

All across Kentucky, women are playing a greater role in the operation and management of family farms. Sometimes it's because a spouse has been driven to seek off-the-farm employment to make ends meet. In other cases, women have become the innovators and entrepreneurs who have helped diversify or add value to family farm operations. What was lacking, however, were programs and support networks focused on the unique needs of these women. Three years ago, the Kentucky Cooperative Extension Service entered into a partnership with a core group of women agriculturalists, non-profit organizations, and government agencies to examine what could be done to support women in agriculture. The result was an annual Women in Agriculture conference that has attracted approximately 400 people each year since its inception. Of those in attendance, 9 out of 10 participants said the conference helped put them in touch with other individuals or organizations with whom they had no previous contact. A similar number said they gained knowledge that would make their farm more profitable. The 2001 conference focused on helping county teams gain the process skills necessary to effect infrastructure or policy issues at the local level. Impact of the 2001 conference has yet to be formally assessed. However, women are being appointed to state and local policy and advisory boards in ever-increasing numbers.

Source of Federal Funds: Smith-Lever
Scope of Impact: State-Specific

Key Theme - Niche Market

Consumers have exhibited an increasing demand for a broad array of speciality melons that are not commonly available in supermarkets. If these melons could be grown in Kentucky, they could potentially be marketed through roadside stands and farmers markets. Consequently, a specialty melon variety trial was conducted the past growing season to determine if these melons, which could not be grown before, could be grown in Kentucky using a newly labeled systemic insecticide for cucumber beetle control. Cucumber beetles infect melon plants with bacterial wilt, which kills the plants. Using a drench treatment applied at the base of each plant immediately after transplanting, at least four weeks of protection from cucumber beetle feeding was achieved. When this treatment is followed by a normal insecticide spray schedule, successful melon production is achieved. In addition to determining that these melons could be grown, 20 specialty melons were screened for adaptability to Kentucky. Several extremely high quality varieties were selected for replicated trials in 2002 including Dorado, Honey Brew, Sundew, Honey Gold, St. Nick, and HSR 2528. All of these were extremely sweet and were rated very highly by a taste panel.

Source of Federal Funds: Smith-Lever, Hatch
Scope of Impact: State-Specific

Integrated Research and Extension

Key Theme - Adding Value to New and Old Agricultural Products

The Kentucky Cooperative Extension Service is supporting a pilot effort to explore the potential of marketing beef, pork, and lamb directly to consumers and restaurants. The effort is led by Extension faculty and staff from the Department of Biosystems and Agricultural Engineering and Department of Animal Sciences with support from the Safe Meat Marketing Alternatives through Research and Technology (SMMART) work group. Specific collaborators include Kentucky State University, the Kentucky Department of Agriculture, Partners for Family Farms, USDA, and the Kentucky Department of Public Health. To date, the effort has involved more than 200 Kentucky producers in the development of budgets designed to assess the profitability of such marketing alternatives. Eighty-eight head of livestock have been used in cutting and marketing tests. Results show that direct marketing to restaurants and other local consumers can produce premiums for efficient producers. Spinoffs of the project include a chef's focus group, research on the demand and willingness to pay for local meat products, a web site, and computer software to assist producers in pricing individual cuts of meat.

Source of Federal Funds: Smith-Lever, Hatch
Scope of Impact: State-Specific
Integrated Research and Extension

Key Theme - Animal Production Efficiency

Nutritional studies have shown that altering cattle diets impact digestive enzyme production and nutrient transport systems. With the proper diets, the cattle regulatory processes, digestion and production are optimized resulting in more economical beef production. Supplementing sow diets with chromium has been shown to increase litter size and produce positive results in benefit/cost ratios for producers. In addition, the presence of ovarian follicular cysts in dairy cattle has been discovered to be a attributable to a hormonal factor. The finding of this hormonal factor will prevent or cure these cysts and increase dairy cow production.

Source of Federal Funds: Hatch
Scope of Impact: State-Specific

Key Theme - Emerging Infectious Disease

To maintain competitiveness in the Thoroughbred horse industry in Kentucky, research is aimed at emerging infective diseases and other equine disorders to reduce the annual attrition rate in the equine population and increase its profitability. Much of the success of the equine export trade is based upon favorable disease status of the equine population in Kentucky which enables the industry to take fullest advantage of global markets to retail its unique product, namely, world-class horses.

The recent spread of West Nile Virus has reached Kentucky and 28 other states. Hundreds of horses have been infected with many fatalities. Efforts are under way to monitor this virus in Kentucky and a vaccination program for WNV has began in order to protect the Billion Dollar industry of the commonwealth of Kentucky.

Research is also being conducted to determine the loss of more than 2000 foals last spring and summer which has been termed MRLS or Mare Reproductive Loss Syndrome.

Source of Federal Funds: Hatch
Scope of Impact: State-Specific

Key Theme - Emerging Infectious Disease

The aphid-transmitted potyviruses cause serious losses of many crops important to U.S. and world agriculture. These viruses can be acquired and transmitted by insect vectors in a matter of seconds to minutes, which makes measures based on vector control virtually impossible. Research in the Department of Plant Pathology has shown that aphids cannot transmit potyviruses without the aid of a protein called the “helper component”. Unless the helper component is present, virus acquired in the process of feeding on infected plants passes into the gut of the insect. The helper component functions by allowing virus to be retained in the insect stylet, from which transmission to healthy plants can occur. An understanding of the nature and mode of action of the helper component should facilitate the development of novel strategies for the control of these important pathogens.

Source of Federal Funds: Hatch
Scope of Impact: State-Specific

Key Theme - Plant Production Efficiency

Soybean is one of Kentucky's important export crops that is now being threatened by a new insect pest, the soybean (Asian) aphid which can reduce yields by 25% and can transmit several plant viruses previously unseen in Kentucky. An interdisplinary, multi-state project has been established involving Entomology, Agricultural Economics, and Plant Pathology to develop a single integrated plan that will protect this vital Kentucky crop.

Source of Federal Funds: Hatch
Scope of Impact: Multi-State

Key Theme - Plant Production Efficiency

Kentucky currently produces 1,100 acres of fresh market tomatoes with a cash value of $12.3 million dollars. Applied research on a recently labeled tomato disease control product, Actigard, revealed that early fruit yield may be reduced with some tomato cultivars. Such a reduction in early yield when prices are high could significantly reduce grower returns. As a result of this research, a warning statement will be placed on the product label.

Source of Federal Funds: Hatch
Scope of Impact: State-Specific

Key Theme - Plant Production Efficiency

Management of water and air in a growing medium is critical to optimum, successful production of plants in containers. Ideally plants should be supplied with adequate water, so the plant is not stressed and at the same time an adequate oxygen supply for root respiration. A Controlled Water Table (CWT) irrigation system developed at the University of Kentucky is capable of maintaining a nearly constant, optimum water/air relationship in a container growing medium. Prototypes of the CWT system were used to irrigate a wide range of floriculture crops grown in greenhouses. Additional benefits include, no runoff, automatic - the plants irrigated themselves-, relatively inexpensive and low disease transfer compared to other bottom irrigation systems and no water on leaves.

Source of Federal Funds: Hatch
Scope of Impact: State-Specific

Key Theme - Niche Market

A number of research projects related to the profitability of niche market products hold promising results for Kentucky producers. Field research has shown that new blueberry cultivars increased yield by 23% and income by $1,100/acre over previously recommended cultivars. *Abgelonia angustifolia* cultivars produced higher flower yields, longer stem length, and longer vase life than earlier cultivars. Such improvements can translate into probable returns of $6.00 to $8.00 per square foot under summer green house conditions. Cultivars of speciality melons, peppers, pumpkins and annual and perennial flowering crops with high market demand were identified for Kentucky growing conditions. A computer-controlled misting system for poinsettia cuttings less overall water usage and improved rooting of cuttings.

Source of Federal Funds: Hatch
Scope of Impact: State-Specific

Key Theme - Biotechnology

Basic research has identified and patented new molecular targets with the potential for the development of an entirely new class of broad-spectrum herbicides with very low human and environmental toxicity.

Source of Federal Funds: Hatch
Scope of Impact: State-Specific

Key Theme - Plant Genomics

Research on genetic instability and host and cultivar specificity in the rice blast fungus *Mangnaporthe grisea*s is being investigated. The current focus of collaborate research is towards the Genomics and functional Genomics of *M. grisea* . Studies seek to identify and knock-out as many genes in this fungus as possible. In addition, a large number of transcriptional profiling experiments are being conducted to understand gene expression in both the pathogen and the host during infection.

Source of Federal Funds: Hatch
Scope of Impact: State-Specific

Key Theme - Grazing

Over half of all arable land in Kentucky is utilized for forage. This represents over 7

million acres. The adoption of baled silage, the usage of improved varieties of forage for hay and grazing and the use of better grazing techniques has improved forage usage. Improved alfalfa varieties have been shown to add one ton of hay yield per acre per year of stand life. This increase income by $700 to $1400 per acre. There has been increased usage of new varieties of red clover that are more persistent and higher yielding while being less expensive. As new hay varieties are increasing so is the adoption of baled silage technology as well as better storage of round bales using plastic wrap to maintain the nutritional value of the hay and to prevent waste of hay in storage. Hands-on grazing schools continue to reach large numbers of farmers in 2001. These schools emphasizes the art and science of pasture management, livestock nutrition, and the physical setup of systems.

Source of Federal Funds: Hatch, Smith-Lever
Scope of Impact: State-Specific
Integrated Research and Extension

Key Theme - Adding Value to New and Old Agricultural Products

The production of high-CLA (conjugated linoleic acid) milk has the potential to boost profits for Kentucky milk producers. CLA is a fatty acid shown to reduce cancer growth in animals. Producers can elevate CLA levels in milk with simple feeding regimen changes. Consumers Taste tests on high-CLA milk, butter, yogurt, and cheese, willingness-to-pay surveys, feasibility analysis, and test marketing of high-CLS cheese produced promising results that helped motivate a proposed private -sector commercial venture in Kentucky. This will place Kentucky as a leader in nutraceutical dairy production. High-CLA milk powder will also find a global market as a useful food ingredient, expanding its commercial prospects well beyond dairy products.

Source of Federal Funds: Hatch
Scope of Impact: State-Specific

Key Theme - Diversified/Alternative Agriculture

Apple is the most economically important tree fruit in Kentucky. As growers in the state look to diversify their farm products, apple production in the state could increase in the coming

years. Variable yields and quality from year to year can have adverse impacts on economic returns to growers. Achieving uniformly high production and quality is essential for long-term economic viability. While yield and quality attributes for apple have been defined, a clear understanding of the physiology underpinning these is incomplete at best. Virtually all aspects of fruit development and quality are dependent on carbohydrate import with sorbitol as the major sugar exported from leaves. Sorbitol dehydrogenase converts sorbitol to fructose and is the key enzyme responsible for the accumulation of sugars by the fruit. Determining how this enzyme is affected and its activity influenced in different genotypes and in response to common horticultural practices such as fruit thinning could lead to ways to modify practices to optimize activity and achieve consistently high yield and quality. With the molecular tools we have developed in the last year, transcriptional, translational and post-translational control of sorbitol dehydrogenase levels and activity can be determined in a wide variety of situations and experimental conditions.

