

FY2005

Annual Report of Accomplishments and Results

Kentucky

University of Kentucky
Kentucky State University



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

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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 1,637,709 contacts (including duplications) with clientele related to improving production, processing, and marketing in FY05. 95,748 of these contacts were made with clientele related to the expanding concept of ‘mastery’ of specific program concepts. In Kentucky we currently offer certifications of Master Gardeners and Master Cattlemen and will be expanding that to include additional program concepts such as Master Grazer and the Grain Academy this year. 43,938 contacts were related to Farmer Markets, which is just the tip of the iceberg in the expanding Agritourism industry in Kentucky. Kentucky State University’s Small Farm Program made 23,717 contacts with limited resource farmers. Thirty-four percent of these contacts were with women. In part, the success of this expansion can be attributed to the success of the “Third Thursday” Programs.

These efforts resulted in 19,547 farmers adopting one or more production practices recommended by Extension while 24,404 producers adopted new resource management technologies such as IRM, IPM, and soil fertility management. Adoption of these practices resulted in \$24,166,944 of additional profits to farmers. 11,332 producers utilized new marketing opportunities while 29,685 Kentuckians learned about the impact of public policy on agriculture and the environment.

The Kentucky Agricultural Experiment Station conducted the equivalent of 83 GPRA percentages related to this goal during 2005. These projects focused on such topics as developing and understanding of the genomic control of plant productivity, quality traits and adaptability of agricultural products, understanding the forage-animal interface, addressing mechanisms of transmission and incidence of the West Nile Virus, and the role of the Eastern Tent Caterpillar in Mare Reproductive Loss Syndrome (MRLS).

External funds to support research within the University of Kentucky College of Agriculture have more than doubled since 2001, to over \$23 million. More than \$7.16 million of this extramural support was secured by faculty members who have a primary appointment in Extension.

Small farm diversification and the search for alternative crops or new uses of existing crops remains the central focus of the research conducted at Kentucky State University. Six research projects are currently supported by KSU Research and three are reported on here: Development of sperm cryopreservation techniques and progeny testing for paddlefish; Crustacean/finfish nutrition and diet formulation research project; and development of new commercial fruit crops for Kentucky and the Southern U.S.

Expenditures	Federal Extension Funds (UK)	\$2,393,216
	Federal Extension Funds (KSU)	\$455,000
	Federal Research Funds (UK)	\$2,579,006
	Federal Research Funds (KSU)	\$672,087
FTEs	Extension (UK)	157.9
	Extension (KSU)	13.25
	Research (UK)	83.0
	Research (KSU)	10.3

Key Theme –Managing Change in Agriculture

Extension specialists developed educational programs, newsletters, news articles and online materials to help tobacco farmers in understanding the tobacco buyout and to assist them in making production and investment decisions related to the buyout. Kentucky possesses the largest number of quota owners and growers with more than 250,000 individuals eligible for buyout payments in 117 of Kentucky's 120 counties.

Educational Programs and presentations by Kentucky CES included

- Training for 100 county agricultural agents and distribution of agent training videos in all 120 counties. Training for 50 Area Farm Management and Extension Specialists.
- 43 county and regional meetings with attendance exceeding 6000.
- Ag lenders training attended by over 100 representatives of Kentucky financial institutions.
- Presentation to the Kentucky Governor's office and Kentucky business leaders on Revitalizing our Rural Economy.
- Workshops and conference calls with various financial institutions including *Merrill Lynch, Edward Jones, Kentucky Bankers Assn, Ag Credit, Ky Farm Bureau Bank and more* as well as presentations at various farm leadership, commodity, real estate and government conferences and conventions.

In 2005, Kentucky tobacco farmers received around \$240 million for their first installment of the buyout. Extension's efforts have resulted in a better understanding the processes for eligibility and acquisition of these funds as well as proper management of these buyout dollars by individuals, financial institutions and communities. This has been vital for many local economies as they transition to a new post-buyout free market for tobacco. These dollars are assisting individuals in diversification opportunities within and outside of agriculture, reducing debt, and providing a stream of income for a more secure future.

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

Key Themes – Aquaculture

In January 2006, all international trade in caviar from wild caught sources was banned by the UN Commission on Trade in Endangered Species (CITES) in order to protect dwindling stocks of sturgeon species. Prior to this ban, the US was the largest caviar importer in the world. The ban is sure to generate domestic opportunities for aquaculture of native caviar producing species, such as paddlefish (a sturgeon relative). Maximum profitability will be realized by US fish farmers if technology is available for all female production. Therefore, development of proven brood lines of sex reversed (neomale) paddlefish originating from WW (super-female) fish of gynogenetic origin will have a major impact on the ability of US fish farmers to compete in world markets. The development of cryopreservation techniques will insure an uninterrupted supply of neomale milt for hatchery production of all female paddlefish by minimizing the risks associated with maintaining inventories of live brood fish. It will also impact hatchery production by eliminating physiological limitations on brood fish readiness and permit paddlefish propagation in a broad spectrum of hatcheries, which might not otherwise be able to manage such a large species.

Source of Federal Funds: 1890 Evans-Allen
Scope of Impact: Regional

Key Themes – Aquaculture

The use of fish meal in aquaculture diets has been questioned by various environmental groups as being wasteful and unsustainable. This project has evaluated the use of turkey meal as a partial and total replacement of fish meal in sunshine bass (one cross of hybrid striped bass) diets and found that when sunshine bass are grown in tanks or cages, 100% of the fish meal can be replaced by turkey meal. As turkey meal, when available, costs approximately \$400 less than marine fish meal, potential savings between \$100-120/ton of diet could result when turkey meal totally replaces marine fish meal in sunshine bass diets. Australian red claw crayfish is considered a popular crustacean species in several countries around the world due to their large size potential and resemblance to high-priced lobsters. There is a very strong interest in growing red claw in Kentucky by small farmers who are interested in crop and income diversification. Results from various experiments conducted at Kentucky State University have indicated that a practical diet containing 22% (as fed basis) protein may be adequate for pond production of red claw. It has been estimated that for every 1% reduction in protein level, between \$1-5/ton of cost can be reduced from the feed. Secondly, results from six separate studies indicate that juvenile red claw can be fed practical diets containing less expensive plant protein sources without fish meal, and those expensive ingredients, such as cholesterol, lecithin, and marine fish oil, do not have to be added to practical pond diets for red claw.

Source of Federal Funds: 1890 Evans-Allen
Scope of Impact: Regional

Key Themes – Plant Germplasm

Rootstocks that promote early fruit production and improve tree establishment rates would assist the development of a pawpaw industry in the southeastern United States. Seedling rootstocks from several pawpaw genotypes (e.g., Sunflower) showed promise in greenhouse experiments and are being evaluated in long-term field studies to determine if these rootstocks will be of value to growers. The pawpaw regional variety trials provided long-term evaluation of currently available cultivars for regional adaptability and suitability. A number of pawpaw varieties can now be recommended for production in Kentucky. Wild pawpaw seedlings in the KSU repository collection have potential as future varieties or as parents in breeding efforts for variety improvement. A pawpaw information website has had over 150,000 visitors who have obtained information concerning how to grow pawpaw and KSU research efforts. A number of gooseberry and currant varieties can now be recommended for growing in Kentucky.

Source of Federal Funds: 1890 Evans-Allen
Scope of Impact: Regional

Key Theme – Agricultural Profitability

The Beef Extension group at the University of Kentucky has been instrumental in the development of guidelines and educational programs to support the Kentucky Cattle Genetic Improvement Program, a Model Program for cost share of Tobacco Settlement Funds. Over \$10,000,000 has been distributed as 50% cost-share dollars to Kentucky livestock producers, representing over \$20 million dollars in bull purchases in 104 Kentucky Counties to date. This program facilitates better selection and performance records for seedstock producers, resulting in better genetic evaluations, and improved selection and crossbreeding for commercial producers. Approximately 10,000 bulls have been purchased through the program. With each bull siring 60 calves with an increased value of \$25/head, an additional \$15 million of income has been realized this year alone. Additionally, producers are developing production skills that they will utilize for years to come.

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

Key Theme – Plant Genomics

A gene switch is like a light switch which is used to turn on/off light bulb. Similarly a gene switch is used to turn on or off genes using a chemical compound. Genes can be used to make genetically modified crops for controlling insect pests and diseases as well as to improve the quality. Current technology uses a chemical that keeps the genes on all the time. It is like connecting bulb to electrical wire without a switch.

There are disadvantages associated with gene switch technology because it is not only metabolic waste for the plant to express the genes we put in all the time but also leads to environmental pollution because a lot of the material made from these genes we put in crops ultimately ends up in the environment. Several gene switches have been developed for use in agriculture. However, these genes switches use chemicals that are not suitable for field use because these are chemically similar to human hormones or antibiotics. The only switch developed to date that is suitable for field use is a switch based on registered insecticide, methoxyfenozide. Unfortunately, these switches required large quantities of chemical, much more than field registered doses, for turning on genes. Therefore, they are not used very much. Recently, University of Kentucky researchers developed a switch that is much more sensitive to a chemical already registered for use in crops and requires about 100X less chemical than the previous gene switch versions. This improvement will open the door to new genetic modifications of plants and find wide-spread use in agriculture.

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

Key Theme – Changes in Agriculture

With the changes in the tobacco industry in the state, the plastic greenhouses, or high tunnels, used in tobacco seedling production will become underutilized, if not abandoned. In order to use these facilities to develop additional revenue streams, better environmental control strategies need to be developed, since the thermal environmental conditions have a great impact on vegetable crop and bedding plant production. The goal of this project is to develop a model which will predict the interior conditions of the greenhouse along with an economical thermal control system to maintain the optimal environmental conditions for plant growth, thus opening the door for the production of bedding plants, vegetables, nursery stock and other revenue generating opportunities for Kentucky farmers.

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

Key Theme – Plant Production Efficiency

Poinsettia are the largest value potted flower in the U.S., with sales around the Christmas holiday season being the primary market. Poinsettias are propagated by cuttings from stock plants, typically in July-August, when the thermal environment of a greenhouse is challenged by high solar and latent heat loads. Cooperative work with Biotechnology and Agricultural Engineering and Horticulture was conducted to evaluate model-based mist control systems to improve the efficiency of propagation, and to evaluate the effect of root zone temperature on root development and growth. The result has been the development of a facility consisting of three replicated controlled environment chambers with thermogradient bases. This facility is now available and being utilized for other species evaluations.

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

Key Theme – Plant Production Efficiency

Cucurbits (cantaloupes, cucumbers, summer squash, pumpkins, watermelons, and winter squash) are grown widely in Kentucky and considerable losses to powdery mildew occur each year. Varieties of several cucurbit crops that are resistant to powdery mildew are available; however, none are immune and fungicides are often required to provide acceptable control. To demonstrate the value of resistance in reducing the cost of fungicide applications, research was conducted in 2005 to evaluate fungicide programs ranging from relatively inexpensive (sulfur or chlorothalonil) to expensive (alternations of azoxystrobin, triflumizole, and chlorothalonil) on varieties of yellow squash that were susceptible, moderately resistant, or highly resistant to powdery mildew. Results indicate that powdery mildew can be managed with inexpensive fungicides when cultivars with moderate or high levels of resistance (Prelude II or Sunray in our trial) are planted. On susceptible varieties, a more-expensive combination of fungicides is required for effective disease control. This information has the potential to reduce production costs for the expanding alternative/specialty crop acreage in Kentucky.

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

Key Theme - Plant Production Efficiency

University of Kentucky Entomologists are studying evolutionary response by which insects adapt to new and/or stressful environments, including novel/resistant plant species (e.g., new crops and ornamental plants), and how extreme temperature affects growth, reproduction, and the operation of natural selection. By simulating natural selection in the laboratory, entomologists examine mechanisms of evolution and the genetic bases of these evolutionary responses. The long-term goal is to improve our understanding of evolutionary responses of insects to new and stressful environments. Recent work has also examined how genetic architecture (the details of inheritance patterns) affects evolutionary responses to selection. These results are directly applicable to understanding evolutionary responses of insects to resistant varieties of host plants, insecticides, and novel agricultural and ornamental plants and hold promise for improving host plant resistance to insect infestations.

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

Key Theme – Precision Agriculture

An interdisciplinary team from the University of Kentucky Agricultural Economics, Agronomy, and Biosystems and Agricultural Engineering have developed production practices that enable Kentucky producers to improve profit margins through precision management of inputs for grain production. Most notably algorithms have been developed to guide grain producers in removing marginal land from production to improve profitability; managing zinc in-furrow at planting to improve the profitability of corn production by an average of \$15 per acre; and managing nitrogen and seeding rates to improve the profitability of corn production by up to \$25 per acre on eroded landscapes.

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

Key Theme – GIS/GPS

A test facility has been constructed for dynamic testing of Global Positioning System (GPS) receivers. GPS receiver manufacturers market products with varying levels of accuracy. Data from the dynamic test facility has enabled one manufacturer to identify and correct firmware errors that degraded the performance of their receiver. A new test facility is under construction to facilitate collection of dynamic accuracy data that mimics the performance of receiver in several agricultural settings. This testing program also supports product and performance standards development within the ASAE for the evaluation of GPS receiver accuracy and standardized reporting of receiver performance data.

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

Key Theme – Agricultural Profitability

Extension's CPH (certified preconditioned for health) program requires a certain health standard for calves sold through the program, such as proper weaning and immunizations. Calves sold under CPH-45 are tagged for identification and grouped by grade and breed in order to create large lots of healthy, uniform calves. Health records assure the proper vaccination of the animals and build confidence among potential buyers.

In the 2004-05 sale period (June 2004-April 2005), 28 sales were conducted at 11 locations across Kentucky for calves which had met the CPH-45 health requirements. Approximately 30,000 feeder calves were marketed in these sales, receiving an average premium of \$7.38 per hundredweight over the average sale prices reported by the Kentucky Department of Agriculture for other types of sales. Using a partial budget to account for the increased value of calves less costs (feed, vet cost, interest, and initial value of calves), the net income realized per head was \$50.97. When this is multiplied by 30,000 head, the net increase is \$1,529,100 for Kentucky farmers. By retaining ownership of these feeder calves for additional time in Kentucky, there is also an increased business for veterinarians, farm supply stores and stockyards.

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

Key Theme – Biotechnology

The stable fly, *Stomoxys calcitrans*, has in recent years emerged as a serious problem for grazing cattle in North America. This blood-feeding fly has a painful bit and cattle attacked by stable flies often respond by bunching in dense aggregations. Bunched herds trample vegetation, accelerate erosion, and increase heat stress which in turn reduces feed intake. Heat stress increases time and feed required to reach slaughter weight, consequently, increasing the cost of finishing beef cattle. Model simulations predict that *Wolbachia* bacteria can be used to reduce or even eliminate the target population. *Wolbachia* bacteria manipulate their host's reproduction via multiple mechanisms, including cytoplasmic incompatibility. With cytoplasmic incompatibility, matings between individuals with differing *Wolbachia* infection types are sterile. Current University of Kentucky research shows a suppression of the resident pest population as a result of releases of cytoplasmically incompatible insects. The goal is to develop sustainable control tactics and management strategies for stable flies that are practical and that will be adopted for use by producers

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

Key Theme – Precision Agriculture

A yield monitor test facility was developed by the University of Kentucky Biosystems and Agricultural Engineering Department to aid in the ongoing refinement of grain yield monitoring devices used in agriculture. This is the most sophisticated test facility of its kind in the world. Two major manufacturers are introducing product upgrades made possible through use of the UK facility. With regard to one of these manufacturers sensor upgrades resulting from testing at UK will be introduced on product lines for North America, South America, and Europe. Data from this facility was also used in the development of a yield monitor test standard that is being approved by the American Society of Biosystems and Agricultural Engineering. This test facility is also helping University of Kentucky Extension Specialists provide guidelines for the adoption and use of yield monitoring technology by Kentucky and US producers.