Source of Federal Funds: Hatch
Scope of Impact: State-Specific

Key Theme - Agricultural Profitability

The Kentucky Beef Integrated Resource Management (IRM) program focuses on increasing the profitability of beef operations by providing producers with the knowledge and skills necessary to make sound production, management, and marketing decisions. Because county Extension agents are key players in helping producers acquire such knowledge and skills, the first phase of the program focused on building the capacity of county Extension agents to support the educational needs of beef producers. During this first phase, specialists developed and distributed a comprehensive beef manual and management calenader distributed to local Extension. In addition, eighty Extension agents have participated in a graduate level course on advanced beef production. The second phase of the program involves delivery of educational programming directly to producers. Learning experiences designed specifically for producers include “cow colleges”, a master cattleman program, study tours, breeding schools, financial analyses, grazing schools, and a multistate interactive satellite conference.

Source of Federal Funds: Smith-Lever
Scope of Impact: State-Specific

Key Theme - Diversified/Alternative Agriculture

The pawpaw [*Asimina triloba* (L.) Dunal] holds great promise as a new, alternative high-value tree fruit crop. It is the largest edible fruit native to the southeastern United States, reaching up to 600 g in size, and has a tropical flavor. The primary impediment to introduction of pawpaw

into both fresh and processing markets is its perishability. Within 3 to 5 days after harvest it is too soft to ship or market. Little is known about pawpaw fruit ripening and its response to standard fruit storage techniques. Our preliminary work has suggested that fruit ripening is probably regulated by naturally-produced ethylene similar to apple, tomato, and banana.. Due to the nearly non-existent data about pawpaw ripening and pos-tharvest storability, it is critical to study fruit response to conventional harvest and refrigerated storage practices in order to develop appropriate handling, transport, and storage recommendations for maintaining fruit quality for both the fresh and processing markets. We are collaborating with scientists at Kentucky State University to characterize pawpaw fruit ripening under diverse post-harvest storage conditions. The objectives of the project include determining how storage temperature and duration affect post-storage ripening and fruit quality, and determining if plant growth regulator treatments commonly used in tree fruit production to delay or hasten ripening influence storage life and acquisition of quality traits during ripening. The information obtained in this study will provide critical information to the emerging pawpaw industry so that it can market pawpaw as a high quality commodity.

Source of Federal Funds: Hatch
Scope of Impact: State-Specific

Key Themes - Diversified/Alternative Agriculture; Plant Germplasm

Kentucky State University serves as the USDA National Clonal Germplasm Repository for *Asimina* species. Using several DNA marker techniques we evaluated genetic diversity in pawpaw, with the goal of improving the diversity contained in our repository collection. Unique pawpaw genotypes will be incorporated into the KSU pawpaw breeding effort for variety improvement. A reliable and reproducible PCR-DNA fingerprinting system was developed to identify cultivars and determine genetic relationships among these genotypes. The authenticity of clonal propagated superior varieties sold by nurseries can now be verified to ensure expected varietal production to growers.

Source of Federal Funds: Evans-Allen and 1890 Capacity Building
Scope of Impact: Multi-State Research and Extension, Multi-Institutional (1890 and 1862 in Kentucky)

Key Theme - Aquaculture

The Australian red claw crayfish (*Cherax quadricarinatus*) is a very popular tropical crustacean species with consumers in Japan and Europe because of its large size (up to 700 g) and its resemblance to the American lobster. While the growing season in the United States is

shorter than in tropical countries, red claw can still be grown in the U.S. to supply domestic and international markets. Diet costs comprise 30-70% of the operating expenses of an aquacultural enterprise. Little research on the nutrient requirements and practical diet formulations exit on red claw. If red claw are to be grown profitably in the U.S., nutrient requirements of the species need to be elucidated and economical and nutritious diets need to be developed.

Source of Federal Funds: Evans-Allen and 1890 Capacity Building
Scope of Impact: Multi-State Research and Extension

Key Theme - Agricultural Profitability

Given the impact of feed cost on total livestock production expense, the determination of a feed ration warrants careful consideration by livestock producers. Historically, feed rations have ignored risk and sometimes feed prices as well. An expanded economic model which allows decision makers to select rations based on nutrient variability and feed price risk shows that minimum cost rations are not best for all producers. Managing either nutrient uncertainty or feed price risk comes at the expense of increasing the ration cost but can help stabilize profits. In general, producers wishing to control only the variability of nutrients in the ration should increase the amounts of the optimal feed ingredients. Controlling price risk requires substituting among feedstuffs in all cases, even if coupled with managing for nutrient variability.

Source of Federal Funds: Hatch
Scope of Impact: State-Specific

Key Theme - Precision Agriculture

The least cost way to adopt precision agriculture might be custom hire or ownership of precision agriculture equipment. A break-even acreage decision aid has been finalized as a simple tool usable by producers. Although farms with more land area under production have the advantage of spreading the fixed costs of equipment ownership over more acreage, custom hire of precision

agriculture services can be a cost effective alternative for producers with less acreage. The least cost alternative depends on the underlying equipment prices, rates of performance and custom hire rates as well as the specific precision agriculture operations being considered. However, a Kentucky producer field mapping, soil sampling and applying a single dry fertilizer under variable rate would have a break-even acreage of about 1065 acres. Farmers with less acreage than this would more cost effectively custom hire these operations whereas farmers with more land would be better off owning equipment**.**

Source of Federal Funds: Hatch, Smith Lever
Scope of Impact: State-Specific

Accomplishments and Results for CSREES Goal 2

Goal 2

A safe, secure, food & fiber system. To ensure an adequate food and fiber supply and

food safety through improved science based detection, surveillance, prevention and education.

Overview

Despite the fact that America's food supply is the safest in the world, foodborne illness remains the greatest of all food safety threats. The annual cost of foodborne illness to our economy is estimated at over $10 billion. Consumers continue to display misconceptions about food safety. In a 1998 survey, only 55 percent of consumers perceived unsanitary handling, processing, or preparation of foods as a threat. Yet, the Centers for Disease Control and Prevention reports that 97 percent of foodborne illness could be prevented with good personal hygiene and improved food handling techniques.

During the past year, the Kentucky Cooperative Extension Service made 61,475 contacts related to food safety, preservation and preparation. In addition, 53,533 individuals indicated that they gained knowledge related to safe storage, handling, and preparation. Of these, 27,097 (or 51%) put what they learned into practice. In addition, 27,194 people adopted practices to increase access to food or make it more affordable.

The Kentucky Agricultural Experiment Station supported 27 research projects related to this goal.

Expenditures	Federal Extension Funds (UK and KSU)	$700,000
	Federal Research Funds (UK and KSU)	$922,500
	State Contribution	$3,200,000
FTEs	Extension (UK and KSU)	37
	Research (UK and KSU)	11

Key Theme - Food Quality

Kentucky grain farmers produced approximately 240 million bushels of corn, wheat and soybeans in 2001. Most of which is stored in on-farm facilities for a period of one to six months. Although the current worldwide glut of coarse grains and oilseeds has kept prices for these commodities fairly low, the combined value of these crops is roughly $619 million at today's

prices. Prudent management of these products is required to protect product quality during storage. Otherwise, elevator discounts can result in hundreds of thousands of dollars of lost profits for producers. Scientists from four academic departments (Entomology, Biosystems and Agricultural Engineering, Plant Pathology, and Agricultural Economics) have collaborated with collegaues at Purdue University and the University of Tennessee to conduct educational meetings that emphasize a holistic, integrated approach to protect stored grain from mold and insect pests. This team also provides leadership to a demonstration project where quality of corn stored with recommended IPM strategies is compered to that of corn stored using practices similart to those used by a majority of the farmers in Kentucky and Tennessee. Updated grain storage management tips were included in the new UKCA Corn Production Handbook.

Source of Federal Funds:	Smith-Lever
	Hatch
Scope of Impact:	Multi-State
	Integrated Research and Extension

Key Theme - Food Safety

An important global issue is the management of environmental impacts associated with the feeding of genetically modified corps to food producing animals. Recent studies have shown that soybean meal from herbicide tolerant soybeans (Roundup Ready) is essentially equivalent in composition and nutritional value to conventional soybean meal. Furthermore, the genetically altered DNA and specific protein that makes the soybeans tolerant to herbicides are not transferred to pork after meal of modified soybeans is injested by pigs. Other studies have shown that pigs and chickens fed diets containing low-phytate corn and low-phytate soybean meal excrete about half as much phosphorous into environment. Environmentally friendly diets containing such genetically enhanced crops are being demonstrated to be completely safe for animal, and for human consuming meat milk, and eggs from these animals.

Source of Federal Funds:	Hatch
Scope of Impact:	State-Specific

Key Theme - Food Safety

The United States food supply is among the safest in the world. But it is estimated that unsafe food and handling causes over 76 million cases of gastrointestinal illness each year, with approximately 5,000 deaths. Food safety education and training for consumers, youth, seniors, limited resource audiences, and hard-to-reach audiences continue to take a priority in Kentucky.

Over 50,000 individuals participated in food safety programs presented by Cooperative Extension Agents, including such programs as Safe Food to Go, Kids in the Kitchen, EFNEP, FSNEP, and other food preparation activities. Approximately 60% of participants reported implementing safe practices during the handling, preparation and storage of food. According to cost/benefit research, training in the food safety arena can lead to savings of $1,000 per person in foodborne illness related costs. Food handling education is an effective means of reducing the occurrence of foodborne illness.

Source of Federal Funds: Smith-Lever
Scope of Impact: State-Specific

Key Theme - HACCP

Food safety training for commercial audiences continues to address the risk of foodborne illness in Kentucky. With the implementation of HACCP for processing plants, Cooperative Extension has tried to meet the needs of small business owners. More than 200 people participated in Extension-sponsored workshops on developing and writing HACCP plans. These training sessions will allow Kentucky plants to follow regulatory guidelines which ensure the safety of Kentucky processed food.