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

Key Theme – Agricultural Profitability

Maleic hydrazide (MH) has been successfully used to control sucker growth in tobacco for more than 50 years but residue has been an industry concern since its introduction. More recently concerns have heighten due to tighter restriction in some markets both here and abroad. A project was initiated in 1995 to reduce MH residue and yet improve sucker control. Field trials were designed to look at many combinations of MH tank mixed with other sucker control chemicals. Other chemicals, while effective, were more labor intensive to apply and a seemingly backward move by producers. A combination of MH at $\frac{3}{4}$ the normal rate and a local systemic product at $\frac{1}{2}$ the stand alone rate applied as a coarse spray was found to be most effective. The advantages were found to be higher yields, improved sucker control, lower MH residue, extended control, rain safety, less weather dependent, less cover crop damage, reduced ground sucker concern, improved grower confidence and more desirable cured leaf quality. Demonstrations were conducted in field trails and field days and the concept was presented to grower in winter meetings and through laminated cards. Cured leaf samples were collected from public markets with the cooperation of the Burley tobacco Growers Cooperative for MH residue analysis from 1997 through 2004. Average MH residues declined steadily from 71 ppm in 1997 to 39 in 2004 as growers adopted the practice. The marketability of Kentucky burley tobacco is stronger than production levels.

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

Key Theme – Innovative Farming Techniques

Tobacco is not native to Kentucky and can be induced to bloom prematurely by extended cloudy and cool weather during the seedling stage. Premature flowering leads to less leaf, decreased yields and lower profits. Dr. Kasperbauer demonstrated in the 1970's that such weather simulates the shorter days and cooler weather that occurs in the fall and that the induction can be broken by a brief amount of light exposure during the night. However, most tobacco producers do not know how easily they can eliminate this problem. A simple timer installation set to turn lights on over the transplants at approximately midnight for one to two hours is enough exposure to breakdown the accumulation of phytochrome that builds during dark periods and is responsible for floral induction. As a result of Extension educational efforts, neighbors are expected to see lights come on in greenhouses and outside beds during the night all over Kentucky during April and May, but not see blooms in farmer's fields this June.

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

Key Theme – Managing Changes in Agriculture

The Kentucky Agricultural Development Board has approved a model program for hay, straw, and commodity storage in 66 Kentucky Counties. County boards have committed over \$7.4 million and participating farmers agreed to match that amount with an additional \$7.4 million to construct on-farm storage facilities. In order to qualify for funds, producers were required to participate in educational programs through the Cooperative Extension Service. Extension engineers from the University of Kentucky's Biosystems and Agricultural Engineering Department worked with county extension agents and other college faculty to develop educational materials that would provide planning and construction guidance for program participants. Teaching materials were developed and a web page (<http://www.bae.uky.edu/ext/HayStorage/>) was created to provide quick and easy access to the materials. During the year training programs were conducted with approximately 30 county extension agents and educational programs were conducted in counties for over 1100 producers who are building storage structures on their farms. Upon completion of their projects, those producers will be able to realize a savings of over \$1,000,000 per year as a result of reduced storage losses.

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

Key Theme – Animal Health

The per annum impact of the horse industry to the gross domestic product of the United States is approximately \$102 billion, with \$7.4 billion of that attributed to the horse breeding industry. In April 2001, a sudden increase in equine fetal deaths and abortions occurred in central Kentucky. This occurrence cost the Kentucky horse industry an estimated \$336 million in 2001 alone. Economic losses due to fewer Kentucky-bred horses continue to this day.

University of Kentucky College of Agriculture researchers have reproduced Mare Reproductive Loss Syndrome (MRLS) by feeding pregnant mares eastern tent caterpillars, which were abundant in the area in 2001 and 2002. Studies reported in 2005 have strongly implicated the hairs of the caterpillar to be the causative factor, and demonstrated that the disease may also impact other livestock species of economic importance to the state. Another field study addressed the question as to how long pregnant mares should be kept off ETC contaminated pastures. A third study looked at suppressing ETC populations by infecting caterpillar nests each season with virus grown in the laboratory as a biological control. Current studies are investigating the role of the immune system of the mare in MRLS. UK Researchers participated in presenting research studies into MRLS under the auspices of the Kentucky Thoroughbred Owners and Breeders (KTOB) Foundation November 30, 2005. The University of Kentucky has also established a website to keep the Equine Industry apprised of current research efforts and outcomes. The impact of these studies is to prevent future occurrences of MRLS by gaining a better understanding of the mechanisms of the disease, and to restore confidence in horse breeders world-wide that Kentucky is the best place to breed and raise horses.

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

Key Theme – Agricultural Profitability

The purpose of the Allied Inputs and Marketing Program (AIM) is to encourage the formation of local alliances or cooperatives to enable producers to lower input costs of production and create a greater demand for their product. The goal is to provide producers with information to help them organize and develop collective production and marketing plans. The AIM concept encourages producers to form a county- or area-based alliance. Currently, 8 AIM alliances are functioning in Kentucky. Together they encompass 336 producers who own approximately 20,000 cows. Purchased costs of these products were 20-30% lower than average retail. Financial analyses have shown production costs reductions of \$45 per cow in the first year alone. Cooperative marketing efforts have generated a \$5-12 / cwt. premium over other cattle sold in Kentucky that same day. The cooperative marketing has increased net returns per cow by \$28. With increases of approximately \$75 per cow, AIM has increased profitability by approximately \$1,350,000.

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

Key Theme – Precision Agriculture

Recent trends in agricultural field machinery exploit the use of microcontrollers to enhance machine function. Controller Area Networks (CAN) have been developed to facilitate communications between microcontrollers. Off-target placement of crop production inputs is a costly and time consuming problem for agricultural producers. Typical seeding/application problems include: skipped areas, double treatment, unintentional treatment, or treatment of environmentally sensitive areas. The goal of this research effort is the development of CAN-based distributed control systems for precision placement of crop production inputs such as seed, fertilizer, and pesticides. This control system utilizes dedicated microcontrollers for single element metering of inputs. Dynamic adjustment of machine operating parameters such as seed meter air pressure and shaft speed are made in response to feedback from rate sensors, ground speed radar, and GPS position fixes. Precision placement of inputs will improve Kentucky farm profitability through increased crop yield and reduced input costs through the elimination of skipped and doubled treated regions within a field, and by maintaining desired fixed and variable seeding/application rates across the toolbar or effective application width while turning and in point row regions of a field. The control system under development represents a significant advance and is warranted in view of increasing input costs and the need for traceability.

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

Key Theme – Agricultural Profitability

Adverse compaction in fields as determined with a soil cone penetrometer has shown strong correlation with decreased crop yield. Modification of a deep tillage implement to change tillage depth in response to GPS-based prescription maps resulting in variable depth tillage has been applied to approximately 450 acres of cropland in a University of Kentucky research setting. The application of this research in variable depth/ deep tillage can be used to improve net returns for cash crops.

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

Key Theme – Innovative Farming Techniques

The idea of an autonomous tractor is not a new one. Every child who lived on a farm had dreams of a farm vehicle that could take over the plowing and harvesting chores, saving them from the boredom of driving long monotonous hours. With advances in GPS technology and computerization of farm equipment this dream is now closer to reality. While an autonomous farm tractor is a realizable dream, there are still several concerns being addressed at the University of Kentucky before they become common on the family farm.

An autonomous farm tractor has been constructed and demonstrated for use in simple field operations by the University of Kentucky's Biosystem and Agricultural Engineering Department. The system is unique in that it utilizes low-cost microcontroller technologies and Controller Area Network communications based on ISO 11783, an emerging communications standard for implement/tractor sharing of information. A refined version of the original autonomous vehicle is now under development. The new vehicle platform departs from the original design in that it can be easily reconfigured to meet multiple uses. The new vehicle design is amenable to seeding and spraying operations. Further, wireless communication is being deployed to sustain a real-time link between the management computer and on-vehicle task controllers.

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

Key theme – Animal Production Efficiency

In the forage-fed cow-calf operations of Kentucky, low dietary energy typically limits calf growth, whereas the diet often supplies excess protein. The conversion of excess protein (amino acids) by the liver to glucose typically accounts for 15 to 35% of all blood glucose in cattle. The goal of this research has been to optimize the supply of excess amino acids to the liver by coordinating whole body protein digestion, absorption, and metabolic events, thereby increasing energy levels to support calf growth under commercially-relevant experimental regimens. This research fills a critical void in our current growth prediction models used by the livestock industry. With a 0.9 kg gain/calf (0.4% of body weight) realized from this research, producers will realize an increase in direct farm receipts of \$1.2 million dollars from the sale of weanling calves, and a total economic gain of \$6 million will be realized annually.

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

Key Theme – Home Lawn and Garden

Rapid urbanization in the USA during the past 50 years has increased the need for safe, effective management tactics for insect pests of landscapes and turf. Concerns about environmental impact and hazard of chemical pesticides, and loss of insecticide registrations have fueled this demand. Pests such as root-feeding white grubs, Japanese beetles, scale insects, wood borers, and leaf-feeding caterpillars cause extensive damage to lawns, landscapes, nursery crops, street trees, parks, and golf courses, amounting to hundreds of millions of dollars in economic loss. University of Kentucky researchers are developing new methods for dealing with insect pests of urban landscapes, and contributing to a better understanding of pest biology upon which control strategies are being built. Research on a highly specific virus of black cutworms is laying the groundwork for commercial development of a natural insecticide that promises to reduce pesticide usage on golf courses and sport fields.

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

Key Theme – Home Lawn and Garden

The Web site <http://gardendata.org/> was developed by the University of Kentucky Cooperative Extension Service's Western Region Horticulture Quick Response Team in response to the overwhelming seasonal demand for consumer home horticulture information. The goal was to provide gardeners, consumers and other visitors a reliable source of updated horticultural information on the World Wide Web through a database of commonly asked gardening questions that have science-based, peer-reviewed answers. This was accomplished by coordinating university multi-disciplinary experts to provide answers to clientele asking gardening questions. GardenData.org is now a statewide Extension resource. Currently, GardenData.org contains over 600 "frequently asked questions" in the subject areas of flowers, fruits, trees and shrubs, houseplants, vegetables, turf grass and water gardening, just to name a few. GardenData.org is an ever expanding knowledge base that grows with the addition of every user. The client also has the option of accessing information from previously asked questions or "ask the expert" by submitting a question of their own. Currently, the self-service rate for the site averages just over 97% which indicates that most clients who use the site find the information they are looking for without needing to ask a question. Currently a Kentucky project, we are now working with 17 other states to merge similar databases into one for eXtension and, working with others, have submitted a proposal for "Consumer Horticulture Community of Practice" with eXtension. The proposal was awarded a \$75,000 grant to further develop and integrate the sites.

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

Key Theme – Permaculture Land Management

A mechanical system has been designed and fabricated (U.S. Patent 6,056,066) that can reconstruct soil up to 4 feet deep without any surface vehicle traffic. This method has been devised whereby organic material or other amendments can be mixed with the soil during reconstruction. Continued research is being conducted to determine the rate at which soil can be reconstructed with this system and to determine the productivity of reconstructed soil. This work will be used for reclamation of prime farmland and other cropland subjected to surface mining or similar disturbance.

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

Key Theme – Animal Health

Internal parasites pose an ever-present, worldwide threat to the health and economic prosperity of the equid and ruminant sectors of animal production agriculture. Most producers are aware of the problems that worms cause, which range from decreased productivity of their animals to death. Animals are usually routinely dewormed with different commercial chemicals, by owners using a variety of deworming schedules. Every dewormer on the market has had some resistance built up to it by the internal parasites that infest livestock. This resistance means that not all the worms are killed during deworming. The surviving worms pass that genetic resistance on to offspring. University of Kentucky Researchers are gathering further information on the prevalence, ecology, and molecular mechanisms of drug-resistance of intestinal nematode parasites.

A Kentucky study of foals on a number of selected horse breeding farms clearly showed that the popular worming compound ivermectin has become much less effective against ascarids-the most important internal parasite of foals. New data indicated that of the compounds evaluated, oxibendazole was the most effective against ascarid infection. Sharing this information with livestock producers will reduce the negative economic impact of internal parasites on the equid and ruminant commodity industries, both of which Kentucky agriculture are heavily dependent.

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

Key Theme – Adding Value to New and Old Agricultural Crops

Cheese processing efficiency and product consistency is improved as the coagulation process is more accurately controlled. In cheese manufacturing the current practice requires manual selection of coagulum cutting time based on subjective evaluation of curd texture. University of Kentucky researchers have developed an optical sensor to measure light backscatter during enzymatic coagulation. The sensor in combination with an algorithm to interpret the data accurately predicts cutting time and thus automates this step. The cutting time prediction technology has been commercially tested and is currently being used by three cheese plants.

UK's current research is focused on expanding the technology for monitoring curd shrinkage during the cooking process. Through the development of a sensor capable of monitoring whey release from the curd, moisture content is standardized, reducing the damage to cheese during ripening and improving its final quality. Cottage cheese and yogurt manufacturers have also expressed an interest in using this technology.

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

Key Theme - Bioterrorism

Selected as point-of-contact for the National Extension Disaster Education Network (EDEN) committee, the University of Kentucky College Of Agriculture developed a committee of Extension specialists in the college to address and improve Kentucky's preparedness for agro-terrorism and natural disaster. With additional funding from the Federal Health Resources and Services Administration (HRSA) and building partnerships with the National Weather Service, University of Kentucky Medical Center, University of Louisville, the state Public Health service and the state's Emergency Managers, the committee has conducted multiple training programs across the state. KY EDEN web site was created to provide agro-terrorism and nature disaster preparedness training resources and safety tips for CES and Kentucky residents. Also, at the request of the state Emergency Managers 120 county severe weather web pages were created for all first responders, first detectors and storm spotters in Kentucky. StormReady Supporter Certification criteria for Cooperative Extension Offices were developed by the UK Agricultural Weather Center and have been accepted by the National Weather Service. This is being used by the Cooperative Extension Service to improve preparedness for county Extension offices across the state. This program has been shared at the National Extension Disaster Education Network (EDEN) meeting in 2005, so all Cooperative Extension offices in the nation can have specific preparedness criteria to complete the StormReady supporter certification.

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

Key Theme – Biotechnology

The use of enzymes in industrial applications is growing rapidly due to the specificity and environmental compatibility of enzyme catalyzed processes. Many of the potential users of biologically-based conversions industries are in the food and fiber processing sectors. University of Kentucky researchers are developing a technique which uses wastes from these industries to produce enzymes which would be used on the front-end of the process. This type of application adds value, reduces costs, and creates a more sustainable process. In addition, enzyme production and bioconversion processes using fibrous organic material opens potential new markets for U.S. farmers. For example, this project could reduce the cost of producing biofuels from lignocellulose, so that Kentucky farmers could share in a market for the corn stover in addition to the grain.

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

Key Theme – Agricultural Profitability

The Kentucky Master Cattleman Program continues to be an integral part of the comprehensive effort underway to replace diminishing tobacco revenue by improving Kentucky's expanding beef-forage operations. It is a collaborative effort of the University of Kentucky College of Agriculture, Kentucky Cattlemen's Association, and Kentucky Beef Network. The program consists of 10 four-hour sessions that focus on management, nutrition, facilities, environmental stewardship, genetics, reproduction, herd health, and marketing. materials are developed by Extension specialists from the University of Kentucky, who deliver the program and train extension personnel.

In 2005, the program consisted of 18 groups attending 180 county sessions and 4 field days. A total of 575 beef producers participated and 450 completed at least 8 of the 10 sessions.

The economic impact of this program is substantial. Master Cattleman participants averaged 92 cows each and with 575 participants that would be roughly 53,000 cows impacted in one year. With modest increases in calving percentage (5%), weaning weight (20 lbs), proper vaccination, increased utilization of pastures and home raised forages, and culling open cows, these participants should realize a potential increase of over \$6 million through improved management practices.

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

Key Theme – Agricultural Profitability

Melons sold in supermarkets lack the flavor and quality of locally produced melons because they must be harvested before they are ripe to insure successful shipping. Variety trials over the past five years have shown that new high quality excellent flavored specialty melons can be successfully grown and sold in Kentucky if certain soil applied insecticides are used and a stringent fungicide spray program is maintained throughout the season. Growers worked with Extension Specialists to identify several varieties, both new and new to Kentucky, which sold well at farmers' markets, roadside markets and a produce auction once consumers tasted them. Prices were excellent and ranged from \$2.50 for larger melons to \$1.00 each for smaller melons. This opens the opportunity for growers to produce a new crop that will have little or no competition with supermarkets in terms of product and fruit quality.

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

Key Theme - Biofuels

Corn stover is a potential feedstock for the production of fuels and chemicals. Annually it is estimated that 2.8 ton/acre of stover could be removed that would generate additional farm revenue of \$70/acre. Research conducted to characterize corn stover has determined that the leaves, husks, and cobs are the most valuable components for the production of fermentable sugars. Re-engineering of combines to allow for the collection of the leaves, husks, and cobs during grain harvest has been accomplished. This should decrease costs corn stover collection, and reduce negative environmental impacts of soil erosion by continuing to leave less valuable plant components in the field. It is expected that this research will decrease the collection cost by 40% relative to existing operations and increase the value of the corn stover by 20% as a result of increased sugar concentration.

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

Key Theme – Adding Value to Old and New Agricultural Products

Scientists from the Department of Biosystems and Agricultural Engineering and the Center for Applied Energy Research are currently working on a biomass conversion project. The thermochemical conversion of agricultural and forestry biomass into value-added chemicals and materials holds great promise for improving industrial sustainability and increasing markets available for US crop producers. This project investigates the conversion of biomass to value-added chemicals and materials by catalyst moderated liquefaction (CML). In CML, a heavy solvent is utilized to directly convert biomass to liquid products, gases, and solid chars without the need for hydrogen overpressure at conditions which favor the formation of heavy products such as pitch. Several catalysis systems are being considered to optimize biomass conversion and solvent recovery, while producing a wide variety of value-added chemicals and materials.

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

Key Theme – Agricultural Profitability

A unique education program was developed to provide beef producers and agriculture agents a complete education in beef and forage production. Cow College is a fee-based program for those who desire in-depth training on the latest beef management practices. Cow College is the first producer-oriented advanced training session in Kentucky. Cow College is a ten-day instructional event that includes both hands-on activities and lectures on all aspects of beef cattle production. Two hundred two producers have registered and/or participated in Cow College. These producers represented approximately 13,100 commercial cows, 1,950 purebred cows, and 10,775 stocker cattle. Size of operation ranged from 10 to 900 cows. The average rating for each session was 8.8 on a 1 - 10 scale.

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

Key Theme – Adding Value to New and Old Agricultural Products

A farm friendly and visionary legislation allows Kentucky farmers to grow, process, and sell their value added food products from their home kitchen. This has created a need for developing and implementing an educational program of food safety techniques. The University of Kentucky Cooperative Extension Service has responded to this need. Since developing these materials, over 205 entrepreneurs have been trained in the microprocessing aspects of home based business. Homebased processors (low risk items such as jams, jellies, cakes and pies) and homebased microprocessors (higher risk items such as barbecue sauce, salsa, pressure canned green beans and pickled corn relish) can now sell their home grown, value added products from the farmers market, certified roadside stands or their own farm providing new sources of income for an expanding home based and agritourism industry.

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

Key Themes – Adding Value to New and Old Agricultural Products

The Cut Woody Stems for the Florist Trade research project showed that *Hydrangea paniculata* cultivars have the potential to be marketed as fresh cut flowers. *Hydrangea paniculata* is currently available as a cut stem from the Holland market. A national commercial wholesale source of this stem is not readily available. This study could potentially result in the development of a new cut stem for the U.S. wholesale fresh cut flower market. University of Kentucky researchers have identified production practices, storage methods, and preservation solutions which produced acceptable cut flower quality in the several cultivars of *Hydrangea p.* in the study. This shows potential for a new crop opportunity for growers interested in alternative incomes.

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

Key Theme – Plant Genomics

The time between water absorption and initial root protrusion in seeds is a vulnerable stage in the plant's life cycle. Pre-plant seed treatments that enhance germination under commercial growing conditions will significantly improve plant livability and population stands. Ethylene is produced during seed germination and our research has demonstrated that its production can be diagnostic for seed vigor. In seeds, abscisic acid (ABA) promotes seed development, embryo maturation, synthesis of storage products (proteins and lipids), desiccation tolerance, is involved in maintenance of dormancy (inhibition of germination), and apoptosis. As well, ABA affects plant architecture, including root growth and morphology, and root-to-shoot ratios. University of Kentucky researchers are seeking a better understanding the relationship between ethylene, ABA, and germination speed which will lead to the increased understanding needed for the development of pre-plant seed treatment resulting in reduced production costs and yield increases.

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

Key Theme – Plant Production Efficiency

Improper irrigation significantly limits the growth, quality and profit of commercial container crops. Generally crops are either irrigated too frequently or more likely insufficiently especially under bright, warm conditions. Also, most crops are not irrigated uniformly. University of Kentucky Horticulture researchers are developing an automatic, no runoff irrigation system that controls and maintains a uniform water/air ratio in the growing media of all containers in a growing area, automatically irrigates individual plants on the bench and the nutrient solution does not drain from the system, resulting in no pollution of natural water sources. Normally, nutrient concentration is 100 ppm N from 20%N-8%P-17%K. Recent results using this system show that increasing the nutrition concentration from 100 to 150 ppm nitrogen after 2 weeks increased plant size and may produce a more uniform crop since the plants are rarely under water stress. A CWT irrigation system is adaptable relatively inexpensively to existing greenhouse benches using readily available components. The CWT system of production for container-grown plants provides several advantages over other irrigation systems including a reduced disease potential as the solution is not re-circulated and therefore little chance exists to spread disease.

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

Key Theme – Small Farm Viability

The Kentucky State University Cooperative Extension (KSUCEP) Small Farm Program works annually with limited resource farmers in the areas of new enterprise development, farm production practices, sustainable agriculture systems, budgeting, record-keeping, the effective use of USDA agencies, farm safety, and marketing, including alternative marketing systems. Currently 125 farm families receive one-on-one education in these areas, plus many were reached through meetings, field days, and statewide activities. The Trigg County Farmers Market was developed as a result of this effort, as was the Breckinridge Graded Cattle Markets. Historically, families enrolled in the Small Farm Program have increased their gross farm income while reducing their input costs. Counties with KSUCEP Small Farm paraprofessionals report that participating farmers average approximately \$10,000 in gross increased annual incomes over the course of their enrollment in the program. The economic impact in participating in KSUCEP County programs range from \$150,000 to over \$1 million in increased income as a result of the program, with most counties averaging an increase of \$250,000 - \$350,000.

Source of Federal Funds: 1890 Extension Funds
Scope of Impact: State Specific

Key Theme – Small Farm Viability

The Outreach and Assistance to Socially Disadvantaged Farmers and Ranchers Program (OASDFR) uses competitive grant funds from USDA-CSREES to work annually with small, limited resource, women, and minority farmers in the areas of farm production practices, financial management, sustainable agriculture systems, marketing, farm safety, health screenings, and the effective use of USDA agencies. This program serves over 150 families, one-on-one annually, plus many more through field days, meetings, and outreach activities. Partially as a result of the program, Kentucky has the lowest USDA-FSA loan delinquency rate in the South. Families enrolled in the OASDFR program have increased their gross farm income while reducing their input costs. This program facilitated the development of the Fairview Produce Auction, Inc. which had \$1.3 million in sales in 2005. The Fairview Produce Auction, Inc., in-turn, helped to develop the Crab Orchard Produce Auction, Inc. KSU in conjunction with NRCS established four warm seasons native grass demonstration pastures. In 2005, KSU hosted a field day in Meade County with 120 producers present to show the results of the demonstration and the value of native warm season grasses as alternatives to tall fescue.

Source of Federal Funds: 1890 Extension Funds, CSREES Competitive Grant Funds
Scope of Impact: State Specific

Key Theme - Apiculture

Due to the reduction of tobacco production in Kentucky farmers are planting more monocrops that require honey bee pollination. The Kentucky Honey Bee Pollination Association, that KSU was instrumental in creating, has played an important role in both educating farmers about the need for honey bee pollination as well as educating beekeepers to the need for crop pollination. During the past year KSU has trained County Agriculture agents as well as supplied them with protective clothing to enable them to better help their local beekeepers. The Kentucky State University Cooperative Extension Program continues its extensive involvement with the Kentucky State Beekeepers Association Queen Honey Bee Breeding program. This program has been established to raise and produce queen honey bees in Kentucky that have not been treated with any chemical mite control. This ensures that a naturally mite-resistant honey bee is available to Kentucky beekeepers. The result is a much healthier and more productive honey bee population for Kentucky producers.

A critical need in apiculture is an economical method for processing honey. KSU is meeting that need by designing Honey Processing Units and placing them in 12 strategic Kentucky counties, providing significant benefit to at least 72 surrounding counties. Four new Beekeeping Associations have been established as a direct result of the KSU Honey Processing Units. This has had a positive impact on the honey production and availability of honey bees for pollination.

Providing onsite, regional education to beekeepers throughout the Commonwealth is important to local beekeepers. Presentations by extension specialists were made at “Bee Schools” in Bowling Green, Versailles, and at the KSU’s Research and Demonstration Farm as well as to the apiculture class at Berea College and at the Eastern Apicultural Society annual conference in Pennsylvania. KSUCEP continued activities to organize and direct the third Heartland Apicultural Society annual conference in Lebanon, Tennessee, attracting 250 to 300 people, mainly from the Midwestern and southern states.

Source of Federal Funds: 1890 Extension Funds
Scope of Impact: Multi-state –PA, KY, TN, Midwestern and Southern states

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 one of the greatest food safety threats. The annual cost of foodborne illness to our economy is estimated at over \$10 billion and growing. Consumers continue to display misconceptions about food safety. According to some, changes in the risk of foodborne disease are due primarily to changes in diet; increasing use of commercial food service and in food eaten or prepared away from home; new methods of producing and distributing food; new or re-emerging foodborne pathogens; and the growing number of at-risk individuals, such as the elderly and immuno-compromised. 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 42,000 individuals in Kentucky indicated that they gained knowledge related to safe food storage, handling, and preparation as a result of involvement in Extension programs. Of these, 26,556 (or 63%) put what they learned into practice. We now realize that many don't recognize food safety as an issue at home because of increasing use of commercial food service and the growing amount of food eaten or prepared away from home. This has given us an additional focus for educational programs. In addition, 24,779 people adopted practices to increase access to food or make it more affordable. As a result of new farm friendly legislation allowing Kentucky farmers to process home grown food products in their home kitchen, 3662 Extension contacts were related to home based and micro-processing of food, with 205 entrepreneurs being trained in food safety issues.

The Kentucky Agricultural Experiment Station enhanced research efforts in pre- and post-harvest food safety and quality. An antibiotic-free swine herd has been maintained for 30 years and has allowed researchers to study the nature of development of antibiotic resistance. In partnership with Extension, a value-added incubator allows application of research findings to small meat processors. Research also investigates the effects of diet on mechanisms that control cardiovascular health. The station conducted a full-time equivalent of seven projects related to this goal in FY05.

After reviewing the Key Themes listed for each goal, the Kentucky State University projects listed in the Five-Year Plan for this goal are now listed under Goal 3 and Goal 4, whichever was deemed more appropriate.

Expenditures	Federal Extension Funds (UK)	\$375,032
	Federal Extension Funds (KSU)	N/A
	Federal Research Funds (UK)	\$578,962
	Federal Research Funds (KSU)	N/A
FTEs	Extension (UK)	24.7
	Extension (KSU)	N/A
	Research (UK)	7.0
	Research (KSU)	N/A

Key Theme – Food Safety

The future success of Kentucky's diversified agricultural economy is dependent on building stronger producer consumer relationships. Consumption of Kentucky farm and value added food products can result in increased profits for farmers and a positive economic and social impact on surrounding communities but along with this comes a responsibility to insure that on-farm processing follows proper food safety, sanitation and USDA recommended processing procedures. Resource materials and county programs are offered that showcase locally grown and processed products and encourage the consumer-producer link. The University of Kentucky Cooperative Extension Service (UKCES), Kentucky Department of Agriculture and Kentucky Cabinet for Health Services were successful in their efforts to establish farm friendly and visionary legislation allowing Kentucky farmers to grow, process, and sell their value-added food products from their home kitchen. This created a need for developing and implementing an educational program of food safety techniques. Since developing these materials, over 205 on-farm entrepreneurs have been trained in the microprocessing aspects of home based business. *Homebased processors* (low risk items such as jams, jellies, cakes and pies) and *homebased microprocessors* (higher risk items such as barbecue sauce, salsa, pressure canned green beans and pickled corn relish) can now sell their home grown, value added products from the farmers market, certified roadside stands or their own farm.

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

Key Theme – Food Safety

An issue of tremendous interest in this country involves the safety to humans and the environmental impacts associated with the feeding of genetically enhanced crops to food producing animals. Recent studies at the University of Kentucky have shown that soybean meal from herbicide-tolerant soybeans is equivalent in composition and nutritional value to conventional soybean meal, and the genetically altered DNA and specific protein that make soybeans tolerant to herbicides are not transferred into the meat following consumption of genetically enhanced soybean meal by pigs. Other studies have shown that pigs and chickens fed diets containing low-phytate feeds (corn and soybean meal) and supplemented with phytase excrete 70% less phosphorus into the environment than their counterparts fed conventional feeds. Research at UK also shows that nitrogen excretion is reduced dramatically by feeding low-protein, amino acid-supplemented diets. Environmentally-friendly diets are economical and completely safe for animals as well as for humans consuming meat, milk, and eggs from food-producing animals.

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

Key Theme – Food Safety

Food safety issues are a very important societal concern, especially with certain groups. The elderly population appears to be at greater risk of serious complications when they experience foodborne illness. It has been reported that 80% of all food safety problems arise from lack of education or lack of awareness. Based on the belief that education plays an important role in reducing cases of foodborne illnesses, faculty from the University of Kentucky's School of Human and Environmental Sciences worked with the Kentucky Cabinet for Health and Family Services-Division of Aging Services, Bluegrass Agency on Aging and the Bluegrass District Dietetic Association (BGDDA) to develop and provide a food safety education program for elderly participating in congregate and home-delivered meal programs (Meals on Wheels). The program named SNIPS (Safety & Nutrition Information Program for Seniors) was funded through the Thomas P. Rogers Foundation. The program provided three lessons on food safety with pre- and post-intervention assessments regarding elderly's food safety perceptions and behaviors. A total of 219 elderly in 9 counties in Central Kentucky participated in some aspect of the food safety education, and 114 elderly completed the program through post-intervention. After the food safety intervention, more seniors understood the commonality and risk of contracting foodborne illnesses and believed food safety problems were "most likely" to occur in the home than before the intervention. Also, more seniors ate their meals immediately or within two hours after delivery as recommended.

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

Key Theme – Food Safety

A primary concern with feeding antibiotics at sub-therapeutic levels is the putative stimulation of a reservoir of drug-resistant enteric bacteria; thereby constituting a potential public health risk. Although chlortetracycline (CTC) was originally used to reduce deleterious effects of certain species of gut flora on the intestinal mucosa, it is now known that CTC is absorbed by and accumulates in animal tissues. One way to gain the economic benefits of CTC without its associated health risks would be to identify the proteins/biochemical pathways responsible for improved animal performance so that microflora-inert CTC "mimics" can be developed. Currently, in the United States alone, it is estimated that about 45% of steers and heifers fed for slaughter each year (16 million head) suffer a loss of at least one quality grade from inferior grading of carcasses, whereas the feeding of CTC increases the carcass quality grade by 0.5 units. Therefore, if used, the successful development of a CTC-mimicking compound(s) would add an additional value of \$106/hd (2004 prices).