Source of Federal Funds: Smith-Lever
Scope of Impact: State-Specific

Key Theme - Food Safety

The feed regulatory program routinely inspects feed manufacturing facilities to assure compliance with Good Manufacturing Practice Regulations for Medicated Feed. These regulations require the feed manufacturer to employ proper procedures in the production and distribution of medicated feed to assure the feed is safe and effective for the consuming animal. Manufacturers may mix only FDA approved drug uses that are scientifically proven to be safe to the consumer of milk, meat and eggs. The Kentucky program is part of a nationwide effort by state and federal agencies to assure the safety of human food. Maintaining consumer confidence in the safety of livestock products is essential for a vital livestock industry in Kentucky.

Source of Federal Funds: State
Scope of Impact: Multi-State

Key Theme - Food Safety

Research shows that individuals who eat low-fat, high fiber diets that are rich in fruits and vegetables have a reduced risk for many chronic diseases. Yet in rural Kentucky, there is likely to be a significant gap between earnings and the cost of living, making fresh or frozen

fruits and vegetables from the grocery an impracticable food option. Preserving homegrown fruits and vegetables may allow limited resource audiences to improve the nutritional quality of their diet, while also becoming more financially self-sufficient. Other audiences enjoy preserving their own produce for personal satisfaction and that homegrown taste. Using a research-based food preservation curriculum coupled with hands-on experience, participants gained the necessary skills to maximize resources and feed their families better and safely. County Extension Agents offered these learning experiences across the state. In addition, consumers are kept up-to-date with the latest in food preservation techniques through publications, newsletters, print and radio media, exhibits, and by having agents answer their questions. The annual Food Preservation Workshop presented by Extension Nutrition Specialists allows agents to remain current on research-based food preservation information.

Source of Federal Funds: Smith-Lever
Scope of Impact: State-Specific

Key Theme - Foodborne Pathogen Protection

Understanding the genetic basis of the ability of pathogenic microbes to switch during their life cycles from a non-damaging mode of parasitic growth on plants to a damaging one, could help address the fundamental question of why some microorganisms induce expression of disease, allowing for the development of novel management strategies and so helping to ensure a safe and secure food and fiber system. An example of a pathogen that switches from a non-destructive to a destructive state is the experimentally-tractable fungus *Colletotrichum graminicola*, which causes a disease of corn called anthracnose. This fungus exhibits a bimodal disease cycle. Initially it causes only minimal damage, as it invades its host's cells one by one. For reasons that remain enigmatic, about 48 hours after infection the pathogen switches to a highly destructive necrotrophic mode, in which it produces multitudes of invasive hyphae and kills large numbers of host cells, including cells that have not yet been invaded.

Source of Federal Funds: Hatch
Scope of Impact: State-Specific

Accomplishments and Results for CSREES Goal 3

Goal 3

A healthy, well-nourished population. Through research and education on nutrition and development of more nutritious foods, enable people to make health promoting choices.

Overview

During the past year, the Kentucky Cooperative Extension Service made 164,120 contacts related to promoting healthy lifestyle practices. An additional 92,296 contacts related to helping Kentuckians know and understand the Food Guide Pyramid. Agents and specialists made 81,588 contacts related to injury reduction and 11,993 contacts related to the development of comprehensive health management systems. Extension collaborated with other organizations and agencies to co-sponsored 1,381 different events or activities which focused on comprehensive health maintenance.

These efforts resulted in 31,115 citizens making behavioral changes designed to achieve a minimally balanced diet. An additional 27,194 individuals implemented personal health protection practices appropriate for their life cycle stage (preventive health practices, participation in screening and detection opportunities, immunizations, etc.) and 27,455 people adopted at lease one new safety practice (bicycle helmets, fire extinguishers, tractor roll bars, radon testing, smoke detectors, proper ATV operation, etc.)

Human nutrition and health is a focus area of research and extension at Kentucky State University. Diet modification and the use of functional foods to improve human health is a long range goal. Kentucky State University currently supports three research projects related to human nutrition and health. The project featured in this report focuses on the positive effects of soy products on calcium metabolism and the skeleton.

The Kentucky Agricultural Experiment Station supported 5 research projects related to this goal.

Expenditures	Federal Extension Funds (UK and KSU)	$1,600,000
	Federal Research Funds (UK and KSU)	$717,500
	State Contribution	$8,000,000
FTEs	Extension (UK and KSU)	90
	Research (UK and KSU)	8

Key Theme - Human Health

Approximately sixty percent of Kentucky adults are overweight and participate in no leisure time physical activity. Up to 33% of Kentucky children may be overweight and at increased risk of type 2 diabetes. From 1994 to 2000, the prevalence of diabetes in Kentucky increased 33 percent. In response to these alarming statistics, the Kentuuck Cooperativbe Extension launced an all out campaign focusing on diavetes prevention and control. In May 2001, the Kentucky Cooperative Extension Service released a new component of its ***Wildcat Way to Wellness*** program focusing exclusively on diabetes. (Since the 1999, more than 35,000 Kentuckians have used the program materials.) County Extension Agents and public health educators from 93 Kentucky counties attended the training at which the new diabetes component was released. Agents and educators who participated in the in-service also helped conduct a survey of 400 Kentucky schools to assess the nutrition and activity environment offered to students. This survey data will provide valuable input for design of future programs. In October 2001, the Kentucky Cooperative Extension Service co-produced an educational television broadcast on the Kentucky Educational Television Network focusing on diabetes prevention and control. The live call-in program received 281 phone calls from 5 states.

Source of Federal Funds: Smith-Lever
Scope of Impact: State-Specific

Key Theme - Human Health

Kentuckians are experiencing a high incidence of nutrition-related health problems, e.g., cardiovascular disease or atherosclerosis, which may be due to over-consumption of fat and lack of protective nutrients such as antioxidants and micro nutrients. To address these issues, we focus on “endothelial cell nutrition” as a key variable in the etiology of diseases such as atherosclerosis, with emphasis in the role of nutrients on biochemical and molecular mechanisms of vascular endothelial cell function, injury and protection. In addition, we also are studying mechanisms of nutrient interactions with the cytotoxic effects of specific environmental contaminants in relation to endothelial cell activation and the pathology of atherosclerosis.

Source of Federal Funds: Hatch
Scope of Impact: State-Specific

Key Theme - Human Health

To better understand the mechanisms underlying pathogenic variability, plant pathology personnel have been investigating the genetic and molecular bases of frequent chromosomal deletions that occur during *Magnaporthe grisea* meiosis. These studies have led to some novel, and potentially very significant, findings. The deletions occur only when the homologous chromosomes are heteroallelic for the unstable region. This type of behavior is unprecedented and indicates that a new meiotic mechanism may be involved. This research has implications far beyond the fungal model in which it has been studied to date, for the findings may provide benefits to human health through improved understanding of chromosome structure and maintenance.

Source of Federal Funds: Hatch
Scope of Impact: State-Specific

Key Theme - Food Accessability and Affordability

The Food Stamp Nutrition Education Plan (FSNEP) was implemented in 1997 to educate food stamp recipients and eligibles on food budgeting, food handling, food preparation, and wise grocery shopping. The program is conducted in partnership with the USDA Food and Nutrition Service and the Kentucky Cabinet for Families and Children. Family and Consumer Science agents who choose to participate in FSNEP sign an annual time commitment contract. In return for this commitment, agents receive two "waves" of educational materials including a food demonstration kit, targeted lesson materials, social marketing tools, and support materials. Since its inception, 114 of Kentucky's 120 counties have participated in this program. Extension agents from these counties have collaborated with schools, workforce training programs, social service offices, senior citizen centers, community action agencies, housing authorities, and family resource centers to gain access to the program's intended audiences. From October 2000 through September 2001, the Extension FCS agents made more than 47,000 face-to-face contacts related to the Kentucky Gets FoodWise program. Over 13,000 participants attended sessions that were evaluated. These evaluations revealed that on the average each participant learned two new behaviors. When measuring nutrition, food safety, or food economics outcomes for these participants, 84% gained knowledge, 54% aspired to change one or more behaviors, and 20% of those participating in on-going groups adopted new behaviors.

Source of Federal Funds: Smith-Lever
Food and Nutrition Service
Scope of Impact: Multi-State

Key Theme -Human Nutrition

Osteoporosis is one of the major nutrition-related health problems in the United States and other developed countries. It occurs mostly in postmenopausal women, currently afflicting 15-20 million Americans, causing each year an estimated 1.3 million fractures of the vertebrae, hips, forearms, and other bones in people 45 years of age and older. Direct financial expenditures for treatment of osteoporotic fractures cost this country nearly $14 billion each year. The effects of soy protein concentrates, soy protein isolates, and soy extracts on bone in mature animal models on osteoporosis was examined. The soy products did not prevent bone loss caused by estrogen deficiency, which occurs in postmenopausal women.

Source of Federal Funds: Evans-Allen and 1890 Capacity Building
Scope of Impact: Multi-State Research and Extension

Accomplishments and Results for CSREES Goal 4

Goal 4

Greater harmony between agriculture and the environment. Enhance the quality of the environment through better understanding of and building on agriculture's and forestry's links with soil, water, air, and biotic resources.

Overview

During the past year, the Kentucky Cooperative Extension Service made 179,381 contacts related to promoting the effective stewardship of natural resources. An additional 33,196 contacts related to the maintenance of a safe, accessible, and economically affordable water supply. 29,052 contacts related to the management of waste through reduction, reuse, or recycling and 27,110 contacts related to the management of forests and woodlands.

As a result of these efforts, 28,793 individuals adopted practices that ensure safe water, 3,610 individuals began using new forest management practices. 40,035 individuals adopted one or more practices related to conserving, sustaining, or protecting soil resources. Conservation tillage practices were used on additional 635,117 acres of land.

Kentucky's karst topography and sloping land are key factors which contribute to the threat that pesticides pose to water quality. Consequently, research activity at Kentucky State University focuses on small farm water quality and the use of sustainable cropping practices remains an active goal area at Kentucky State University. The KSU reserach project featured in this report focuses on reducing runoff of insecticide residues.

The Kentucky Agricultural Experiment Station supported 29 research projects related to this goal.

Expenditures	Federal Extension Funds (UK and KSU)	$900,000
	Federal Research Funds (UK and KSU)	$1,640,000
	State Contribution	$3,400,000
FTEs	Extension (UK and KSU)	47
	Research (UK and KSU)	32

Key Theme - Air Quality

The anaerobic nature of manure stabilization can cause offensive odors and release of hydrogen sulfide and ammonia along with other gases during storage, agitation and subsequent land application of manure. Several states, including Kentucky, have very strict regulations related to the emission of gasses and odor from livestock operations, with special emphasis on swine units. As a result, many pork producers are considering the implementation of odor control technologies in order to comply with these regulations. Faculty at the University of Kentucky and University of Minnesota have evaluated the use of a non-woven geotextile cover to minimize odor and gas emissions from manure storage basins for two consecutive years in commercial operations in southwestern Minnesota. Results have shown that the geotextile covers are able to reduce odor and specific gas emissions to the atmosphere, but its performance seems to deteriorate with time. In addition, issues related to management and operation of the cover need to be resolved before farmers feel comfortable using the cover. The National Pork Board has actively participated in this project and was responsible for its funding.

Source of Federal Funds:	Smith-Lever
	Hatch
Scope of Impact:	Multi-State
	Integrated Research and Extension

Key Theme - Weather and Climate

Vegetation, especially trees, helps reduce carbon dioxide levels in the atmosphere. Excess levels of carbon dioxide have been linked to the thinning of the ozone layer and are associated with producing the greenhouse effect on the Earth's weather and temperature. University of Kentucky Forestry Department researchers have begun a three-year study to develop improved methods of planting trees on strip-mined land (over 250,000 acres of land have been impacted by surface mining and another 1.6 million acres have been designated for coal extraction). The project will reclaim 3,000 acres in three areas of the state and measure the ability of those newly planted trees to remove carbon dioxide from the atmosphere. The project is funded by grants from the U.S. Department of Energy and the U.S. Forest Service. Mining companies provide land, labor, and equipment to plant trees. The Department of Mining Engineering and Department of Biosystems and Agricultural Engineering are also involved as partners in this project.

Source of Federal Funds:	Smith-Lever
	Hatch, Department of Energy, Forest Service
Scope of Impact:	Integrated Research and Extension

Key Theme - Nutrient Management

The Kentucky Nutrient Management Training Course was developed to fulfill NRCS and EPA requirements for nutrient management plans. The goal of the training course is to improve the way nutrients are managed statewide by training the professionals who routinely work one-on-one with producers. The training course was delivered as partnership between the Kentucky Cooperative Extension Service, USDA-NRCS, Kentucky Division of Conservation, Kentucky Division of Water, Kentucky Department of Agriculture, and commodity group representatives. A total of 387 resource professionals have participated. Participants have included certified crop advisors, staff from NRCS, Cooperative Extension, and the Kentucky Division of Conservation, and representatives from several public and private laboratories. As a result of this training, professionals are better qualified to help producers increase profitability while improving water quaility. Moreover, the course supports the implementation of key best management practices mandated by the Kentucky Water Quality Act.

Source of Federal Funds: Smith-Lever, NRCS
Scope of Impact: State Specific

Key Theme - Forest Resource Management

The Kentucky Master Logger Program is a mandatory 3-day comprehensive continuing education program for Kentucky timber harvester. The program teaches loggers to use best management practices (BMPs) to bring hardwood timber out of the forest with minimal environmental impact. Loggers also learn about safety in the forest and how to stay in compliance with federal and state laws. The program is a cooperative partnership between the Kentucky Cooperative Extension Service, Kentucky Division of Forestry, and the Kentucky Forest Industries Association and is sponsored by industry support and the Kentucky Division of Water's 319 program. To date, the Kentucky Master Logger program has trained and graduated 4,539 individuals, of which 3,442 are loggers. Kentucky logging firms currently have an average of 2.2 Master Loggers employed. These firms harvest 1.04 billion board feet of timber on a total of 347,676 acres of woodlands, 90% of which is owned by nonindustrial private owners. The value of the timber harvested by Kentucky Master Loggers on nonindustrial private forestland is over $130,000,000 dollars and over 300,000,000 dollars of delivered logs.

Source of Federal Funds: Smith-Lever
Scope of Impact: Multi-State Extension

Key Theme - Air Quality

Eleven public service announcements were written, taped and distributed throughout the Kentucky Radio Network in observance of National Indoor Air Quality Month. Each PSA was aired to over 175,000 listeners on radon, lead, carbon monoxide, biologicals, and air testing. In addition an agent in-service training session on asthma and allergy issues, covered such topics as importance of asthma and allergy control (targeted at school-age children), moisture and mold issues, a Tools For Schools program update, and carbon monoxide dangers. Indoor Air exhibits have been on display at meetings of various professional groups, including the Kentucky Public Health Association and the Kentucky School Nurses Association. These exhibits include information on identification, measurement, detection, and the physiological effects of pollution.

Source of Federal Funds: Smith-Lever
Scope of Impact: State-Specific

Key Themes - Water Quality; Pesticide Application

Soil erosion and pesticides in runoff are recognized as one of the most serious problems facing agriculture today. The potential of using soil amendments to improve soil quality, detoxify contaminants, and reduce erosion is the focus of the project. Potato yield was lowest in no-mulch and tall fescue and highest in compost treatments. Insecticide residues in soil were higher in compost treatments which indicates that the organic fraction of the soil treated with yard-waste compost is primarily responsible for pesticide adsorption rather than the clay. This means that a substantial amount of pesticide is being trapped by the organic fraction in compost along the hill slope that would otherwise have been transported down hill.

Source of Federal Funds: Evans-Allen and 1890 Capacity Building
Scope of Impact: Multi-State Research

Key Theme - Water Quality

Certain pesticides are approved for use in organic agriculture. Natural pyrethrin, those that have been extracted from plants, can be used for organic production. However, little is know about the fate of these pesticides in the environment. Research conducted during the past year has demonstrated that pyrethrin can be bound by the humus or organic matter in soil. When bound by humus, the mobility of pyrethrin in water is reduced. Consequently, the likelihood that pyrethrin will migrate from the field where it is applied, to ground water or to surface water, will be reduced in the presence of greater quantities of humus. This project represents a collaboration between Kentucky State University and the University of Kentucky.

Source of Federal Funds: Hatch
Scope of Impact: State-Specific, Multi-Institutional

Key Theme - Soil Erosion

Findings from an Evans-Allen research project is evaluating and developing different uses of conservation tillage, living mulch, and legume cover crops to in vegetable production to reduce both soil erosion and the use of commercial inorganic nitrogen fertilizers. Research of the Kentucky State University Land-Grant Program has demonstrated that sweet corn, bell peppers, and watermelon can be grown successfully without chemical nitrogen fertilizers if they follow a hairy vetch legume winter cover crop. These vegetables can also be grown using no-tillage if weeds are controlled adequately. By producing vegetables using hairy vetch winter cover crops, farmers can grow vegetables as a supplement to tobacco while eliminating nitrogen fertilizer costs of about $30 per acre. Organic growers may save near $100 per acre since costs of commercial organic fertilizers are higher. Forty-six percent of the cultivated crop land in Kentucky is classified highly erodible, and the soil loss rate in Kentucky is three times the tolerable level. Because no-tillage can reduce soil erosion by about 90% on highly erodible lands compared to tillage, adaptation of no-tillage by farmers could reduce erosion to within tolerable limits. Results have been demonstrated to farmers at monthly meetings at the Kentucky State University research farm and at an on-farm research site.

Source of Federal Funds: Evans-Allen
Scope of Impact: State-Specific, Multi-Institutional

Key Theme - Agricultural Waste Management

Knowledge of the benefits and costs of policies affecting the utilization of public and private land is useful to state and federal regulators who are considering setback legislation as a means to protect surrounding properties from animal waste odors. Small and medium sized Kentucky dairies benefit from federal and state investments in BMP cost share programs. The programs result in substantial reductions in production cost and installation of manure management BMPs are beneficial to environmental quality.

Source of Federal Funds: Hatch
Scope of Impact: State-Specific

Key Theme - Air Quality

A multi-state, multi-disciplinary and multi-component project on “Reducing Ammonia Emissions form Poultry Houses by Enhancing Manure and Diet Management” is being studied to determine building ammonia emission factors for broiler and layer chicken facilities in the U.S., and requires measurement of building air flows and exhaust stream NH3 concentrations over a range of environmental, managerial, and housing regimes.

Source of Federal Funds: Hatch
Scope of Impact: Multi-State

Key Theme - Integrated Pest Management

The Qol fungicides are a new group of fungicides derived from natural compounds produced by wood-rotting fungi and are considered reduced-risk pesticides because of their favorable environmental and health safety profiles. They are active against a wide range of diseases and are used rather widely on many crops already. Kentucky researcher were involved in discovering and reporting on three cases of Qol resistance in a pathogen that attacks perennial ryegrass. One case was in Kentucky and two were in Illinois, during the 2000 growing season. These, along with a case of resistance in a cucurbit disease in the Southeast, were the first cases of Qol resistance to any pathogen in North America. While this was anticipated some day, it was not expected to occur so quickly. The observations indicate that continuing studies will be needed to ensure harmony between management strategies important to agriculture and the environment.

Source of Federal Funds: Hatch
Scope of Impact: State-Specific

Key Theme - Integrated Pest Management

Kentucky is also conducting research to understand how plant viruses infect and cause disease in plants. To achieve this goal, basic research that addresses fundamental questions in plant virology has been pursued. This research involves the use of model plant viruses (Tombusviruses) that are easy to manipulate and will allow solution of novel problems for the first time. Both *in vivo* and *in vitro* approaches to study replication of Tombusviruses have been developed. In addition to replication, virus recombination, a process that occurs frequently and can generate new resistance- breaking virus strains, has also been investigated. Preventing viral recombination to occur would allow the development of long-term resistance against viruses. Due to the powerful model system available, this research is expected to influence both basic and applied research on plant, animal and human viruses. Therefore, not only may economic advantage arise from reduced crop damage caused by plant viruses, but the quality of life for animals and humans may also be enhanced.

Source of Federal Funds: Hatch
Scope of Impact: State-Specific

Key Theme - Integrated Pest Management

Seventy arborists /tree care professionals were trained in Integrated Pest Management / Plant Health Care management practices. Such practices have reduced detrimental impact of unnecessary pesticides and cultural practices where perceived problems do not merit control. Thirty arborists were trained in Tree Risk Assessment and potential for failure and mitigation of these hazards. To date, 127 Kentucky arborists have been internationally certified.

Source of Federal Funds: Hatch, Smith-Lever
Scope of Impact: State Specific

Key Theme - Pesticide Application

Historically, termite control has relied upon the application of large amounts of pesticide around, under, and within the walls of houses. This requires companies to drill through clients' floors, pull back carpeting, move furniture, and often drill foundations and finished walls. Field experiments conducted during the past 2-1/2 years at twelve severely infested sites in Kentucky have shown that excellent termite protection can be afforded by applying new insecticides only around the exterior foundations of buildings. Results have been shared with the pest control industry in Kentucky and nationwide, and with state and federal regulatory officials in support of modifying current application requirements. Benefits to consumers include less disruption of household items, negligible drilling of floors, and reduced risk of indoor exposure to pesticides. The findings will have a significant impact on the way termites are managed in the future.