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

Key Theme – Food Quality

Bruised strawberry fruit produce unique volatile products that can impact the development of post harvest mold problems. The major bruise-induced product, trans-2-hexenal, was found to influence protein expression of the fungus *Botrytis cinerea* (gray mold), showing that it affects fundamental aspects of fungal development. This University of Kentucky study shows that alteration of the concentration of the wound chemical in the air surrounding the plant products shows promise in helping to control disease development.

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

Key Theme – Food Quality

Food borne pathogens such as *E. coli* O157:H7 and *Salmonella* give off chemicals into the air which may be used as "markers" for contaminated food. This research study has potential for locating disease-causing bacteria by merely sampling the air. A natural chemical has been identified that has the potential for controlling the important human pathogen *Listeria* on food.

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

Key Theme – Food Quality

Pawpaw is a highly perishable climacteric fruit. The goal of this research study is to identify optimal ripening and storage conditions to endure a quality product for the consumer. The fruit showed good firmness and quality after ripening following 4 weeks of cold storage, but longer storage periods are not recommended. After 8 and 12 weeks, fruit fail to ripen normally and exhibited poor quality. Manipulation of ripening on trees or after harvest with common techniques has been explored but as of yet, has not been successful.

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

Key Theme – Food Safety

The goal of the Expanded Food and Nutrition Education Program (EFNEP) is to not only improve diet and nutritional practices for low income families with children but to reduce the incidence of food borne illness in these homes through improved food handling and storage procedures. Educational classes are conducted by program assistants in one-on-one, small group, and school settings. The University of Kentucky collected FY 05 impact data from 13,898 participants in 4,563 Kentucky families. Food safety practices, such as thawing frozen foods and storing foods properly improved for 79% of participants.

Source of Federal Funds: Smith-Lever, Other Federal
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 137,058 contacts related to Food and Nutrition beyond the 235, 222 Expanded Food and Nutritional Educational Program (EFNEP) targeted program contacts including a significant increase in contacts through the Food Stamp Nutrition Education Program (FSNEP). In response to increasing awareness of proper diet and obesity and its effects on health and longevity, 611,311 additional contacts were made related to promoting healthy lifestyle practices by coupling proper diet and nutrition with exercise and preventive health practices in order to make informed health choices. This area represents one of the fastest growing programming needs in Kentucky Extension. In order to best deal with increasing demand, Kentucky Extension collaborated with other organizations and agencies to co-sponsored 1,770 different events or activities focused on comprehensive health maintenance. Program such as *Get Moving Kentucky* and *LEAP for Health* are creating an awareness of the breadth of Extension program opportunities among an expanding clientele base.

These efforts resulted in 47,347 citizens making lifestyle changes for the purpose of improving their health. An additional 29,111 individuals implemented personal health protection practices appropriate for their life cycle stage (preventive health practices, participation in screening and detection opportunities, immunizations, etc.) and 26,507 people adopted at least one new safety practice (bicycle helmets, fire extinguishers, tractor roll bars, radon testing, smoke detectors, proper ATV operation, etc.).

In FY05, the Kentucky Agricultural Experiment Station conducted the equivalent of four GPRA percentages related to this goal. With the addition of a dietetics program to the College of Agriculture, as well as the statewide focus on human nutrition, Goal 3 will become even more prominent in research.

Human nutrition and health is a focus area of research and extension at Kentucky State University. Diet modifications, the use of functional foods to improve human health, and determining the effect of human exposure to pesticides are long range goals. Three research projects are currently supported by KSU Research and two are reported on here: Combined effects of soy protein and other dietary factors on bone metabolism, and monitoring biological endpoints of pesticide exposure in blood of farm workers.

Expenditures	Federal Extension Funds (UK)	\$1,480,266
	Federal Extension Funds (KSU)	\$109,000
	Federal Research Funds (UK)	\$684,229
	Federal Research Funds (KSU)	\$374,499
FTEs	Extension (UK)	97.6
	Extension (KSU)	6.5
	Research (UK)	4.0
	Research (KSU)	7.0

Key Theme – Human Nutrition

Kentucky has over 500 Superfund (hazardous waste) sites. Exposure to environmental contaminants from these sites contributes to an increased risk for chronic diseases including cardiovascular disease, diabetes, hypertension, and cancer. Nutrition impacts overall health, particularly chronic conditions, as well as the body's response to environmental pollutants. Drawing on the strength of the nutrition-related research of Superfund Program, University of Kentucky faculty and Extension Specialists have developed nutrition education outreach programs for families living near Superfund sites, health care professionals, and other broad audiences as well as provided training for Extension Agents on the subject of environmental safety. Kentucky's community outreach model of translating safe effective nutrition information to those affected by Superfund sites has been presented at national meetings and has received attention as a model for other Superfund research programs.

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

Key Theme – Human Nutrition

The goal of the Expanded Food and Nutrition Education Program (EFNEP) is to improve diet and nutritional practices for low income families with children. Educational classes are conducted by program assistants in one-on-one, small group, and school settings. The University of Kentucky collected FY 05 impact data from 13,898 participants in 4,563 Kentucky families.

A total of 95.2% showed a positive change in food consumption habits; fruit and vegetable consumption increased from 2.6 servings per day to 5 servings per day. A total of 94% of participants improved in one or more food resource management practices including: planning meals, comparing prices, using a grocery and running out of food less often. Nutrition practices (planning meals, considering family health, not adding salt, reading labels and eating breakfast) improved by 95% in one or more areas. Youth education is conducted in schools, after-school programs, camps, and summer feeding program sites. 27,092 youth participated in at least six hours of nutrition education during FY 2005.

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

Key Theme – Human Health

Medical nutrition therapy results in health benefits and cost savings for the public. According to the Surgeon General, eight of the 10 leading causes of death, including coronary heart disease, stroke, some types of cancer, and diabetes, are related to diet and alcohol consumption.

A major focus of current research is the role of leptin in appetite regulation. Malnutrition and weight loss commonly occur in patients with inflammatory bowel disease (IBD). In pediatric patients with IBD, malnutrition and weight loss may cause permanent growth stunting. Recently, leptin, an appetite hormone, has emerged as a potential mediator of inappropriate satiety in inflammatory states such as IBD. University of Kentucky researchers hypothesized that patients with IBD may have elevated leptin concentrations contributing to inappropriate satiety and reduced food intake. In an animal model of IBD, research results showed a dramatic increase in leptin concentrations in the IBD mice compared to controls. An investigation is currently underway to determine if the same is true in humans. Confirmation of this will lead to therapies to reduce leptin levels in those IBD patients who have the added problem of anorexia and weight loss.

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

Key Theme – Human Health

The average Kentuckian has poor dietary habits (high intake of processed foods rich in fat and low in fruits and vegetables), which contribute to poor health. Thus, Kentuckians are experiencing a high incidence of nutrition-related health problems such as obesity, cardiovascular disease, diabetes and hypertension. These and related health problems may be due in part to over-consumption of calories and especially fat, and lack of protective nutrients such as antioxidants and related bioactive compounds. Sufficient consumption of micronutrients, including minerals like zinc can provide effective protection against the harmful effects of high-fat diets. Our research suggests that diet-derived zinc can provide protection against cardiovascular diseases such as atherosclerosis by preventing metabolic and physiologic derangement of the vascular endothelium. The anti-atherogenic role of zinc appears to be in its ability to inhibit oxidative stress-responsive and inflammatory factors involved in disruption of endothelial integrity and atherosclerosis. Thus, research shows whole foods rich in health-promoting minerals and vitamins should be included in every meal.

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

Key Theme – Human Health

“Weight: The Reality Series” is a ten-week educational course designed to help adults learn to control their weight. The curriculum includes lesson plans, participant handouts, marketing materials and evaluation tools. There is also a downloadable educational display available which emphasizes the connection between behavioral risk factors, such as physical activity and weight, and diabetes. In an evaluation of this program in ten counties with over 150 participants, an average weight loss of 5% of initial body weight was realized. County Extension agents are now expanding the use of the program in their community with local partners as part of increased demand for programming in diet, health and nutrition, one of the fastest growing components of Extension programming for families.

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

Key Theme – Human Health

The incidence of autism continues to rise with no cure or understanding of the cause of the disorder. Approximately one in 250 children will be diagnosed with an (ASD) autism spectrum disorder. Of the many etiological theories regarding autism, several include gastrointestinal insult, metabolic abnormalities, specific nutrient deficiencies such as iron and folate, and overload of some nutrients. Nutrition can be an intervening actor in slowing the poor outcomes of cognitive and physiological delay associated with Autism. Autistic treatments include a variety of psychoactive medications which affect both appetite and nutritional status and restrictive diets such as the gluten free/casein free diet. Parents’ influence on the dietary intake is magnified because of the elevated reliance children with autism have on parents and caregivers for daily living activities. This research program evaluates nutritional status and medication interactions in an effort to help parents normalize autistic symptoms in their child. Few parents have the skills to address the nutritional issues of these children without support. This program gathers and provides research-based information to help manage behaviors reduce the many nutritional risk factors that evolve from treatment of autism. Information has been delivered information to over 17,000 persons in FY 05 in parent support groups and with professional organizations in KY, OH, IN and at national and international professional meetings.

Source of Federal Funds: Hatch, Smith-Lever
Scope of Impact: Multi-state

Key Theme – Human Nutrition

According to the Centers for Disease Control (CDC), Kentucky ranks fourth nationally in percentage of obese adults. Overweight and obesity are risk factors for chronic diseases that include heart disease, stroke, and Type II diabetes. Additionally, a higher percentage of Kentucky high school students are overweight or at risk for being overweight than nationally. Faculty from the University of Kentucky's Department of Nutrition and Food Science developed and implemented a healthy menu test, called "Fresh Take," for middle schools in Lexington. The overall objective of "Fresh Take" was to encourage positive, improved changes in eating behaviors of middle school students through increased consumption of healthy menu items, especially fruits and vegetables. Several new menu items, including fruit and vegetable entrée salads and side items, were created and added to the cafeteria menu in 5 middle schools. Post-intervention attitude scores about the program and self-reported consumption data were positive. Students who were aware of the new "Fresh Take" menu items had a significantly better opinion of school lunches after the intervention. Furthermore, students who tried more "Fresh Take" menu items found school lunch to be much better or somewhat better than before "Fresh Take." Successes of this program have been shared at a national graduate conference, with Fayette County Middle School's Health and Physical Education Teachers, and a manuscript is in progress.

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

Key Theme – Human Health

Kentucky leads the nation in the percentage of adults who report low physical activity. Cooperative Extension staff are addressing this health risk factor through an innovative program, called "Get Moving Kentucky." The program manual includes a media awareness campaign, an 8-week physical activity program and health lessons. The program also includes a web-based tracking system that allows participants to keep a record of their physical activity. Communities are encouraged to form a physical activity task force to not only implement the program but also to develop a year-round physical activity plan. The UK Wellness Center and Kentucky Cabinet for Health Services were partners in developing the program. Over 200 County Extension agents and community partners from across the state received program materials and training and are actively working to launching programs in their communities. In FY05, Extension Agents reported 91,803 clientele contacts in the "Get Moving Kentucky" program with an estimated 33,000 Kentuckians participating in the program. An evaluation of the program in 3 counties where 240 participants were surveyed revealed that participants were active 42 minutes per activity day of the 8-week program. This meets the recommendation of 30 minutes of physical activity 5 days a week to reduce the risk of chronic disease. Over half of the participants reported weight loss averaging 4.6 pounds and over a quarter reported a decrease in blood pressure.

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

Key Themes -Human Health

This study recognizes the synergistic effects of soy products and tea in helping postmenopausal women in reduce bone loss due to estrogen deficiency. Study results on bone soups have helped 50 local families to recognize the need for addition of vinegar and proper preparation procedures to derive an adequate amount of calcium from bone soups. Such information helps to meet the calcium needs of many more people, who do not consume dairy products on a regular basis. Overall, results from this project help people to develop effective dietary strategies to reduce the risk of osteoporosis.

Source of Federal Funds: 1890 Evans-Allen
Scope of Impact: National

Key Themes -Human Health

This study has identified endogenous antioxidant enzyme erythrocyte superoxide dismutase as an indicator of pesticide exposure during the growing season and urinary 8 hydroxy deoxyguanosine an oxidative adduct of DNA induced by genotoxic compounds excreted in the urine as a biomarker of cytogenetic damage. After further validation, 8 hydroxy deoxyguanosine or DNA damage by Comet assay could be used as a cytogenetic marker to monitor occupationally exposed groups, as tool in epidemiological studies, and perhaps to minimize the effects of chronic pesticide exposure.

Source of Federal Funds: 1890 Evans-Allen & Capacity Building
Scope of Impact: National

Key Themes – Family Development

The FDM Program continues to partner with the Juvenile Court’s Restitution Program in providing inner city youth, who run afoul of the law, usually a fist-time offenders, opportunities to perform community service, learn from a positive role model and be mentored by professionals, with the hope that they will be motivated to remain in school, and ultimately be deterred from juvenile delinquency. Training provided included decision-making—(good and bad), goal setting, how the law enforcement system operates, consequences for problematic behavior, and the importance of remaining in school and getting a good education. This intervention continues to experience a 100% success rate, in motivating the students to return to school and remain for the duration of the school year.

Source of Federal Funds: 1890 Extension Funds
Scope of Impact: State Specific

Key Theme – Human Health

Since its inception, the Health Education through Extension Leadership (HEEL) Program's goal has been to impact the overall health and wellness of Kentuckians. Extension Agents have historically conducted programs that address health-related nutrition topics with less concentration on the overall health and wellness of Kentuckians. It is understood that several health conditions and factors are responsible for the poor health status of Kentuckians and not nutrition alone. These include, sedentary lifestyle, a poor diet high in fat and low in nutritional value, the use of tobacco, and poor health literacy.

Programs developed and implemented to address the issues Kentucky families face include:

- **Get Moving Kentucky** – addressing physical activity and Kentucky's national ranking as having the worst statistics for physical activity.
- **Calming the Storm** – Addressing social-emotional well being
- **Walk Your Land** – addressing Methamphetamine dangers to landowners.
- **Kentucky Alliance for Drug Endangered Children** – health literacy for serviced providers addressing the dangers to children residing in meth homes.
- **LEAP for Health** (Literacy, Eating and Activity for Pre-Schoolers) – health literacy for preschoolers using storybooks.

Impact Statements reported for FY 01 vs. FY 05 showed a marked increase in Extension health programming (196 in 2001 vs. 319 in 2005) that address the broader issue of diseases and health topics focused on by the HEEL Team. Clientele contact numbers showed a similar increase (349,745 in 2001 vs. 748,489 in 2005).

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

Key Theme – Family Development and Management

Annually, the Family Development and Management Program provide opportunities for enrolled participants to receive assistance in “weatherizing” their homes. As a result of the increases in utilities by approximately 70%, program families were seeking alternative, low cost methods of reducing high utility bills. The FDM Program, in collaboration with the Metro Louisville Community Action Agency's Project Warm, program families were provided a weatherization kit that provided the entire basic tools needed to winterize their homes, including caulking, heavy plastic material used for covering windows and doors. In addition, they received training and a demonstration on how to install, tips on thermostat control, made “draft dogs”, designed to keep out air around door entrances. As a result, program families have realized a reduction in their utility bills of 20%, a savings of \$150-275; thereby resulting in a net savings of \$660 over a 12-month period.

Source of Federal Funds: 1890 Extension Funds
Scope of Impact: State Specific

Key Theme – Human Nutrition

The goal of the Food Stamp Nutrition Education Program (FSNE) is to improve the likelihood that persons eligible for the Food Stamp Program (FSP) will make healthy choices within a limited budget and choose healthy lifestyles consistent with the current Dietary Guidelines for Americans and the USDA Food Guidance System.

The University of Kentucky collected FY 05 impact data from 1,632 participants in 926 Kentucky families showing that nearly three quarters of the participants are families with children and over a fourth have limited English proficiency.