Source of Federal Funds: Hatch
Scope of Impact: State-Specific

Key Theme - Biological Control

Many species of insects communicate using chemical messages called pheromones. Synthetic pheromones have tremendous potential to be used to disrupt mating of key agricultural and forest pests, and thus provide economically sound and environmentally safe pest control. For the full potential of this mating disruption to be realized, it is important to understand the risk that insects could develop resistance to this control tactic. Entomology research has explored the prospects for evolutionary change in the chemical communication system of the cabbage looper moth. We have found genetically based variation in both signal production by females and behavioral response of males. In addition, populations will respond with adaptive changes in the communication system to selection imposed by using mating disruptants. These results indicate that we need to be concerned about the insects developing resistance to synthetic pheromones, but our research suggests ways to preserve the effectiveness of pheromone-based pest control.

Source of Federal Funds: Hatch
Scope of Impact: State-Specific

Key Theme - Biological Control

Research on conservation biological control of generalist arthropod predators, such as spiders, carabid beetles and other predacious insects, is revealing the extent to which these native predators reduce populations of major insect pests of vegetable crops. Such knowledge, by providing a basis for incorporating their conservation and management as a major component of vegetable-crop IPM, will benefit society by leading to more sustainable agricultural practices through reduced reliance on chemical insecticides. Research on the food web of forest-floor leaf litter is revealing how changes in rainfall predicted to occur as a result of global warming may affect rates of litter decomposition. Such knowledge will benefit society by helping to predict how global climate change will change basic ecosystem processes, such as nutrient cycling, that affect the functioning and health of our forests, a major natural resource.

Source of Federal Funds: Hatch
Scope of Impact: State-Specific

Key Theme - Wildlife Management

“Ecological Characteristics of an Elk Reintroduction in Eastern Kentucky" examines the feasibility of restoring this large ungulate to a portion of its former range. Although elk were reportedly abundant in Kentucky during colonial times, they were all but gone by the turn of the 19th century. This research employs the use of satellite and radio telemetry technologies on more than 400 elk, and examines the natural and anthropogenic factors that influence reestablishment. We have focused on elk ecology and elk interactions with amphibians, birds, white-tailed deer, and coyotes. It has been concluded that elk do not yet pose a threat to forest-interior amphibians because elk tend to avoid the centers of large, intact patches of forest. This finding suggests the value of limiting continued fragmentation of eastern Kentucky forests. Also the activity patterns of colonizing elk and their behavior patterns are similar to western elk despite their translocation of several thousand kilometers into a new landscape. Elk demographics have been sufficient to allow population growth. Most released animals have remained within 20 km of the release sites and exhibit rapid herd formation and site fidelity. Research on aspects of elk habitat use, elk mortality, landscape-scale movements, and interactions with native fauna remain on schedule. calves born in eastern Kentucky. The findings of our on-going work have been important to other states that are now engaged in elk restoration programs of their own. Because this is the most intensively monitored elk restoration in history it will serve as a benchmark against which future efforts will be compared.

Source of Federal Funds: Hatch

Scope of Impact: State-Specific

Accomplishments and Results for CSREES Goal 5

CSREES Goal 5

Enhanced economic opportunity and quality of life for Americans. Empower people and communities, through research-based information and education, to address economic and social challenges facing our youth, families, and communities.

Overview

The Kentucky Cooperative Extension Service made 566,390 contacts related to the development of life skills in youth and adults. 397,719 contacts related to community capacity building, 275,159 related to decision-making, and 149,711 related to the development of interpersonal communication skills. An additional 240,142 contacts focused on character education.

238,881 Kentucky youth participated Extension 4-H Youth Development programs and 21,862 individuals were members of Extension Homemaker Clubs affiliated with the Kentucky Extension Homemaker Association.

As a result of these efforts, 77,521 individuals demonstrated informed and effective decision-making. 73,190 youth and adults demonstrated the application of practical living skills. 66,432 youth reported the acquisition of one or more life skills as a result of participation in non-formal youth development programs conducted by Extension.

Extension helped and additional 14,669 prepare to enter the workforce. 7,144 dependent care providers (adult or child care providers) reported changes in knowledge, opinions, skills, or aspirations as a result of programs conducted by Extension. 26,137 individuals reported changes in knowledge, opinions, skills, or aspirations related to parenting or personal relationships and 20,759 individuals adopted one or more practices to improve their financial wellness.

Expenditures	Federal Extension Funds (UK and KSU)	$4,900,000
	Federal Research Funds (UK and KSU)	$205,000
	State Contribution	$18,000,000
FTEs	Extension (UK and KSU)	277

Key Theme - Child Care/Dependent Care

Middle school students in Cumberland, Green, and McCreary Counties in Kentucky are learning that staying after school can be fun. That's because an innovative after-school program tunes into their needs. In the fall of 1999, the state 4-H department convened a meeting of Extension staff and school personnel interested in establishing 21st Century Community Learning Centers in their counties. The state 4-H department offered to fund a grant writer for any local program that would involve both 4-H and the public schools as partners. A consortium of three south-central Kentucky counties agreed to work together to develop a funding proposal. Initially, schools saw the project as a way to improve academic achievement among students. 4-H saw the after-school environment as an opportunity to provide enrichment activities to students who had no other place to go in the afternoon. Through dialogue and negotiation, a partnership driven by the needs of students, rather than the needs of the organizational partners emerged. An asset-based model for development serves as a common framework for operation. The successful proposal resulted in the consortium receiving a total of $2.39 million over a period of three years. Funds support a site director and 4-H program assistant for four different after-school sites. Advisory boards comprised of both youth and adults determine the nature of the program at each site. During its first year of operation, sites were open an average of 15.5 hours per weeks and reached 876 youth or 59.8 percent of potential. More than 60 agencies and organizations partnered with project staff at the four sites to provide more than 185 different learning experiences. In particular, Extension provided curricular resources in areas such as health and fitness, fine arts, food and nutrition, computer science, cultural understanding, woodworking, personal development, citizenship, and leadership.

Source of Federal Funds: Smith-Lever
Scope of Impact: State-Specific

Key Theme - Conflict Management

Rural Sociology faculty are conducting training sessions for Extension educators, community leaders, and elected officials on how to address public disputes in a healthy way. This conflict resolution initiative has matured into a nationally recognized training program. Using a "train-the-trainer" model, the Kentucky Cooperative Extension Service has assembled a critical mass of individuals who can teach public dispute resolution across the Commonwealth. Extension has developed an ongoing relationship with the Kentucky League of Cities as a result of this initiative. Each year, more and more elected officials are participating in the training.

Source of Federal Funds: Smith-Lever

Scope of Impact: State-Specific

Key Theme - Impact of Change on Rural Communities

The ability to make effective decisions at the local level is determined in part by a community's access to data relevant to the decision at hand. To meet this need for readily available information, Rural Sociology faculty are actively involved in an effort to develop county-by-county profiles of socioeconomic and demographic data organized around current issues facing Kentucky communities. These user-friendly profiles are available as both printed documents and on the internet. These profiles have been used in local planning efforts, the development of grant proposals, and in presentations by county Extension agents and elected officials. With the devolution of government responsibility to the local level, this series of data profiles is meeting the ever-increasing needs of communities for data and information useful for local decision-making.

Source of Federal Funds: Smith-Lever
Scope of Impact: State-Specific

Key Theme - Home Safety

Health officials in Kentucky have sounded a serious alarm about the increased obesity and lack of physical activity among children and adults. It is imperative to reverse these trends by encouraging greater physical activity. At the same time, transportation officials have embraced the national agenda of encouraging bicycling and walking as important facets of our transportation system while ensuring a decreased injury and fatality rate. In conjunction with the Governor's Highway Safety Program, the Department of Biosystems and Agricultural Engineering is spearheading a statewide effort to educate Kentuckians about bicycle safety. This effort includes helmet awareness and distribution programs, newspaper articles, classroom programs, health and safety fairs, 4-H project material, and internet communications.

Source of Federal Funds: Smith-Lever
Scope of Impact: State-Specific

Key Theme - Family Resource Management

Financial stress is the greatest stessor of American families. Money 2000+ is a program to encourage families to set financial goals for saving money and/or reducing the amount of consumer debt to improve their financial well-being and security. In Kentucky the program provides a series of six money management lessons to families during the first six months of enrollment. Each quarter for four years (1999-2002) each family has received a MONEY2000+ newsletter. The letter is distributed electronically to agents for distribution in each county as well as posted on the Family and Consumer Sciences web page. Testimonial stories and data provide information that the program has been helpful to families that enrolled and received the information. Many families reported having savings for financial emergencies for the first time ever. Other families reported paying down credit card debt or eliminating it totally. The last survey of 103 Kentucky families showed that they had saved $57,224.00 towards goals to save $78,024.00. Debt reduction was $23,614.00 toward a goal of $148,200.00 in debt reduction.

Source of Federal Funds: Smith-Lever
Scope of Impact: State-Specific

Key Theme - Parenting

Recent brain research indicates that stimulating parental contact is crucial for infant/toddler development and learning. Consequently, the "Key's to Great Parenting" is designed to capture what is known about early brain development and collaborate with key groups across the Commonwealth to put that knowledge into the hands of parents. During the first year of the program, 110 county agents and community professionals were trained to deliver the program in their local communities. These individuals reached approximately 1,200 parents through group sessions they conducted. At the various group sessions, between 50 and 86 percent of parents reported success in reaching their parenting or self-care goals. The Governor's Office of Early Childhood Development provided $50,000 to be used for parent educator training, Spanish translations of core publications, and duplication of 35,000 full-color educational posters. The Kentucky Department of Libraries and Archives provided $15,000 to support a 15-county agent/librarian partnership project through which Extension offices and local libraries engage in a partnership to deliver the training. The program was recently piloted in seven New York counties by the Cornell Cooperative Extension for possible use in that state.

Source of Federal Funds: Smith-Lever
Scope of Impact: Multi-State

Key Theme - Character/Ethics Education

The Kentucky 4-H program has been actively involved in supporting the implementation of the Character Counts! program in counties across Kentucky. The program is organized around the core character principles of trustworthiness, respect, responsibility, caring, fairness and
citizenship. These principles or "pillars" form a foundation for ethical decision-making throughout life. Last year, 35,315 young people were involved in character education programs through 4-H. Of 74 Oldham County young people who participated in an impact study of the program, more than three-quarters said their classmates cheated less often after participating in the program. Nearly half of the young people questioned said their classmates were truthful more often, kept their word more often, used put downs less often, and did kind acts more often after participating in the program.

Source of Federal Funds: Smith-Lever
Scope of Impact: Multi-State

Key Theme - Workforce Preparation - Youth and Adult

Statistics show that most Kentucky adults seek employment armed with only a high school education. In 1999, 22 percent of Kentucky's population over 18 years of age had not completed high school. Of the 78 percent who had completed high school, only less than 20 percent had attained a bachelors degree or higher. Kentucky 4-H is striving to help youth people take an early in-depth look at future employment possibilities through the 4-H WorkBook series. The beginning unit, designed for 9 and 10 year olds, looks at people working in their community. Middle school youth learn about careers related to their interests, employer expectations, earning potential, lifestyle choices, and options for post secondary education. The high school WorkBook offers practical tips on how to find a job. Last year, 9,007 youth completed WorkBook projects. As additional support to the WorkBook series, a simulation experience called "Reality Store" helps young people understand the financial demands of adult life. Last year alone, the "Reality Store" effectively served as a "wake-up call" for 40,000 Kentucky youth. Evaluation results show that youth who participated in the experience gained a better understanding idea of what it costs to maintain a household, the type of education needed for jobs they desire, and how the job one holds affects potential and quality of life. As a result of participating in Reality Store simulations, many youth aspire to try harder in school, delay having children, and continue their education after high school.

Source of Federal Funds: Smith-Lever
Scope of Impact: State-Specific

Key Theme - Home Safety

All of us face some risks to our health in our day-to-day lives. Some risks are unavoidable but many, especially in our homes, can be avoided or corrected. Kentucky's Healthy Home program addresses some of these important concerns. One method has been through the development of the KY-A-Syst for the Home assessment program. Educational materials from the national Home-A-Syst workbook were adapted for use in Kentucky. In addition to these materials Extension agents were provided with teaching guides, evaluation instruments, and presentation files they could use in their respective counties. In addition, a publication entitled ***Help Yourself to a Healthy Home*** adressed five environmental topics related to providing children with a healthy living space. Six hundred copies of this publication have been distributed through special interest meetings and exhibits. In addition, Kentucky is one of eight Southern states working on a Children's Environmental Health Program in conjunction with EPA Region 4 in Atlanta.

Source of Federal Funds: Smith-Lever
Scope of Impact: Multi-State

Key Theme - Home-Based Business Education

Over 377,000 people operate home-based businesses in Kentucky (almost 14% of the population over the age of 18). U.S. Department of Labor, SBA-sponsored research indicates that **60% of all new firms begin at home** and about three-fourths of new business owners are also employed in a wage-and-salary job at start-up. In Kentucky, the number of home-based business owners is evenly distributed across both rural and urban populations.

Jefferson and Fayette Counties (both urban) offer a series of seminars annually to address topics relating to start-up and operation, i.e. developing a business plan, record keeping, marketing, learning community resources, funding sources, taxes, etc. Evaluations from the fifty-two participants who attended in Fayette County indicated 90 percent gained new knowledge and skills in business management while and 67 percent indicated they were better prepared to research ideas, prepare business plans and develop record-keeping systems. After six months, participants in Fayette County reported they were benefitting economically and were more confident as a result of the seminar. Comments included "This seminar may very well have prevented us from losing our business future and livelihood", "I have been researching starting a business and often felt overwhelmed by the diversity of information. This seminar addressed everything."

Eight counties in the Lincoln Trail Area conducted a Home-Based Business Seminar. 46 percent of the attendees indicated they planned to start a business and 38 percent planned to expand their current businesses. As a follow-up in assisting producers and consumers with business plans and opportunities, the Lincoln Trail Area counties joined Mammoth Cave Area in offering a Farm to Table two-day event. 300 attended the two-day event and 500 attended a Taste of Kentucky evening event.

Five counties in the Northern Kentucky Area conducted a seminar series entitled "Pathways to Success" which focused on various business techniques such as finding local resources, creating business plans, pricing and the utilization of the internet to market a business. Evaluations indicated 100 percent of participants said they learned how to find state and local resources to help develop their business, devise a marketing plan or market a business on the web. Ninety-one percent said they were planning to develop a marketing plan.

Eight counties in the Fort Harrod Area conducted a seminar entitled "Essential Skills for Starting Your Own Business." The evaluations indicated that, as a result of the program, 48 percent of the participants planned to start a business, 20 percent decided to expand their current business, 20 percent decided to delay opening, and 1 person decided not to start a business at all. 88 percent said they learned how to develop a business plan, 76 perecent how to market products to customers and 72 percent where to locate funding resources. One attendee said " The seminar gave me the confidence to go on and take the risk." The person is now in business.

Several rural counties concentrated on **skill development** to assist people in improving their economic opportunities. **Estill County offered instruction in basket making that could be used for a home-based business.** One successful participant learned how to make baskets in the program and has since started her own business. She sells at various outlets and was featured as Entrepreneur of the Year at the Bluegrass Area Basket Seminar. She was offered $1,800 for one basket although most of them range from $30-$50.

Perry County is teaching sewing skills that can be developed for income generation. Participants from the classes have been able to generate income from these sales in excess of $30,000. At least 10 known home-based businesses have started as a result. **Garrard County has also taught sewing skills.** Several program participants now make and sell quilted handbags for profit.

Source of Federal Funds: Smith-Lever

Scope of Impact: State-Specific

Key Theme - Home-Based Business Education

One of the biggest challenges facing home-based entrepreneurs relates to isolation from peers and problems in individually marketing their products and services. Included is the difficulty in competitive pricing for products produced in small quantities and in being perceived as professional business people. **Cooperative Extension has been successful in assisting these entrepreneurs to organize networks or associations that help them overcome these problems**. In Jefferson County, The Greater Louisville Home-Based Business Association has been an organization for three years. Sponsored by Extension, they offer educational programs to members and guests and highlighted 33 home-based businesses and 3 vendors at a Home-Based Business Showcase which informed the general public of home-based businesses in Jefferson County and surrounding areas. As a result of the networking opportunities and educational information presented at the Home-Based Business Association meetings, three members reported doubling their business and saving many thousands of dollars by bartering with other association members. One member reported her business is growing so fast that she is now looking into hiring people. She said "My business is a big success today because four years ago I took the Home-Based Business Workshop and got involved in the Home-Based Business Association." In Madison County, Extension is sponsoring the Madison County Small Companies Association for Networking. They also collaborated with the Chamber of Commerce and the Small Business Development Center in conducting the first county-wide Business to Business Conference. Extension co-sponsors a home-based business networking group with the Lexington Chamber of Commerce. As both a marketing and a networking tool, the "Directory of Kentucky Home Based Businesses" is published bi-annually and offers free listing to business owners. Over 500 Kentucky home-based businesses are listed in the publication.

Source of Federal Funds: Smith-Lever
Scope of Impact: State-Specific

Key Theme - Children, Youth, and Families at Risk

Kentucky was one of only a few states to use all of its funding from the federal government to insure children in need of health insurance. As a result, Kentucky became eligible to receive additional funds for this purpose from the federal government. Seeing the need to continue to insure uninsured children, the Robert Wood Johnson Foundation granted the University of Kentucky $950,000 to increase coverage to uninsured children by simplifying the enrollment form and renewal process. The Cooperative Extension Service has been one of the partners educating the public about the program. County Extension agents use articles prepared

by state Extension specialists to inform the public of the program. In particular, the Cooperative Extension Service has played a key role in helping Spanish-speaking migrant workers mlearn about the program through a bilingual hotline.

Source of Federal Funds: Smith-Lever
Scope of Impact: State-Specific

Key Theme - Impact of Change on Rural Communities

Faculty of the Rural Sociology group have developed a model for facilitating community visioning efforts. With assistance from the University of Kentucky, a local leadership group organizes and implements a citizen-based process to obtain residents' preferences on the future of their community. Citizens are trained to facilitate community discussion on four preference questions (heritage, change, vision, action). Citizen responses are enumerated and evaluated for a final report that defines citizens' vision for the future and recommends specific actions that can be implemented by local government and other organizations to achieve this vision. A subcomponent of this work is assisting communities in building leadership capacity by training citizen facilitators.

Source of Federal Funds: Smith-Lever
Scope of Impact: State-Specific

Key Theme - Leadership Training and Development

A Landscape Design Study Program is being carried out in conjunction with the Kentucky Council of State Garden Clubs. Three courses (in a series of four) have been conducted to assist participants in developing means to critically evaluate landscape designs and land use planning. Approximately 80 people have attended at least one of the three courses offered to date. These people take information from the courses and apply it in their own landscape, and also in service to the committee through their participation on various committees such as those related to land use planning, tree boards, park boards, and beautification recognition.

Source of Federal Funds: Smith-Lever
Scope of Impact: State-Specific

Key Theme - Family Resource Management

The Kentucky Department of Insurance (DOI) requested the assistance of the Cooperative
Extension Service in offering insurance education to the people of Kentucky. In response, Extension worked jointly with the DOI to design and promote a series of insurance education seminars at Cooperative Extension facilities across the Commonwealth. Programs were tailored

to the need of the community based on input from extension clientele. This joint effort not only saved both agencies a significant amount of money and professional time, but also reached more people. Kentucky county Extension agents also assisted in the statewide distribution of two DOI publications on auto and homeowners insurance. This saved Kentucky Cooperative Extension Service approximately $20,000 in publication printing and development costs.

Source of Federal Funds: Smith-Lever
Scope of Impact: State-Specific

Key Theme - Children, Youth, and Families at Risk

According to the Centers for Disease Control, Kentucky deaths attributable to cancer, heart disease, and cardiovascular disease are among the nation's highest. Specifically, Kentucky's death rates rank first in the nation for lung cancer death rate, fifth for colorectal cancer, third for all cancers, seventh for ischemic heart disease, and eighth for cardiovascular disease. Tragically, many of these deaths could have been prevented through basic heath maintenance behaviors. During the fall of 2000, the Kentucky Cooperative Extension Service, developed and submitted a proposal to CSREES to fund a CYFAR New Communities Project (NCP) focusing on helping families implement practices and behaviors which improve the overall health of family members in three Kentucky counties. This funded project revolves around development, validation, utilization of an ***Inventory of Family-Based Health Assets (IFBHA)***. When completed, the inventory will contain items describing actions or behaviors that a family can take to maintain or improve the health. Items for the inventory are derived from the United States Department of Health and Human Services' ***Healthy People 2010: Objectives for Improving Health***. Partner families will be encouraged to hold a family meeting to discuss the assets and determine which heath assets are either fully or partially present in their family. They will then identify three target assets they wish to build or acquire. Families decide on the asset-building behaviors they wish to put into practice, identify the knowledge and skills required to implement the behaviors, and develop a learning plan which will guide their progression toward achievement of their asset-building goals. Each of the three counties has hired Extension Health Education Assistant (HEA) who will enroll targeted families in the program. The HEA will serve as a learning coach for the partner families. They will help the families implement the learning plans they develop. Each of the three community projects will employ a different strategy for gaining access to and enrolling families in the program.