Nearly 92% of participants showed a positive change in diet. The average number of servings in most food groups increased; there was an increase in the variety of foods eaten and a decrease in fat and sugar intake. A total of 89% showed improvement in one or more food resource management practices such as price comparison and using a shopping list. A total of 89% showed improvement in one or more nutrition practices such as reading nutrition labels and feeding their children breakfast more often. A total of 61% showed improvement in one or more food safety practices such as not allowing food to thaw at room temperature.

Impact data from families who grew gardens showed an average current market value for food items at \$175 per family. Families also reported canning, freezing, and drying fruits and vegetables.

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

Key Theme – Family Development and Management

Money management for youth is also a focus of the Family Development and Management Program. Research continues to demonstrate that adults teach children by how they model certain behaviors in daily living and their conversations regarding money. The manner in which children are exposed to the concepts of saving and spending money may have lifelong consequences, as parents continue to be the first and most important teacher and influencer of their child's behavior. Preschool children, as young as three years of age can be taught how to identify coins and keep their money in a safe place. The FDM Program continues to provide trainings for child care providers on money management for preschool children. These seminars provide training in the areas of human develop (ages and stages of development), developmentally appropriate practices, the value of play, techniques and strategies for teaching difficult concepts to preschool children, (money, saving and putting off spending to purchase something that is highly valued at a later time). As a result of these seminars, demonstrated knowledge and skill gains were noted among child care worker in attendance. In addition, 100% of the participants indicated that they were motivated to return to their classrooms to teach concepts learned on money management.

Source of Federal Funds: 1890 Extension Funds
Scope of Impact: State Specific

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 FY05 program year, the Kentucky Cooperative Extension Service made 218,691 contacts related to promoting the effective stewardship of natural resources. The success of the Master Logger Program is evident in that the Kentucky Legislature now requires a trained University of Kentucky Master Logger to be on site at all commercial logging operations. Another success of this program is the spawning of a new program for next year for woodland owners entitled the Kentucky Woodland Owners Education Program. The Kentucky 4-H Camping program for the first time adopted a statewide curriculum on Water Quality for the nearly 10,000 junior 4-H campers resulting in 13,732 youth contacts.

As a result of these efforts, 24,862 individuals adopted practices that protect the water. 3,842 individuals began using new forest management practices. 25,943 individuals adopted one or more practices related to conserving, sustaining, or protecting soil resources. New conservation practices were used on an additional 947,839 acres of land.

The Kentucky Experiment Station conducted the equivalent of 20 GPRA percentages related to this goal in FY04. The projects include animal waste management and biological control, two areas of research important to the state and region.

Research into water quality on small farms, use of integrated pest management, and the use of sustainable cropping practices remains an active goal area at Kentucky State University. Three research projects are currently supported by KSU Research and one is reported on here: Resistance of stored grain moth pests to transgenic grain.

Expenditures	Federal Extension Funds (UK)	\$385,362
	Federal Extension Funds (KSU)	\$104,500
	Federal Research Funds (UK)	\$1,315,824
	Federal Research Funds (KSU)	\$412,769
FTEs	Extension (UK)	25.4
	Extension (KSU)	1.0
	Research (UK)	20.0
	Research (KSU)	7.0

Key Theme – Energy Conservation

In the past year an Extension-wide Energy Committee was formed to give leadership and guidance to Extension Programs. The department's work in the residential housing area has shifted to energy efficiency (conservation) and indoor air quality issues. This work is closely integrated with the department's research efforts in renewable energy and energy efficiency. The energy conservation work is focused on proper insulation levels and techniques and proper sizing of HVAC systems. The indoor air quality work focuses primarily on mold and humidity control.

The department has established a strong working relationship with State Office of Energy Policy in the Commerce Cabinet to develop programs that deal with energy conservation. Through grant funding from this agency the department has been able to hire a full time staff member to provide energy conservation programs throughout the state including some non-traditional Extension audiences such as Home Builder Associations, Realtor Associations, energy suppliers, etc. As a component of this program a major display has been created for the Kentucky State Fair.

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

Key Theme – Energy Conservation

Heating and cooling account for approximately half of the energy used in residences in the US resulting in an annual cost of approximately \$66.5 billion. It is estimated that air infiltration and ventilation represent a third to a half of that load so air tightening has become important. There are tradeoffs however between tightening up the home (and thereby reducing the infiltration) and maintaining sufficient ventilation for indoor air quality. A proof-of-concept, demand-controlled-ventilation system has been developed and tested. Further research on this concept is being done where the weather conditions will control the amount of outdoor air being introduced into the residence. This control will account for the amount of natural infiltration coming into the residence and then adjust a mechanical fan to bring in an optimal amount of outdoor air needed to provide for adequate indoor air quality while minimizing the energy required.

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

Key Theme – Air Quality

Agricultural air quality has received increasing focus in the past few years. A multi-state, multi-disciplinary project to quantify ammonia emissions has resulted in over 16 months of high quality emissions data. Ammonia is a contributor to poor air quality, and agriculture is a major source of ammonia. The US EPA is required as part of the Federal Clean Air Act to determine sources and quantities of key air pollutants including ammonia. The poultry industry's contribution to the economies of Kentucky (broilers), Iowa (eggs) and Pennsylvania (both) is substantial, and objective, science-based emission measurements are a critical missing element. A grant was funded by the USDA IFAFS program, with the University of Kentucky as leader; it involved the acquisition, analysis and dissemination of ammonia emissions information to all stakeholders. A key contribution to the science to date was the development, fabrication and dissemination of ten units for measuring building ventilation rates; and a portable, low-cost means of measuring total building emissions. More recently University of Kentucky-Biosystems and Agricultural Engineering in partnership with Iowa State University began the first-in-nation Air Consent Agreement study site, on two broiler growout farms in western Kentucky. This study includes multiple gases and particulate sizes.

Source of Federal Funds: Hatch,
Scope of Impact: Multistate Research -KY, PA, Iowa

Key Theme – Natural Resource Management

High-value hardwood trees are being established on surface-mined lands in Eastern and Western Kentucky while reducing carbon dioxide (CO₂), flooding and sedimentation of streams and lakes. Since 1980, an estimated 1.2 million acres were permitted for coal mining representing nearly 5% of the state's total land area. Hundreds of acres of high-value hardwood trees, on currently mined and reclaimed areas, are being established and monitored for survival and growth. Reclamation methods are being modified by changing current practices, which result in compaction and low tree survivability, to loose dumped spoil which produces a surface topography with 3- to 5-ft depressions. Monitoring at 11 sites concluded that peak flow and runoff volume, infiltration rates, sediment loading and effluent sediment and water quality concentrations are resulting in much lower environmental impacts. Kentucky has influenced policy development nationwide and approximately 20% of new mining permits in Kentucky have adopted this new reclamation technique.

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

Key Theme – Riparian Management

Kentucky has more beef cattle and more stream miles than any other state east of the Mississippi River. Since most of Kentucky's grazed land contains streams, cattle are generally given free access to the streams. By utilizing management strategies such as alternative shade, off-stream water, pasture enhancement, and low level herbicide treatments the impact of cattle on Kentucky's streams may be reduced. These management strategies have been applied on small pastures at the Animal Research Center while cattle have been tracked with GPS collars. By tracking the animals in this way, cattle position can be obtained every 5 minutes for up to 18 days. The data are being analyzed to determine which management strategies are the most effective for altering cattle position in the field.

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

Key Theme – Agricultural Waste Management

Pervious concrete is a mixture of coarsely graded aggregate and cement that results in a material that easily transmits water. Pervious concrete has mainly been used to control runoff from parking lots and to allow groundwater recharge. Since the mixture has a porosity and permeability, there could be several advantages of using pervious concrete for agricultural purposes including solid/liquid separation and waste remediation. We believe that the pore structure of pervious concrete will provide space for bacterial growth, which will enhance organic material digestion as well as aid in carbon dioxide evolution, urease production, and reduction of pathogen colonies in the samples during and after manure additions.

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

Key Theme – Water Quality

The Kentucky Master Logger program in 2004-05 introduced 422 new loggers to potential water quality problems associated with harvesting and the proper use of forestry Best Management Practices for protecting water quality. These loggers in combination with those loggers trained in previous years implemented improved practices to protect water quality on 312,827 acres owned by 8668 landowners. These practices provided increased protection for 1,390 perennial and 3,823 intermittent streams in Kentucky. Water quality programs were also delivered to woodland owners resulting in over 1000 individuals adopting improved water quality practices.

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

Key Theme – Forest Resource Management

Fire has been an important disturbance agent in our forests for thousands of years, and is thought to have been integral to the long-term development of upland oak forests in the Appalachian region. Starting in the 1930s, fire suppression was initiated as a control measure to limit the negative impacts of fire on forest stands. Although seemingly necessary at the time, recent evidence suggests some negative effects of fire suppression on oak forests. This project builds on ten years of research examining the role of carefully prescribed fire in the management of upland oak forests. This research improves our understanding of the role for prescribed fire in fuel reduction and accumulation, tree species composition and stem density, and tree seedling establishment. This project has an important technology transfer component that stems from close collaboration with the Daniel Boone National Forest and USDA Forest Service Southern Research Station.

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

Key Theme – Integrated Pest Management

Scientists recognize that evolution of resistance is a significant threat to continued development and success of Bt insecticides and transformed plants. Thus, information provided by these investigations is essential to the development of tactics that may delay or reduce the evolution of resistance to Bt corn, or for the development of novel products that can replace those which pose resistance concerns. Proactive description of resistance development and mechanisms of resistance will prolong the useful life of important tools for managing moth pests of stored grains, nuts, and other commodities organically. For example, results of this investigation will help preserve effective use of the organic Bt products Xentari DF, Biobit, and Dipel DF which is a concern of organic growers especially grain producers. There are roughly 88 organically certified grain producers and handlers in the United States. They produce annually 90 million and 73 million bu of organic corn and wheat, respectively. Organic grain consumption by humans and livestock is expected to increase annually for the foreseeable future. Organic meat and poultry consumption alone is projected to increase 30% per year for the next four years. Further studies with different insects in laboratory and especially field settings need to be performed in order to gain full understanding of the mechanisms of resistance development.

Source of Federal Funds: 1890 Evans-Allen
Scope of Impact: State-specific Research

Key Theme – Integrated Pest Management

The roles of many abundant natural enemies are poorly understood. Minor changes in cropping practices can affect natural enemy abundance and impact on pests. This seeks to clarify the roles of abundant natural enemies in crops, as well as the influence of cropping practices on natural enemy abundance and effectiveness. Our studies of *Coleomegilla maculata* have revealed a possible mechanism (companion plantings) for increasing the larval densities of this predator on sweet corn. Furthermore, we have shown that predation by larval *C. maculata* is not easily replaced by predation from other natural enemies.

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

Key Theme – Endangered Species

Black bears den in large hollow trees; they consume acorns, beech nuts, and carpenter ants; and they travel forested corridors between large forested tracts. The black bear is also a game species – a secretive, challenging quarry that lives in remote, inaccessible areas. When it comes to the conservation and management of eastern forests, the black bear is a classic flagship species. The successful management of this wide-ranging species requires large, mature forests, and stewardship that not only promotes viable populations of bears, but healthy ecosystems as well. Researchers at the University of Kentucky, Department of Forestry are uncovering the secrets of the black bear in the forests of eastern Kentucky and the swamps of south central Florida. In Kentucky, the black bear is on the rise, decolonizing the state after more than a century's absence. In Florida, a small, isolated population is imperiled by busy highways, habitat loss, and conflicts with people. The work, in collaboration with state wildlife agencies and private land owners, has shown that Kentucky bears produce up to 5 cubs per litter, but in the declining Florida population, litter sizes are small, and many animals get killed on highways. The research has targeted the development of population estimates and habitat evaluations that will permit managers to restore populations in both states to numbers that benefit ecosystem processes and promote positive outdoor experiences for people.

Source of Federal Funds: Hatch
Scope of Impact: Multi-state – KY, FL

Key Theme – Land Use

Kentucky State University’s “Third Thursdays” program continues to receive state, regional, and national recognition as a model farmer-professional education program. It serves as a model for the Southern Region SARE. Approximately 1, 000 participants attended the workshops in FY2005. As a result, the SARE program sponsored KSU to take 75 small farmers to the Southern Sustainable Agriculture Workers Conference. The Third Thursday sustainable agriculture workshops focus on marketing issues including home-based processing and micro-processing, value-added and local sales; goat production and marketing; farmer to consumer - the need for producing healthy food; pawpaw, current and grape production and marketing; vineyards and wineries; farm equipment maintenance and safety; sustainable fish and shrimp production for small farmers; goat and beef cattle production systems and the USAIP; and, sustainable and organic vegetable production.

Source of Federal Funds: 1890 Extension Funds
Scope of Impact: State Specific

Key Theme – Energy Conservation

The major reasons small buildings have traditionally not been very energy efficient is that there are insufficient design fees for architects and engineers to do any energy optimization on their designs and/or they are designed and constructed by design-build construction contractors lacking the resources necessary to build energy efficient buildings. A Biosystems and Agricultural Engineering faculty member at the University of Kentucky organized and is leading a consortium of professional organizations consisting of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), the American Institute of Architects (AIA), the Illuminating Engineering Society of North America (IESNA), the New Buildings Institute (NBI), the US Green Building Council (USGBC) and the US Department of Energy (DOE) to perform research and to develop and publish design guides. *The Advanced Energy Design Guide for Small Offices (AEDG-SO)* was recently completed and published. The purpose of the series is to develop ways to design and construct buildings which will use 30-, 50- and 70% less energy than buildings built to today’s building codes. The development of this Guide required approximately 5000 person-hours of professional input over a period of one year. It is estimated that this AEDG will lead to an annual energy savings of over \$400 million and an annual reduction of 2.2 million metric tons of CO₂. Another AEDG for small retail buildings is currently being developed and one for K-12 schools is scheduled to begin in 1st Q 2006. The AEDG-SO was recently awarded the 2005 USGBC Leadership Award for Research and was runner-up in the 2005 Alliance to Save Energy’s Stars of Energy Efficiency Award.

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

In FY05, the Kentucky Cooperative Extension Service made 1,600,703 contacts related to the development of life skills in youth and adults. These include Parenting, Family and Consumer Sciences, Family Resource Management, Leadership, Personal Development and Civic Engagement. 180,441 contacts were related to community capacity building, such as Community Systems and Processes, Economic Development and Small and Home-based Business Development. 146,625 contacts were related to the development of communication skills in youth, a hallmark of the 4-H Youth Development Program.

194,273 Kentucky youth participated in Extension 4-H Youth Development programs with over 168,000 (86%) receiving 6 hours or more of instruction in science, technology and life skills education. 20,275 individuals were members of Extension Homemaker Clubs affiliated with the Kentucky Extension Homemaker Association. This approach of using multiple contacts allows us to impact people's lives rather than just touch them.

As a result of these efforts, 86,735 individuals demonstrated informed and effective decision-making. 98,324 youth and adults demonstrated the application of practical living skills. 93,840 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 6,727 prepare to enter the workforce. 8,088 dependent care providers (adult or child care providers) reported changes in knowledge, opinions, skills, or aspirations as a result of programs conducted by Extension. 18,076 individuals reported changes in knowledge, opinions, skills, or aspirations related to parenting or personal relationships and 26,620 individuals adopted one or more practices to improve their financial wellness.

In FY05, the Kentucky Agricultural Experiment Station conducted the equivalent of five GPRA percentages related to this goal.

After reviewing the Key Themes listed for each goal, the projects listed in the Five Year Plan of Work for Kentucky State University for this goal are now reported on under Goal 3 and Goal 4, whichever was deemed more appropriate.