Source of Federal Funds: Smith-Lever, CYFAR
Scope of Impact: State-Specific

Stakeholder Input Process

Strategic Goals

Research and Extension programs continue to work toward the achievement of strategic goals established in 1997. Extension programs are organized around six goals while research activities focus on achievement of four. Goals were established through a broad-based strategic planning process that involved more than 3000 people. In addition to providing direction, the goals also provide a framework for organizing accountability data collected from across the state. The process used for identifying these goals was described fully in the FY00-04 Plan of Work.

Local Program Development

In the winter of 1999, each Kentucky county conducted a broad-based assessment of local needs which resulted in the development of program priorities that would be addressed under the framework provided by the strategic goals. Action plans were developed for each program priority. The program plans developed for these priorities went into effect with the FY00 program year and continue to be updated and revised each year based on input from local advisory councils.

Extension Advisory Council System

Historically, the Kentucky Extension Advisory Council System has served as the primary mechanism for gaining stakeholder input into establishing program priorities. During FY01, a County Extension Council (CEC) continued to function in each of Kentucky's 120 counties. Area Extension Councils provided the opportunity for discussing needs and issues across county lines. A State Extension Advisory Council meets annually identify program priorities to be addressed under the framework of the strategic plan. Similar structures for establishing program priories at the county, area, and state level also continue to exist within the 4-H, Family and Consumer Sciences, and Agriculture and Natural Resources program areas, but operate under the umbrella provided by the overall Extension Advisory Council System.

Agricultural Advancement Councils

While structurally functioning within the Extension Advisory Council System, the relatively new Agricultural Advancement Council system also serves as a sounding board for research and teaching programs of the College of Agriculture. More than 100 counties now have Agricultural Advancement Councils which send representatives to one of fourteen Area Agricultural Advancement Councils. A fifteenth Area Agricultural Advancement Council provides input into Kentucky State University's research and Extension programs. A state Agricultural Advancement Council meets twice a year.

Program Review Process

There have been no significant changes in the review processes described in the Plans of Work submitted for the Research and Extension programs of the University of Kentucky and Kentucky State University.

Evaluation of the Success of Multi and Joint Activities

The effects of salient issues such as the transition from a tobacco-dependent economy, market development, land use, community empowerment, youth development, health, and economic development are not bounded by the arbitrary boundaries which exist between states. Rather, they affect particular regions of the country in clearly defined ways. Addressing issues such as these requires that land grant universities work across state lines to deploy resources is a planned and systematic manner. We believe that the multi-state activities of the Kentucky Cooperative Extension Service have contributed to a more efficient and effective mobilization of public resources in addressing critical issues of people.

Kentucky has a unique opportunity to work across state lines. It shares borders with West Virginia, Virginia, Tennessee, Missouri, Illinois, Indiana, and Ohio. These states represent three of the four Extension regions. The opportunity to work across state lines is clearly evident.

During FY01, the Kentucky Cooperative Extension Service supported more than 150 different Multi-State Extension activities, each of which was clearly linked to one of the state's six strategic goals. In planning and conducting each activity, key consideration was given to either increasing efficiency (through such things as economies of scale) or effectiveness (by contributing the resource our state each partner was best equipped to provide). For example, Kentucky frequently contributes the expertise and services of its award-winning Educational Media unit to multi-state projects. In other cases, Kentucky relied upon out-of-state expertise in subject areas not well supported by our current array of faculty and staff.

Approximately one-third of these multi-state activities were developed and implemented by county Extension agents working in border counties. The predominant state partners were Tennessee, Indiana, and Ohio. The grass-roots nature of this multi-state collaboration provides further evidence that multi-state activities addressed the needs and issues of stakeholders. Impacts and outcomes of most of these multi-state efforts are clearly documented in impact statements written by county Extension agents.

A large proportion of the multi-state efforts focused on the needs of under-served and under-represented populations. Examples include small business owners, small farmers, food stamp recipients, and loggers.

Research and Extension functions have been, and will continue to be, integrated to a unique extent within in the Kentucky system. The Dean of the College of Agriculture formally serves as Director of both the Kentucky Agricultural Experiment Station and the Kentucky Cooperative Extension Service. The Associate Dean for Extension and Associate Dean for Research have close working relationships. Extension, research, and teaching faculty are housed together within academic departments and all participate in regularly scheduled department meetings. Extension faculty conduct applied, collaborative research while research faculty participate in Extension and other outreach/service activities. Many faculty even hold joint appointments to both Research and Extension.

Yet, even with all of these structural and functional attributes which promote integration activities, Kentucky used the mandates of the AREERA legislation as a catalyst for bring Research and Extension programs closer together. Extension staff are more cognizant of the need to undergird their activities with sound research. Research faculty are realizing the dissemination of findings involves more than publishing results in a scholarly journal.

Both the Kentucky Agricultural Experiment Station and Kentucky Cooperative Extension Service expended in excess of 25% of qualifying funds on integrated activities in FY01.

Brief Summary of Multi-State Activities

During FY01, the Kentucky Cooperative Extension Service supported more than 150 different Multi-State Extension activities, each of which was clearly linked to one of the state's six strategic goals. Approximately two-thirds of these multi-state activities were state-level partnerships led by state-level administrators, specialists, and associates. The remaining third were conducted by county Extension agents working across state lines. Virtually all of multi-state Extension activities involving state-level faculty and staff can best be characterized as on-going collaborations lasting a year or longer. These included such things as serving on national and regional committees, production of multi-state publications, and curriculum exchange agreements. Conversely, nearly 60 percent of the county-level projects were short term in nature and were completed within the Fiscal year. These included such things as study tours, exchange trips, and training schools in border counties.

Multi-state Extension activity is recorded in a Microsoft Excel spreadsheet. The following impact statements are a representative sample of some of the multi-state Extension activities involving the Kentucky Cooperative Extension Service.

Five-State Beef Initiative

The Kentucky Cooperative Extension Service is a partner in a five-state initiative focusing on enhancing profitability of cattle feeders in the Eastern corn belt states. An extensive database management system has allowed producers to establish baseline product characteristics and more accurately focus improvement efforts on targeted aspects of the production process. To date, 213 producers from four different geographic regions of the state have participated. Producers in the program are required to use strict genetic improvement and feedlot management practices that result in healthier cattle and higher quality meat. Feedlot health and carcass evaluation data has been collected for 2,300 cattle. Data for cattle managed under program guidelines show a morbidity rate of 4.5 percent compared to a typical industry-wide range of between 15 and 20 percent. Similarly, data for cattle managed under program guidelines show a mortality rate of 0.5 percent versus an industry-wide range of between 2 and 5 percent. Carcass data shows that 94 percent of these cattle are classified in grades 1 through 3 and 60% are prime

or choice, both well above industry standards. Results show that Kentucky cattle are higher quality than many producers think and can easily command premiums of $30.00 to $50.00 per head due to improved feedlot health and carcass quality.

Agricultural Leadership Development

The Philip Morris Agricultural Development Program is a two-year leadership development program designed to enhance the leadership skills of young agriculturalists. The current year's class involves participants from Kentucky, Tennessee, Indiana, Ohio and Missouri. Although multi-state, the University of Kentucky College of Agriculture is responsible for participant recruitment and the development of the curriculum involving 10 seminars, a domestic study tour and an international study tour to Brazil and Mexico. A survey of graduates from the first five classes revealed that 99 percent of the alumni indicated that this program was worth their time away from their normal activities. More than 80 percent of the eighty alumni who responded said they gained knowledge about our country's role in a global economy. More than 90 percent said the program helped them develop leadership or human relations skills.

National Clonal Germplasm Repository for *Asimina* spp. (pawpaw)

Since 1994, Kentucky State University (KSU) has served as the USDA National Clonal Germplasm Repository for *Asimina* spp. As a satellite site of the repository at Corvallis, OR, the collection contains more than 1700 trees from native stands in 66 distinct geographic regions of 16 different states. These wild trees will be used in future KSU pawpaw breeding efforts to obtain even better pawpaws. Extension efforts have resulted in the planting of more than 5800 commercial trees in Kentucky, West Virginia and Maryland over the past three years with 960 of these trees planted at 21 Kentucky farms. In 2001, KSU distributed more than 375 copies of the "Pawpaw Planting Guide" based on propagation and production research efforts at KSU. In 2001, approximately 130 people from 22 states attended the Second International Pawpaw Conference at KSU, where they exchange information about pawpaws, toured the orchards, and sampled pawpaw products. In addition, the public was made aware of KSU pawpaw research efforts via newspaper, radio, and television reports. Perhaps more importantly, this multi-state effort has resulted in the development of a commercial market for pawpaw. KSU's efforts have resulted in pawpaw ice cream produced in Bedford, Kentucky being sold at a gourmet restaurant in Louisville. The pawpaw ice cream sells for $10.00 per gallon.

Horticultural Marketing

Research on marketing systems for produce in the Southern U.S. has been initiated with collaborators in Tennessee, North Carolina, and Georgia. More farmers in Kentucky are looking to horticultural opportunities as a part of the farm as tobacco quotas are cut back. Market structures are changing in a way that profoundly impacts smaller-scale producers. The research

has focused on identifying the best ways farmers can profitably participate in a rapidly consolidating system. Three new farmer cooperatives have been formed in Kentucky and marketing alliances developed with several business partners in other southern states. Sales through the produce coops are expected to triple over the next four years. Survey data on producer and handler marketing activity in these states provide important benchmarks for the development of state-level marketing programs and market infrastructure development efforts.

Precision Agriculture

Multi-state research and Extension work related to on precision agriculture is aimed at targeting specific needs of producers through a set of tools that allows agricultural producers to optimally manage small zones within fields through the use of advance electronic technologies. Integrated research and extension programs are intended to develop and evaluate technologies and management techniques and to help producers implement strategies to achieve maximum economic return and environmental sustainability. Specific activities include independent testing and evaluation of GPS receivers and yield monitors, development of new sensor technologies to evaluate farm fields, development of low-cost remote sensing platform, and evaluation of field management and decision support tools.

Master Tree Farmer

Master Tree Farmer is an educational program for forest landowners delivered via live satellite broadcast to ten sites across Kentucky. The program was comprised of six nights of live satellite broadcasts that originated from Clemson University and a seventh night devoted entirely to Kentucky issues which originated from the studios of KET. Regional forestry experts from the southeast provided instruction on the basics of forest management, forest finances, pine management, hardwood management, harvest/marketing, and wildlife management. The Kentucky segment was taught by personnel from the University of Kentucky Department of Forestry, the Kentucky Division of Forestry, Kentucky Division of Water, Kentucky Division of Fish and Wildlife Resources, a member of the Kentucky Association of Consulting Foresters and a representative from Westvaco. In addition to the onscreen instructors, each viewing location had a Kentucky Division of Forestry forester and a member of the Kentucky Woodland Owners Association present to answer any questions which arose at that location. Topics covered on the Kentucky night included: Laws and Regulations that effect Kentucky landowners, the AWQA forestry best management practices, selling and marketing timber, and landowner assistance programs. Each participant received a 3-ring binder of reference materials for future use. A total of 197 people attended at least a portion of the program. Of those who responded to a post-program survey 79% indicated that the information presented would help them save money on their timberlands, several respondents indicated that they expected to save at least $10,000. Seventy-eight percent of those responding to the survey indicated that the information presented would assist them in earning income from their timberlands. The amounts they expected to be able to earn ranged from $1000 to $100,000. Survey respondents indicated that the information gained from the MTF 2001 program would impact over 11,000 acres.