Expenditures	Federal Extension Funds (UK)	\$3,311,728
	Federal Extension Funds (KSU)	207,000
	Federal Research Funds (UK)	\$105,266
	Federal Research Funds (KSU)	N/A
FTEs	Extension (UK)	218.4
	Extension (KSU)	7.5
	Research (UK)	5.0
	Research (KSU)	N/A

Key Theme – Financial Management

The 1990 Farm Bill mandated that borrowers obtaining loans from the Farmers Home Administration (currently the Farm Service Agency) would be required to receive training in farm business planning, financial management, and crop and livestock production practices. Changes in agriculture including the Tobacco Buyout Program have made this type of training even more essential for success. Farm Management Specialists with the University of Kentucky, Department of Agricultural Economics conduct intensive, 16-contact hour, training programs developed specifically for this clientele group of predominantly small farm operators in central and eastern Kentucky and larger farms in western Kentucky. At the beginning of each session, participants fill out surveys to give instructors an idea of the general characteristics, enterprises and size of operations of the farms as well as provide information on their current financial management practices. This year nearly 100 operators attended the training, enhancing their practice and management skills. At the conclusion of each workshop participants evaluate the program. While many are reluctant at the beginning of this process, the effectiveness of these workshops is best indicated in that more than 95% of borrower participants would recommend this workshop to another farmer. A particularly meaningful participant comment indicating the true educational value of the workshops has been, *“I wish they had made us do this, 30 years ago.”*

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

Key Theme - Tourism

Computerization is one of the fastest-changing aspects of the hospitality and travel industry. The importance of IT in the infrastructure of the hospitality industry has had solid strategic implications for industry leaders. In particular, the e-commerce research is cutting-edge research, reflecting the explosive growth of e-commerce in the travel industry. “E-travel consumers” or “online travel planners” totaled 12 million in 1997 and increased to 66 million in 2004. The e-travel sector was projected to have become a \$106 billion market in 2005. Current Research is particularly significant and meaningful to the state of Kentucky by making positive impacts on Kentucky by benefiting the economy of Kentucky and the lives of Kentuckians. Research on IT use in the Kentucky foodservice operations revealed that the operators view IT resources as useful to business operations, and they indicated that more support for financial investment and training should be provided by the management to fully utilize the IT systems. E-commerce research demonstrated that more than 75 percent of the Kentucky population qualifies as e-travelers. The research outcomes suggest that Kentucky hospitality and travel operations should make strategic plans on how they can take advantage of IT systems to maximize revenues and customer satisfaction.

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

Key Theme – Leadership Training and Development

Recognizing the need to develop agricultural leaders that will be equipped to function as better informed and more articulate spokespersons for agriculture and rural issues, the agriculture leadership development program was created. In a state heavily dependent on agriculture income from tobacco production and acknowledging the challenges facing the tobacco industry, there was a need to increase understanding of the policies and problems related to tobacco and other farm commodities. The University of Kentucky College of Agriculture, in cooperation with Philip Morris U.S.A., established a two-year intensive leadership development program. Thirty leadership participants from Kentucky, Tennessee, Missouri, Indiana and Virginia comprising Class VII of the burley agricultural leadership program graduated in March 2005.

A survey of past program graduates showed that they believe they are more adept at cooperating and working as a team member; asking questions; and developing pride and confidence in themselves. All (100%) have shared information with other farmers and business associates. Some shared program information with community groups (90%), commodity groups (82%), and civic clubs (74%). Over one-fourth (27%) have implemented action at the local level on public policy issues that they studied during the leadership program. One-fourth (25%) of the participants have organized groups/networks to address agricultural issues or problems. A significant outcome of the program has been increased community service through elected leadership positions. One participant is now a state legislator (in TN), one is running for magistrate in Harrison County, the Executive Director of Kentucky Farm Bureau is a graduate as are 10 of the 30 members of the Board of Directors of the Burley Growers Cooperative. Two of the 3 regional field representatives of the Kentucky Agricultural Development Board have also graduated from the program.

Source of Federal Funds: Smith-Lever
Scope of Impact: Multi-state – KY, TN, IN, MS, VA

Key Theme – Jobs/Employment

Thompson's millwork is a start-up company located in Pikeville, Kentucky. Their production focus is on millwork products such as hardwood flooring, house trim, and other related products. University of Kentucky Extension Forestry Specialists have provided them with information about marketing, production equipment, production layout, and tool design and manufacture. This information has been shared by personnel in a variety of formats ranging from one on one consultation to formal structured training events. Thompson's Millwork currently has 5 employees and is looking to add 2 more in the near future but the real success is that they will soon be moving to a larger facility in neighboring Floyd County. Based on the expected size of operation, Thompson's Millwork could in the future employ up to 115 people in an area of the state that could use significant economic stability and growth.

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

Key Theme – Community Development

This program enables many small Kentucky manufacturers in the Secondary Wood Industry to take advantage of the expertise and technically advanced equipment available through the University of Kentucky Department of Forestry and its Wood Utilization Center. At the heart of every secondary manufacturer lies a moulder. A moulder is a machine that shapes a piece of wood on all four sides. Nearly every piece of wood that is in your house at some point was processed through one of these machines including the flooring, studs, trim, cabinets, and even the furniture. This piece of machinery is the biggest obstacle to expanding production and sales because the complexity of the machine as well as cost of ownership and operation. This process involves the development of a template or guide, which will be used to manufacture the tooling. This process is normally done by hand, takes a long time, is tedious in nature, and is not very accurate. Technology is available to reduce or eliminate many of these problems; however, because of the expense involved and the small size of most Kentucky manufacturers, few have purchased the technology. The UK Wood Utilization Center has acquired the technology and the Department of Forestry extension staff offers template making and tooling design as a service to the industry. This creates an open line of communication with the industry that otherwise would probably not exist. Not only is the University of Kentucky providing a tool for the industry, we are also now training those in the industry on how to design and manufacture the tool resulting in significant reductions in error and set-up time, improved quality, and increased production, providing a huge advantage for our Kentucky manufacturers. There have been eight trainings conducted during the current year impacting Kentuckians all across the state. These trainings have directly impacted the forest product industry \$10,514,835 in dollars earned or saved. Four hundred and nineteen templates have been produced for Secondary Wood Manufacturers in Kentucky during this reporting period.

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

Key Theme – Youth Development/4-H

Communities often fall short of engaging citizens that are most affected by the decision-making process. Young people are the most likely to be consumers of services rather than contributors to society. However, things are changing rapidly in Kentucky. Six counties are currently participating in the *Engaging Youth Serving Communities* Initiative. This initiative employs youth-adult partnerships as a vessel to provide a chance for youth and adults to gain valuable skills by working together and to be of service to their communities. Youth and adults from each county have been trained to work in a youth-adult partnership and are currently at various stages of implementing a community action plan. Some of the counties are recruiting and training additional members on their local teams, while others are in the midst of completing projects. Projects range from organizing community clean-ups to addressing underage drinking. One county 4-H group has worked with its local Main Street Corporation to raise money to revitalize the downtown area. They assisted in hosting a basketball match-up between past and current players of the local high school, raising over \$10, 000 towards the project.

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

Key Theme – Tourism

Agritourism enterprises provide small business development opportunities and potential profitability to sustain family farms and the rural landscape. The Kentucky Cooperative Extension Service has facilitated the establishment of leadership networks which have resulted in farm enterprises and tourism organization members networking to increase individual enterprise revenues and state tourism dollars through collective marketing. These organizations have successfully obtained State/County Agricultural Development funds from Tobacco Settlement Funds, Grants from the State Agritourism Council, and matching funds from state, county and regional Farm Bureaus, agribusinesses and tourism promotion organizations for marketing plan implementation. Marketing initiatives include the current development of member promotional brochure/map, websites, regional tourism advertisements and brochure distribution at state welcome/rest areas and state/national parks – all designed in cooperation Kentucky’s ”Unbridled Spirit” campaign. The state agritourism director has also used the marketing plans and initiatives of the Kentucky Extension Western Regional Rapid Response Team as a model program at the Southeast Agritourism Forum, June 2005. The “Pride of Kentucky Showcase” is the feature article for *Kentucky Living*’s June/July 2005 issue – increasing exposure for these enterprises. Proposals are currently under consideration by state government for increased directional signage and enhancement of the Kentucky Product state purchasing program. Offshoot programs include “Hospitality Matters,” a ‘train the trainer’ program for agritourism producers and tourism employers focusing on the importance of hospitality services to the community, businesses, visitors and employees.

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

Key Theme – Leadership Training and Development

As a grassroots organization Cooperative Extension relies on input from county advisory groups. A state-wide survey of agents indicated a need for additional training to strengthen advisory leadership in their roles, namely engaging advisory members in program development, recruiting a diverse cadre of advisory members, and enhancement of the leadership skills of advisory group members. Kentucky Cooperative Extension collaborated with the Southern Region states to develop a series of sound, comprehensive materials and teaching plans which allowed County Extension Agents to enhance leadership skills and the program development process at the county level. Extension agents in Kentucky were trained in the use of these materials with the expectation that they would establish local goals at home in regards to the expansion of the leadership base and the development of leadership skills. Agent reports indicate an increase in diversity on local advisory councils, improved attendance of advisory group members, more engagement of advisory groups in programming, implementation and evaluation of programs, more advocacy by council members, and improved leadership skills among officers. A higher level of commitment by state level advisory group members exists also from these educational efforts.

Source of Federal Funds: Smith Lever
Scope of Impact: Multi-state – Southern Region

Key Theme – Family Resource Management

The Family Economics and Management (FEM) Specialist at Kentucky State University reached over 1,150 direct contacts with programs related to development of life skills and decision making for youth and adults. Of those contacts involving agents and paraprofessionals, it is estimated that over 12,000 additional contacts were made on programs related to financial management; consumer education; the earned Income Tax Credit (EIC); preparation of legal materials such as powers of attorneys, living wills, wills, and trusts; credit; resource management; and consumer decision making. Over 350 of the direct contacts were made with youth groups including: 4-H; REAP (Research and Extension Apprenticeship Program), interns; Girls, Inc.; CASS (Cooperative association of States for Scholarship) students; high school classes; SIFE (Youth Entrepreneurship) program; and youth enrolled in the Lincoln Foundation's Young Scholars program. Youth were involved in workshops on money management; resource management; credit; and consumer decision making. As a result of the programs it is estimated that 60% of participants adopted 2 practices related to better money management; 65% developed skills to better manage their money; and 65% improved consumer decision making skills. It is also estimated that over 800 Kentuckians received in excess of \$2 million in Earned Income Tax credit refunds as a result of EIC outreach efforts through county agents and other groups.

Source of Federal Funds: 1890 Extension Funds
Scope of Impact: State Specific

Key Theme – Community Development

The Kentucky State University Cooperative Extension Program works closely with the Kentucky Cabinet for Economic Development's Division of Community Development and the University of Kentucky Cooperative Extension to conduct business expansion and retention (BR&E) surveys and reports. This partnership provides KSU the opportunity to have statewide exposure to the challenges of local economic development. The impact of this partnership is that KSU is now the lead institution for preparing interviews, conducting analyses, and reporting results for these BR&E survey projects.

Kentucky State University also provided leadership in conducting asset mapping training to the Kentucky Entrepreneurial Coaching Institute sponsored by the University of Kentucky, which is being conducted in Eastern Kentucky. The impact of this effort is that 2 participants in training have conducted asset mapping in their local communities and local business owners have developed a strategic plan for economic development.

Source of Federal Funds: 1890 Extension Funds
Scope of Impact: State Specific

Key Theme – Leadership Development

Social change begins with a vision of the possibilities and opportunities that then is made practical in a strategic plan. Diverse groups and organizations across Kentucky have benefited from the development of strategic plans a process taught and facilitated by Extension Specialists from the University of Kentucky Cooperative Extension Service. As a result of strategic planning processes, organizations have developed web sites, initiated new educational programs for members, improved communications with members and their communities, and provided the support for new economic development initiatives. Some examples of specific outcomes include:

- The Lexington Farmer’s Market clarifying the requirements for a site for a covered farmer’s market and using these criteria to identify potential locations
- The Greenup Heritage Council has created a “Welcome to South Shore” area and established a “Gateway to the Country Music Highway” sign
- Leadership Jessamine County has hosted a meeting with local officials to discuss economic and community development initiatives
- The Kentucky Cattlemen’s Association developed strategies for enhancing member services
- Daviess and Jefferson County Extension Councils identified new program initiatives for their extension programs and recommendations for Extension Staffing in the county.

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

Key Theme-Youth Development/4-H

As a part of the effort to improve the camping experience for the nearly 9,000 youth who attend 4-H Camp in Kentucky each summer, the State Camp Advisory and County Extension Agents agreed to adopt a common educational curriculum at the four 4-H camps across Kentucky. “Water” was chosen as the theme for 2005. This was an effort to raise the awareness of these youth about water and water usage, to stimulate their appreciation of water as a limited resource, and to increase their knowledge of water stewardship

Educational activities from the Project Wet Curriculum and Activity Guide, a nationally and internationally known water education program were selected. These activities were conducted during every camping session at each camp with every camper. Simple pre- and post-tests based on content and attitude factors were developed and administered each session. Both scantron test forms and other informal instruments were used to measure a change in attitude and/or content level of the campers

Over the summer of 2005, a total of 7720 campers experienced the water curriculum at camp. Even with only two hours of class activity on the water curriculum, preliminary results from the pre- and post-tests are indicating positive outcomes. We are still awaiting the results of the pre- and post-tests to determine the degree of change.

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

Key Theme – Children, Youth, and Families at Risk

Illegal methamphetamine manufacture and use is an especially serious problem in Western Kentucky, in part because of the easy availability of anhydrous ammonia. Anhydrous is used as a low cost source of nitrogen for row crops but is also used in the manufacture of this illegal drug. In response to concern raised through County Extension Councils in Western Kentucky, a Quick Response Team (QRT) was formed to research, develop educational materials and plan a training for county Extension agents and social workers addressing the social, economic, and environmental issues related to prescription drug abuse and methamphetamine use. *Are Drugs Knocking on Your Door?* training was held in which 100% of the 60 Extension Agents, social workers and other agency representatives responded that they gained additional knowledge and skills about how to effectively deal with topics related to drug abuse. Ninety two percent indicated they could successfully establish or enhance a community partnership to address this issue locally. The importance of the establishment of a community partnership to deal with such issues was demonstrated through the fact that this effort was the result of partnership with University of Kentucky's Cooperative Extension Service, UK's Health Education through Extension Leadership (HEEL) Program, University Training Consortium, Kentucky State Police, Pennyriple Area Narcotics Task Force, local law enforcement, University of Kentucky Colleges of Medicine and Pharmacy, and the local medical community. As part of this effort County Extension Agents provided public awareness of the dangers of meth labs through the "[Walk Your Land](#)" and "Operation Safe Land" Programs which resulted in 30 methamphetamine labs in the region being reported and cleaned up by law enforcement.

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

Key Theme – Youth Development/4H

Since 1966 The American Private Enterprise System program has had the following impacts: 95 of the state's 120 counties have been involved in the program and over 1,500 high school juniors and seniors participate in the program annually. Since 1966 over 50,000 youth have participated in the program. Of this number over 10,000 have advanced to the state youth seminar and nearly 1,000 youth have participated in the program at the national level. Many local organizations provide the program with financial support estimated at \$100,000 each year. The College and the Kentucky Council of Cooperatives award program participants \$8,000 - \$10,000 in college scholarships and other forms of financial support on an annual basis. Local volunteers, numbered in the thousands, provide leadership in conducting local programs. Kentucky continues to have one of the largest and most structured programs. The program meets many of the goals of the Kentucky Education Reform Act.

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

Key Theme- Children, Youth, and Families at Risk

This project focuses on helping at-risk children, youth and families improve their overall health by increasing the number of health assets present within the family. Three targeted communities participate in the project - Hopkins, Jessamine and Wayne Counties.

The primary tasks completed were training for grant sites, agents across the state, and Extension personnel at select conferences throughout the country; evaluation and federal year-end reporting; sustainability planning; and integration of the Children Youth and Families At Risk (CYFAR) philosophy into base county Extension programming.