The Millennium Bed and Breakfast Business Research Report

The Millennium Bed and Breakfast Business Research Report is an eight-state study of the bed and breakfast industry in Kentucky and the surrounding states that was published and disseminated by the Cooperative Extension Service during 2001. The home-based business program partners with other program areas within Extension and the university, other agencies and academic institutions, and cabinets and departments in state government and federal agencies.

Brief Summary of Integrated Research and Extension Activities

Activities of Research and Extension faculty were considered to be integrated if at least one of the following conditions were met.

- The leadership team for the Research project or Extension program was comprised of both Research and Extension faculty.
- An Extension program is directly related to dissemination of the findings of Experiment Station research projects.
- The program component falls within the scope of one of the College's formally established initiatives which integrate Research and Extension Activity. Examples include the Weed Science Group, Food Quality and Safety Task Force, and the Beef Integrated Resource Management Team.

Integrated Research and Extension Activity is recorded in a Microsoft Excel spreadsheet. The following impact statements are a representative sample of some of the integrated research and Extension activities of the University of Kentucky College of Agriculture.

The Biotechnology Research and Education Initiative (BREI)

The Biotechnology Research and Education Initiative (BREI) was created to provide cutting edge knowledge from the field of biotechnology to scientists, students, and the general public. BREI is comprised of a multi-disciplinary team of research, extension, and teaching professionals from the College of Agriculture at the University of Kentucky. BREI strives to provide unbiased, science-based information regarding discoveries, benefits, and risks concerning agricultural biotechnology. This past year, team members have made presentations

on agricultural biotechnology issues to a number of audiences including civic, farm, and youth organizations. Other BREI activities include agent training, web site development, and authoring of 6 extension publications addressing various issues and aspects of biotechnology education.

Horticultural Pests

Horticulture is the fastest growing segment of Kentucky's agricultural economy, with cash receipts from nursery, fruit, vegetable, and greenhouse crops, and revenue from golf courses, sod farms, and landscape maintenance totaling more than a half-billion dollars per year. Street trees, landscapes, and turf grasses beautify our cities and suburbs and provide economic and recreational benefits for millions of Kentuckians. These commodities are attacked by many destructive insects that cause substantial economic losses, and that require use of potentially hazardous insecticides for their control. University of Kentucky entomologists are studying these problems to provide practical solutions for professionals, county agents, and homeowners. Ongoing projects include management of tree-killing scale insects on horse farms, the eastern tent caterpillar as a possible risk factor in Mare Reproductive Loss Syndrome, and Japanese beetles as pests of fruit crops and roses. Other studies are contributing to the development of reduced-risk insecticides and other control tactics for pests of lawn and landscape pests.

Bean Pod Mottle Virus Management

Bean pod mottle virus (BPMV) is endemic in Kentucky soybean. A long-term, cooperative effort between University of Kentucky Extension plant pathologists and researchers has brought about an enhanced awareness of the BPMV situation among producers. State-wide surveys conducted during 1985-87 and 2001 revealed that BPMV has been, and continues to be a problem across Kentucky. Surveys were conducted with the assistance of soybean growers and County Extension Agents for Agriculture. The most recent survey indicated that a severe strain of BPMV is prominent state-wide and may be associated with a developing problem called green stem syndrome. Extension pathologists have collaborated with researchers to investigate the BPMV insect vector, potential overwintering hosts for the virus in weeds and perennial crops, and seed quality issues. Extension plant pathologists have made numerous presentations at field days and grower meetings and have developed various informational articles and publications aimed at providing the most recent information on BPMV and its management to farmers.

Latent Infections of Pine by *Sphaeropsis sapinea*

Sphaeropsis tip blight, a common disease of pines, causes newly infected shoots to stop growing and quickly die. Despite expensive control measures, more than half of the 700 mature trees were lost in one large Kentucky landscape. Research was initiated to clarify why the control measures failed. Investigations revealed that nearly half of the Austrian and Scots pine trees appearing completely healthy had, in fact, detectable latent *S. sapinea* infections in

symptomless tissues. A rapid, sensitive, polymerase chain reaction-based DNA test for the pathogen was developed, so it may be possible to tell if a tree is infected long before symptoms appear. The presence of *S. sapinea* in symptomless tissues of tip blight-diseased trees has important implications for disease management. Using newsletters, radio programs, posters, and oral presentations, Extension programs have educated landscape professionals about the need to avoid disease-susceptible trees and ineffective, expensive fungicide treatments.

Sustainable Vegetable Production Systems

An Evans Allen research project is identifying and evaluating different uses of conservation tillage, living mulch, and legume cover crops in vegetable production to reduce both soil erosion and the use of commercial inorganic nitrogen fertilizers. Research of the Kentucky State University Land-Grant Program has demonstrated that sweet corn, bell peppers, and watermelon can be grown successfully without chemical nitrogen fertilizers if they follow a hairy vetch legume winter cover crop. These vegetables can also be grown using no-tillage methods if weeds are controlled adequately. By producing vegetables using hairy vetch winter cover crops, farmers can grow vegetables as a supplement to tobacco while eliminating nitrogen fertilizer costs of about $30 per acre. Organic growers may save near $100 per acre since costs of commercial organic fertilizers are higher. Forty-six percent of the cultivated crop land in Kentucky is classified 'highly erodible', and the soil loss rate in Kentucky is three times the tolerable level. Because no-tillage methods can reduce soil erosion by about 90 percent on highly erodible lands adoptation of such practices could reduce erosion to within tolerable limits. Results have been demonstrated to farmers at monthly meetings at the Kentucky State University research farm and at an on-farm research site.

Youth Development

After-school hours are times of great risk for unsupervised youth, and parents need safe alternatives for their youth. Rural Sociology faculty are participating in a multi-state research project titled "How Do Structured Out-of-School Experiences Contribute to Positive Youth Development?" The project is attempting to identify both key developmental processes that occur in structured out-of-school activities and how individual youth, family, and community factors influence participation in them. The utilization of research findings will lead to better models of structured out-of-school experiences for youth, a better match between the needs of individual youth and specific types of programs, and assistance for youth and parents choosing out-of-school experiences.

Soil Laboratory

The mission of the soil laboratory is to help citizens in Kentucky maintain productive and economical plant growth operations by testing soil, water, greenhouse media, animal waste, and mine spoils and issuing fertilizer and lime recommendations which are based on the test results.

Recommendations are made specifically for Kentucky conditions. Nutrient needs and fertilizer responses are determined by research conducted through the University of Kentucky College of Agriculture on crops and soils in Kentucky.

Two University of Kentucky soil testing laboratories are maintained. Labs in Lexington and Princeton perform routine tests of pH, buffer pH, P, K, Ca, Mg, and Zn. Non-routine tests for B, organic matter, triazine residue in soil, pH and nutrients in greenhouse media and water, nutrients in animal waste, and acidity in mine spoil are performed in Lexington only. The soil laboratories conducted tests on 39,549 agricultural soil samples, 7,009 home lawn and garden soil samples, 647 commercial horticultural soil samples, 380 animal waste samples, 62 greenhouse media samples, 52 water samples, and 10,000 research samples in 2001.

Preventing Risk-Taking among Rural Adolescents

Adolescents often engage in behavior that puts their health at risk. Youth who are high sensation-seekers and impulsive decision-makers are particularly likely to do so. An Extension Professor in the Department of Rural Sociology is collaborating with faculty of the University of Kentucky Department of Communication to conduct a five-year study funded by the National Institute of Mental Health. The study titled ***HIV Interventions for Young, Appalachian Risk-Takers*** is evaluating both a school-based HIV and pregnancy prevention curriculum supported by the Centers for Disease Control and Prevention and a modified version of the same curriculum designed to appeal to both high sensation-seekers and impulsive decision-makers. Results of the project could lead to prevention programs that are more effective with those adolescents who are at the greatest risk of engaging in behaviors that could jeopardize their well-being.

Entomology Outreach

The Department of Entomology has been serving Kentucky and the world through its web site since 1995. The site averages over 200,000 hits per month as visitors search for information on insects pests. The award-winning "For Kids" section remains one of the most popular areas of the site. It includes lesson plans for teachers and home-schoolers, educational games and puzzles for kids, and a "What Is It?" section where users are invited to send in their guesses each month to identify the mystery bugs pictured. A separate IPM site is collaboratively maintained by the U.K. Departments of Entomology, Agronomy, Plant Pathology, and Horticulture. On this site, Kentucky producers can find timely, in-depth information on crops and pests. This site received an average of 8700 hits per month in 2001, an increase of more than 3000 per month over last year. The heart of the IPM website is Scout Info Online, a collection of information sheets about the most important insect, weed, and disease pests of Kentucky's crops. Online versions of IPM manuals, recently recognized for their "farmer-friendliness," provide additional information.

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 Kentucky
State: Kentucky

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**
Community Development	46,914	48,087			
Sustainable Agriculture	445,620	456,760			
Leadership Development	47,667	48,858			
Nutrition and Health	66,491	68,153			
Life Skill Development	264,734	271,352			
Environment and Natural Resources	119,429	122,415			
Total	990,858	1,015,625			

M. Scott Smith — Director
3/1/02 — Date

Form CSREES-REPT (2/00)

U.S. Department of Agriculture

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(Attach Brief Summaries)

Institution: University of Kentucky
State: Kentucky

Check one: ___ **Multistate Extension Activities**
_X_ **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**
Social and Economic Opportunity	46,000	47,150			
Competitive Agriculture	546,000	559,650			
Safe Food and Fiber	213,000	218,325			
Agriculture and Environmental Quality	707,000	724,675			
Total	1,512,000	1,549,800			

M. Scott Smith — Director
3/1/02 — Date

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Multistate Extension Activities and Integrated Activities
(Attach Brief Summaries)

Institution: University of Kentucky
State: Kentucky

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**
Sustainable Agriculture	2,714,712	2,782,579			
Nutrition and Health	299,442	306,928			
Environment and Natural Resources	598,884	613,856			
Total	3,613,038	3,703,363			

M. Scott Smith — Director
3/1/02 — Date

Form CSREES-REPT (2/00)