Two of the three funded grant sites have finalized plans for sustaining their programs after completion of the funding. The state office is working with Jessamine county to develop a sustainability plan. The most frequently deficient assets mentioned by 59 families who were surveyed from the funded grant sites were drinking an appropriate amount of water each day (76% or 45 of 59), eating low-fat foods (75% or 44 of 59), eating 5 servings of fruits and vegetables (70% or 41 of 59), and participating in adequate exercise (64% or 38 of 59). Most frequently mentioned as assets that had been developed by these 59 families were having a smoke detector, fire extinguisher, carbon monoxide detector and/or escape plan (51% or 30 of 59); family members all having dental check-ups within the past year (46% or 27 of 59); having emergency numbers posted near the phone (44% or 26 of 59); and family members all having eye exams within the past two years (44% or 26 of 59).

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

Key Theme – Youth Development

A recent study on the level of environmental literacy in Kentucky concluded that nearly 50% of the respondents incorrectly answered basic knowledge questions about Kentucky's environment. One method of correcting this poor understanding of the environment is to reach preschool and elementary age school children. The Louisville Science Center is nearing completion of their latest permanent exhibit: *The World Around Us*. This exhibit is unlike any other exhibit in Kentucky in that through interactive learning the exhibit will introduce environmental concepts to children. The centerpiece exhibit, *Ecoexplorer*, is a hands-on electronic display that responds to children's efforts to explore wetlands, grasslands, forests, and urban parks and helps them understand environmental concepts like "why do leaves change color," or "what types of spring flowers occur in the Appalachian forests," or "why do birds migrate?" Extension Specialists at the University of Kentucky have been working directly with personnel from the LSC to develop *Ecoexplorer* and other exhibits. More than 600,000 children from Kentucky and southern Indiana visit the museum each year. Staff at the LSC, in partnership with personnel from the University of Kentucky have developed educational outreach materials that teachers and other environmental educators use with elementary age school children in support of this effort.

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

Key Theme - Home Based Business Education

The closings of local factories in many Kentucky counties along with the decrease in tobacco farming have created widespread unemployment, especially in rural areas of the state. Helping small, entrepreneurial home-based businesses to start or expand is not only helpful to the individual business but the cumulative effect of many home businesses can provide more stability in a community than one major employer that may move or go out of business and create a large scale problem. Almost 14 percent of Kentuckians over age eighteen operate a business from home and 19 percent of these business people operate more than one business.

Kentucky Cooperative Extension has taken a leading role in assisting farm families to develop agritourism businesses that provide income allowing them to remain on the farm. Extension has assisted farmers in organizing agritourism associations that enable the businesses to do joint marketing and purchasing. Many of these businesses are small and home-based. Food processing has become a value added product that has provided income. For example, in Mason County, one farm went from producing 16,000 jars of salsa for sale to 50,000 jars in a one year period. They credit their FCS agent with helping them to achieve this success.

Extension has conducted workshops for persons interested in starting a home-based or micro business. In two urban areas, Extension has sponsored a home-based business association and a home-based and micro business group that has enabled these entrepreneurs to network and to take part in educational trainings that have helped them increase the success rate of their businesses. In Louisville, more than 50 businesses have attended monthly meetings. One new home-based business received valuable information on inexpensive advertisement and reported that the business then doubled while spending zero on its advertising budget.

Kentucky's craft heritage has provided income for families. Extension has presented business workshops for these crafters as well as assisting them in skills development and marketing. One county has created an incubator for artists, art and crafts products and arts programming.

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

Key Theme – Community Development

“Failing to plan is planning to fail.” This is true in communities as much as it is for our own personal lives. Successful communities connect local assets to a community vision. A University of Kentucky Extension specialist has designed processes, facilitated the discussions, trained local community leaders, analyzed outcomes and prepared drafts of community plans.

In 2005, Pendleton County was able to develop a comprehensive community plan as a result working with the extension specialist and this process. As a part of this planning process, fifth year students in the Landscape Architecture program at UK developed “The Best of Both Worlds,” a land use planning document based on hundreds of hours of discussions with local residents, evaluations of land use characteristics, and estimates of development opportunities and challenges. “The Best of Both Worlds” provides visual documentation of how Pendleton County can become a national leader in rural land use development. In this plan 11 goals for community action were identified including: redevelopment of downtown areas, managing land use changes, meeting the social and human service needs of local people, expansion of employment opportunities and consumer choices, tourism development, and diversifying and enhancing the revenue streams of local government.

In another example, a group of citizen leaders, businesses, and the Owen County Extension Service collaborated on a process to define a vision for the future of Owen county. 2,249 people in Owen County – from the youth in elementary and middle schools, high school students, and adults of all ages – shared their ideas for how to make Owen County a better place to live and work. This is one in five persons who live in Owen County. The local organizing committee raised \$12,000 to market the process with street banners, lawn signs, full-page ads in the local newspapers and to provide incentives for youth and their parents to participate in the process. The Owen County Extension Office assisted in the training of over 50 adults and nearly 50 youth who facilitated the community discussions. Facilitator training and analysis of the results was provided by a state Extension specialist. A community form reported the results of the process and 5 task forces of volunteers have been formed to act on the recommendations.

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

Key Theme – Children, Youth and Families at Risk.

The “Take Ten Fit It In: Take Charge Challenge” at Kentucky State University – a physical activity program – has been a great success with the first pilot phase completed with 27 teams comprised of over 300 University employees participating. Two hundred and twenty four of those persons volunteered to undergo body fat analysis and body mass index. Twenty four of the 27 teams have retention rates greater than 70%. Incentives are given when both teams and individuals reach 75 % of their goal. Three additional 10 week programs will be completed by June of 2006. By training employees, the idea is that these healthy habits will carry over to family members to turn around the trend of poor diet, health and nutrition practices for Kentucky families.

Source of Federal Funds: 1890 Extension Funds
Scope of Impact: State Specific

Key Theme – Workforce Preparation

The efforts of the 4-H program to educate youth at military bases on the mechanical and informational systems that rely on GPS/GIS technology will help create a competitive, educated workforce.

For example, the Devers Youth Center 4-H Technology Team of Fort Knox completed a community service project for the City of Radcliff, sister city to Ft. Knox. Youth from the club used GPS units to mark 1,490 waypoints and sidewalk conditions in their local community. This information was presented to the Radcliff City Manager and City Planning and Zoning Commission so decisions can be made about repair and construction of Radcliff sidewalks. The City of Radcliff received two grants from the Department of HUD Housing and Senate Appropriation Committee in order to restore sidewalks throughout the city, partially as a result of the efforts of these youth.

In another example, 14 teens from the 24/7 4-H Tech Club at Fort Campbell used GPS units to provide satellite mapping information for homeland security purposes. They assisted the Hopkinsville-Christian County Planning Commission in gathering data on the train system used by Ft. Campbell. 4-H'ers used GIS in a practical way to serve their community beyond the installation.

A total 734 4-H youth (178 technology and engineering and 556 computer technology) participated in the 4-H technology related projects in Kentucky this program year. These efforts were supported by over \$300,000 in grants received at the local level.

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

Key Theme – Leadership Training

The Kentucky 4-H program is making consistent strides to enhance the scope of youth development by strengthening the professional development opportunities for county 4-H youth development agents. Understanding youth development as a concept and the importance of adult/youth partnerships is the focus of one new extension specialist. This has resulted in in-service trainings to educate agents on research-based approaches to youth development with the intended outcome of enhancing county-based programs. The following trainings have been held: Youth Development Basics, Positive Youth Development, and Youth-Adult Partnerships. Agents have indicated that the concepts presented in these trainings are “innovative” and the approach is “some of the best they have attended.” At the end of each training, most indicate that they have learned useful strategies they plan to incorporate into their own county programs. Six agents have taken their interest even further by agreeing to work with the state youth development specialist through the creation of an advisory council for youth development program initiatives. Complementary to in-services, a quarterly newsletter, the *Youth Development Update*, has been developed, which provides information on recent empirical studies in the youth development field to help agents stay abreast on current trends in research and practice. In each newsletter, the agents are provided with evidence-based studies and how the findings are applicable to their work at the county level. This is the first newsletter of its kind for Kentucky 4-H agents, thus helping them to better understand their role as youth development professionals. Many of the agents are currently using the information in the *Youth Development Update* to augment their own county 4-H efforts (e.g., newsletters, fact sheets, flyers, web pages).

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

Key Theme – Consumer Management

National studies over the last six years show that most high school seniors are financially illiterate. To address this issue Kentucky Cooperative Extension enlisted a program entitled, *High School Financial Planning Program* (HSFPP), produced by the National Endowment for Financial Education. This program provides teens with a greater understanding of goal setting, budgeting, saving, credit, and risk management. The program uses unique games, simulations, case studies, and interactive exercises to apply and test the financial principles being taught. 4-H agents receive weekly financial education lessons to use with after school programming.

In FY05 Kentucky trained 115 volunteer leaders and teachers reaching 11,605 teens, an increase over the 8460 teens involved the previous year. A national survey of the HSFPP shows that teens who completed the program reported significant improvement in their financial knowledge, behavior, and confidence.

Three months after completing the curriculum, surveys showed that 1.) 59% of the students had changed their spending patterns. 2.) The two primary ways that the students reported changing spending habits were that they now only purchase things they really need and that they spend more wisely. 3.) 60% indicated that they had changed their savings patterns. 4.) Of those who reported having changed their savings habits, 80% said they now save for what they really need or want and 20% indicated that they now save every time they receive money.

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

Stakeholder Input Process

Cooperative Extension

The Kentucky Cooperative Extension program development process is based on a grass roots, six-stage model which begins with the engagement of local advisory councils and the citizenry the organization is charged to serve. For the development of the current Plan of Work, agents involved members of the County Extension Council in data collection which includes local resident perspectives, current research, and existing data. Through an analysis of this data and facilitated dialogue, councils identified program opportunities where Extension and local community resources could effectively bring about positive change. County Extension Councils then established program priorities for which county program plans were written. In all, 10,790 people were involved in the process of establishing local program priorities for FY 05-08.

High priority issues and needs identified by County Extension Councils are acted upon locally by county Extension staff and leaders but are also brought to the Regional Issues Committee and Programming Committees. These regional committees are composed of county agents, state extension specialists from the University of Kentucky and Kentucky State University, Department Chairs and Regional Issues and Program Coordinators. This was done to assist university personnel and Extension Specialists in better understanding the county level issues, to speed up the development of resources and to better focus educational methods for dealing with these locally identified issues. Programs of greatest need in the greatest number of counties were referred to Quick Response Teams which identified existing resources and then developed supplemental materials to address issues and concerns. Quick Response Teams were appointed to address such topics as agritourism, methamphetamines and drug abuse, elder care, working with Hispanic audiences, technology, urban programming issues, Asian Soybean Rust, and more.

Experiment Station

As a full partner with the Extension Service, the Experiment Station sets priorities for research activities with information from the County and State Extension Councils and the Kentucky Council for Agricultural Research, Extension and Teaching (UK-CARET). Beginning in the fall of 2003, UK-CARET's role as an advisory and advocacy group for the College of Agriculture was increased. Members have an opportunity to advise in the development of college priorities and assist in generating public support for those priorities at state and national levels. UK-CARET is representative of the full scope of the land grant mission: extension, research, instruction, and service. Membership is composed of active and progressive leaders in agricultural and natural resource enterprises. UK-CARET provides a direct link to the national CARET organization managed by the National Association of State Universities and Land Grant Colleges (NASULGC). Two members of UK-CARET are designated as national CARET representatives.

In addition, the Experiment Station meets formally with other entities: quarterly with the Kentucky Tobacco Research Board to set priorities for research by the Kentucky Tobacco Development Center to assist in the transition from the tobacco-based economy; biannually with

the Gluck Equine Research Center Board to discuss priorities for the equine industry; and regularly with the Tracy Farmer Center for the Environment on conservation-based research. We also receive input through the Community Farm Alliance, the Sierra Club, and other environmental groups through the UK Biotechnology Research and Education Initiative.

Program Review Process

There are no changes in the program review processes described in the Plan of Work which has been approved by CSREES.

Evaluation of the Success of Multi-State and Joint Activities

Work across state lines and across functional boundaries is quickly becoming an expected mode of operation for faculty and staff of the University of Kentucky College of Agriculture. Issues such as the transition from a tobacco-dependent economy, economic development, obesity youth development, and agricultural profitability are not single-state issues. Nor can they be addressed by the research and knowledge base under girding a single discipline. Addressing issues such as these requires that land grant universities work across disciplinary, functional, and state boundaries to deploy resources in a planned and systematic manner.

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 FY05, Kentucky Cooperative Extension Specialists and County Extension Agents reported 216 different Multi-State Extension activities. 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 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.

Thirty nine percent 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 serves as Director of Land Grant Programs to link Research and Extension. The dean works closely with the Director of the Kentucky Cooperative Extension Service and Director for the Kentucky Agricultural Experiment Station specifically who also 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 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 to bring

Research and Extension programs closer together. Extension staff are more cognizant of the need to support 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 FY05.

Brief Summary of Multi-State Activities

The University of Kentucky Experiment Station engaged in 41 Multi-State Regional Fund (MRF) projects, including 18 in the Southern Region, 5 in the Western Region, 12 in the North Central Region, 3 in the Northeastern region, and three National Research Support Projects: the National Animal Genome Research Program, the Species Coordinator for the Horse project, and the National Agricultural Program to Clear Pest Control Agents for Minor Uses program. Over 80 College of Agriculture faculty members have some research effort devoted to these projects.

During FY05, specialists and agents in the Kentucky Cooperative Extension Service reported involvement in 216 different Multi-State Extension activities. Just over sixty percent of these multi-state activities were state-level partnerships led by state-level administrators, specialists, and associates. The remaining thirty nine percent 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. County-level projects tend to be more short-term in nature. These included such things as study tours, exchange trips, and training schools in border counties.

The following impact statements are a representative sample of some of the multi-state Extension activities involving the Kentucky Cooperative Extension Service.

Strengthening Extension Advisory Leadership – Leadership Development

An outgrowth of a southern region multi-state initiative to identify knowledge and skills needed by leaders serving as members of advisory councils, the Strengthening Extension Advisory Leadership (SEAL) project involved advisory council members and professional staff in a regional conference. Following the conference a design team of state partners convened to develop curriculum around critical competency areas. Four modules containing 20 lessons were developed to address the following topics: an overview of Cooperative Extension and the Extension Advisory Leadership system functions and purpose of advisory leadership councils including the roles and responsibilities of members, managing meetings, parliamentary procedure, resolving conflict, tools for facilitating discussion, assessing community needs, interpreting multiple types of data and setting priorities. Each lesson plan contained objectives, a list of materials needed, background information, learning activities, fact sheets, support material and an application section. Powerpoint presentations, learning activities, discussion guides, videos, etc. are included. The material is used for support in agent training and volunteer development. Additional modules were developed for release at the 2005 SEAL Conference. This project has resulted in statewide leader training with all agents and county councils in the Kentucky Cooperative Service which has already brought about expanded membership and broader representation including minorities and low income clientele on advisory councils.

Creation of a Gene Map to Guide Horse Research -Animal Genomics

Creation of a genetic map will enable investigation of important horse diseases using genomic approaches. This project will allow for the creation of powerful tools to investigate hereditary and non-hereditary health problems and performance traits in the horse. The work has necessitated the development of new bioinformatics approaches for sharing this complex information. Since no single laboratory has all the resources to succeed in this project, the research has been and will be conducted through a range of collaborative activities. Meetings, research collaborations and internet based sharing of information are part of the objectives and key to the success of the project. The genome map and genome sequence will underpin all biological research on horses and enable the participating scientists to make discoveries that will address and solve a very wide range of health problems in horses.

Professional Forestry Workshops - Forest Resource Management

The Professional Forestry Workshop Series is a multi-state Cooperative Extension continuing education program sponsored by the University of Kentucky and the University of Tennessee. In 2004/2005 multiple-day technical training programs were held in both states focusing on improving the knowledge and competency of practitioners including state, industry, and consulting forester. In total, 72 foresters participated in these programs. Post-training surveys indicated that 1,969 non-industrial private forest owners annually will benefit directly from this training. This will result in improved practices, increasing sustainability and enhancing revenue, on 131,120 acres per year. This indicates that training one of these forestry professionals resulted in the transfer of information to 27 forest owners and 1,821 acres.

Research Programs in Post-Harvest Grain Processing - Adding Value

Applied research projects include a multi-state project to assess stored grain management practices for wheat in Kentucky and Tennessee, an investigation of post-harvest processing of specialty grains, the development of alternate energy resources from grain crops, a study on merging precision farming tools with NIR instruments that rapidly measure grain quality properties, an experiment to convert soybean oil to hydrogen gas, and the development of software to enhance identity preservation of grain lots for assured quality and security. Experiments are being conducted to improve the mathematical models available for predicting airflow resistance in stored grain. This will lead to modifications to the aeration system design that will minimize the cost and quality deterioration of grain during storage. Grain deterioration leads to mold and insect development that change the flow pattern and loads in the bin. Collaborative research between the Institute of Agrophysics in Lublin, Poland and UK is being conducted to determine the loads created by grain that has spoiled.

National Priester Extension Health Conference – Human Health

The University of Kentucky College of Agriculture Cooperative Extension Health Education through Extension Leadership Program (HEEL) hosted the 2005 Priester National Extension Health Conference in Lexington, Kentucky from April 12-15, 2005. This multi-state conference attracted more than 250 health practitioners and educator participants from 40 states. The 2005 Conference theme was “*Call to the Post: Translating Research into Policy and Practice for Healthier Communities.*” Participants shared research and programming efforts on topics that included Environmental Health, Health Literacy, Social Ecological Determinants of Health, Legal and Regulatory Approaches to Health, and Bio- & Agro-Terrorism. As a result from this effort Kentucky has worked with Mississippi to adapt their Master Health Volunteer program for Kentucky and the two states have collaborated on writing a NIOSH grant to fund collaborative research and outreach in the two states. Kentucky has partnered with several states on methamphetamine abuse programs, sharing the “Are Drugs Knocking at Your Door” and “Walk Your Land” Programs which have been highly successful at creating local coalitions to address drug issues and discovering meth labs.

HorseQuest.info

HorseQuest.info is an interactive site established to provide clientele and other Internet visitors a source of reliable and up-to-date horse information through a knowledge base of commonly asked questions that have science-based, peer reviewed answers. HorseQuest.info allows clientele to ask questions or search for questions and answers asked by other horse people. HorseQuest.info contains answers to questions in the subject areas of nutrition/feeding, health, breeding, marketing, diseases, facilities, horsemanship and management to name a few. HorseQuest.info is an ever expanding knowledge base that grows with the addition of every user. Begun as a multi-state project involving Southern Region Extension horse specialists, the project is now national in scope and serves as a model program for development of information for the eXtension national information network and served as the model for the development of Kentucky’s GardenData.org horticultural information website with is now also going national through eXtension.

CYFERNet – Children, Youth and Families at Risk

The Children, Youth and Families Education and Research Network (CYFERnet) is a web-based, peer-reviewed collection of top quality resources related to children, youth, and family programming. The University of Kentucky, with twenty-nine multi state collaborations, coordinates the process of soliciting materials, coordinating their review, and posting new resources. Last year, 1,127 resources from throughout the nation were accepted and posted to the CYFERnet web site (1329 resources reviewed for an 85% acceptance rate). This information becomes a part of the over 7,200 resources in the database. Sixteen national telephone and web-based trainings were conducted this year with presenters and participants representing the public and private sector. More than 400 people participated in the trainings. There were more than 791,000 hits on the web site (more than 2,000 day on average), providing peer-reviewed, research-based information for free to nearly 88,000 users. The most heavily searched content areas were National Network for Child Care Resources (230,000 hits), Health (75,807 hits), and Child (28,041 hits). This information is used to determine gaps in the resources in order to continually make the site more functional for its users.

Tobacco Buyout; Extension Programming Activities – Managing Change

Extension specialists from Kentucky joined their colleagues from North Carolina, Tennessee, and other tobacco producing states to develop educational programs and online materials to help tobacco farmers in understanding the tobacco buyout and to assist them in making production and investment decisions related to the buyout. University of Kentucky extension specialists organized more than 40 meetings across Kentucky, Indiana, and Ohio with attendance totaling more 6000 farmers. The tobacco buyout provides \$9.6 billion over a 10 year period, which will be distributed to more than 500,000 farms in all 50 U.S. states. In 2005, Kentucky tobacco farmers received around \$240 million for their first installment of the buyout. The infusion of these buyout dollars has been vital for many local economies as they transition to a new post-buyout free market for tobacco. These dollars are assisting individuals in diversification opportunities within and outside of agriculture, reducing debt, and providing a stream of income for a more secure future.

Genetic Aspects of Temperament in Beef Cattle - Animal Production Efficiency

A national beef quality audit indicated that significant portions of the chuck, rib, loin, round and other cuts of finished cattle and cull cattle have at least “superficial” bruises at harvest. These bruises are estimated to cost the beef cattle industry at least \$55,000,000 annually. How much of this bruising can be attributed to cattle with a non-docile temperament is not known. This Multi-State Project is designed, in cooperation with scientists at Arkansas and Louisiana, to assess genetic aspects of temperament in beef cattle. By determining that considerable genetic variation exists for temperament differences, significant savings (reduced carcass trimming loss) will be accrued by the beef cattle industry through sire selection for docile temperament.

Educational Programs in Stored Grain Management – Adding Value

Kentucky's grain farmers produce over 225 million bushels of corn, grain sorghum, soybean, wheat and barley annually, which is conservatively valued over \$ 850 million. Farmers need assistance with decisions on upgrading grain handling equipment or increasing drying or storage capacity to help compensate for income lost from reduced burley tobacco production. An ongoing multi-state program involves a team of research and extension agricultural engineers and extension entomologists in Kentucky and Tennessee to lead educational efforts on stored wheat management issues. Educational programs have been presented to approximately 425 Kentucky farmers, grain buyers, mill managers, elevator operators, bankers and extension agents in a series of county and state-wide meetings. To identify focus topics, a survey of 52 wheat growers and stored grain managers (representing over 4.6 million bushels of wheat from 96,000 acres) was conducted to assess equipment sanitation practices, bin loading and unloading methods, aeration strategies, and grain monitoring tactics. As a result, farmers and elevator operators are changing their storage practices which has resulted in higher quality grain and lower storage costs. Extension engineers on this multi-state team developed an animated PowerPoint® presentation to illustrate proven stored grain management practices suitable to Kentucky producers. This presentation is posted on University of Kentucky's Biosystems and Agricultural Engineering/Stored Grain web page (<http://www.bae.uky.edu/ext/GrainStorage/>) and received a Blue Ribbon Award by the American Society of Agricultural Engineers' educational aids competition.

Conversion of Exotic Introduced Pastures to Native Grasslands

Tall fescue has been planted on more than 30 million acres in the eastern United States for erosion control, for livestock forage, and on conservation reserve set-aside acres. More than 97% of all tall fescue fields are infected with an endophytic fungus that causes numerous reproductive and nutritional problems for livestock and wildlife. Livestock eating tall fescue typically have reduced weight gains, lower reproductive rates, and reduced milk production. Estimated annual costs to the livestock industry range from \$500 million to \$1 billion. Beef cattle operators traditionally "manage" around the problem. Dairy and horse operators, however, have no tolerance for endophytic fescue because it causes lowered milk production and spontaneous abortions in horses.

The purpose of this research and extension program at the University of Kentucky is to develop methods to convert exotic introduced pastures into native grassland habitats and to use herbicides to restore existing habitats. Applied research studies have been implemented over the past decade in Kentucky, Alabama, Indiana, Texas and South Dakota in a variety of native grassland habitats. Current research in South Dakota, Texas and Alabama are seeking methods of converting old world bluestems, Bermuda grass, and smooth brome to native grasses. More than 65,000 acres of Tall Fescue have been converted to natives in Kentucky during the past decade using information generated by this research. As standardized protocols are developed for other grassland habitats the information is disseminated to appropriate clientele including Fish and Wildlife Agencies, Federal Agencies, and interested individuals.

Drainage of Farmland in Flood Plain Areas – Agricultural Productivity

Drainage has been a major topic in this Ohio River community for years. How farmers have addressed or not addressed drainage has dramatically impacted crop yields. Henderson County has some 40,800 acres that can flood at different times but this is just a part of the hundreds of thousands of acres in the Ohio River flood plain. Recent urbanization along this Ohio River corridor has also impacted the drainage situation. During a program needs meeting, the Extension Council prioritized problems and drainage topped the list. Specialists from the University of Kentucky and the Ohio State University conducted the program with some 76 producers from Kentucky and Indiana attended. In the evaluation all rated the program good to excellent. When asked to put dollar figures on what this program was worth, answers ranged from \$5,000 to \$70,000 with the average being around \$9,000. They felt like the information would benefit them through improving on-farm drainage practices or by saving them from spending money on futile efforts. Several were planning on buying tiling machines and decided not to when they learned what could happen if not done correctly and the slim margin of error between a good job and a bad job. Since this program the county judge has put together a drainage committee to look at other drainage problems created by urbanization.

Green Industry Expo – Home Lawn and Gardening

The Tri-State Green Industry Expo is a true educational, in-service type training program for landscape and green industry professionals from Kentucky, Ohio and Indiana. The Northern Kentucky County Cooperative Extension Services participated in planning, producing, and evaluating this conference which attracted nearly 400 industry professionals in FY05. New and emerging practices in arboriculture, turf grass, landscape, greenhouse, insect and weed control and business management practices demand that industry workers strive for continued professional improvements. The Cooperative Extension Service is the primary provider of timely information on research based topics to ensure best management practices and public safety. In a survey of the value of training they received in prior-year programs, participants acknowledged increased knowledge and practice changes as having occurred and indicated that they have now:

1. Adopted new practices regarding the safe usage of pesticides,
2. Gained new knowledge on best management practices,
3. Have increased awareness of and now use improved plant cultivars, and
4. Adopted economically sustainable business practices.

Multi-state Livestock Preconditioning and Sales – Adding Value to Products

All UK Cooperative Extension offices in the Green River Area, and Purdue Cooperative Extension offices in Spenser and Perry Counties work with the Green River Area CPH45 sale committee (Certified Preconditioned for Health) to educate area beef producers on the benefits of improved management in their beef herd by improved record keeping with birth dates, retaining feeder calves post weaning, and the monetary benefit received from selling preconditioned feeder calves at the Kentuckiana Livestock market in Owensboro. Kentucky and Indiana Extension Agents consult with producers on farm to help educate on opportunities to maximize profitability from their herd. All participants are required to be Beef Quality Assurance certified. From August 2004 to April 2005, 5,779 feeder calves were sold in 6 marketing opportunities receiving an average of \$7.64 per hundred weight premium. Estimating an average of 650 pound calves, the net income gain after expense of preconditioning was \$49.66 per animal, a net increase of \$286,985.14 for Kentucky Green Area and Southern Indiana beef producers.

Fruit and Vegetable Production – Plant Production Efficiency

Sharing production methods and research across state lines has resulted in many examples of improved yields, modification of production methods or decreased impact of pests on Kentucky crops. Northern Kentucky vegetable growers and Extension Agents participated in the Tomato Short-Course hosted by Mississippi State University and supported by Extension speakers from 7 states. This short course attracted more than 168 participants from 26 states. The program addressed production, marketing, and labor issues. During the short course, the growers and agent developed a relationship with Dr. Alan Straw, Vegetable Specialist with the University of Tennessee. Dr. Straw invited the Kentucky group on a tour of Grainger, Tennessee vegetable and strawberry enterprises. The group met with the Grainger County Vegetable Marketing Cooperative, 11 producers and 5 seed and chemical company representatives. The result of this intense education was all 3 Kentucky producers adopting new production and marketing techniques. These three growers are now bringing tomatoes to their Northern Kentucky markets on average of 2 weeks earlier in the season. Being on the market earlier allows them to receive higher prices on their tomatoes for a longer period of time. Two of the growers have doubled the size of their tomato greenhouse operations.

Strawberries have always been a high dollar crop for Kentucky growers. Unfortunately, diseases and other production problems have limited their profitability. Two of the growers attending the Tennessee tour are now producing strawberries planted in the fall of the year and harvesting a crop the following spring. This learned production system shortens the harvest wait on strawberries by one season. Utilizing raised beds, irrigation and row covers, growers are able to profitably treat strawberries as annuals, destroying them after the harvest season. This eliminates the root rot disease complex, which has plagued Northern Kentucky growers in the past. Rotating to a new planting site lessens the chance of infection.

The three growers, when surveyed, estimate an increase in profits, from the strawberry and tomato crops, of 45%.

Sudden Oak Death Survey and Diagnostics

Kentucky's forests and landscapes are vulnerable to *Phytophthora ramorum*, a pathogen that causes sudden oak death and ramorum blight on many other plants. *P. ramorum* is transported by the transporting of nursery stock and soil. Concerned with its spread outside regulated West Coast areas, the USDA funded national *P. ramorum* surveys. University of Kentucky Plant Pathology Department researchers, in collaboration with the Office of State Entomologist and the Kentucky Division of Forestry, conducted the Kentucky forest and nursery survey utilizing molecular diagnostics, an advanced disease diagnosis and pathogen detection system. This technique has been proven to be valuable in early detection of new disease infestations in other states as well as the Commonwealth. Thirty forest locations and dozens of nurseries were sampled. No confirmed positive samples were found. The susceptibility of Kentucky native plants is being tested in collaboration with researchers in other states. Early detection and eradication of diseased plants are important to protect Kentucky's forest resources and the nursery and landscape industries. Having the most advanced and rapid diagnostic techniques helps to reduce the impact of plant disease on Kentucky crop products and the health of forests and landscapes. Losing oaks in the forests and landscapes of Kentucky would have a devastating effect on the forestry and landscape industries

Emissions from U.S. Poultry Facilities – Air Quality

Agricultural air quality has received increasing focus in the past few years. A multi-state, multi-disciplinary project to quantify ammonia emissions has resulted in over 16 months of high quality emissions data. Ammonia is a contributor to poor air quality, and agriculture is a major source of ammonia. The US EPA is required as part of the Federal Clean Air Act to determine sources and quantities of key air pollutants including ammonia. The poultry industry's contribution to the economies of Kentucky (broilers), Iowa (eggs) and Pennsylvania (both) is substantial, and objective, science-based emission measurements are a critical missing element. A grant was funded by the USDA IFAFS program, with the University of Kentucky as leader; it involved the acquisition, analysis and dissemination of ammonia emissions information to all stakeholders. A key contribution to the science to date was the development, fabrication and dissemination of ten units for measuring building ventilation rates; and a portable, low-cost means of measuring total building emissions. More recently University of Kentucky-Biosystems and Agricultural Engineering in partnership with Iowa State University began the first-in-nation Air Consent Agreement study site, on two broiler growout farms in western Kentucky. This study includes multiple gases and particulate sizes.

Small Ruminant Animals – Goats - Small Farm Viability

The primary focus for Kentucky State University Extension in the area of animal science is in education with producers of small ruminant animals, primarily goats. The target audience is the small, limited resource, and minority farmers who have been diversifying their farms with the addition of goats. Program activities concentrate on providing basic production and management information and identifying research needs in these areas. Educational information provided included proper hoof care to prevent disease; the effects of quality marketing, selection and management to improve production quality; starting a goat dairy in Kentucky; advantages of crossbreeding and how to plan and manage a crossbreeding program; nutrition and forages for goats; the use of goats for brush control; the preparation of the buck for breeding season; fence building for goat producers; parasite control; and other health issues in goats.

To enhance this effort collaborative efforts in goat production and forage needs have taken place with Tennessee State University, Langston University, and Fort Valley State University, and the University of Kentucky. While the goat industry in Kentucky is growing rapidly, little quality information is available on the forage needs of Kentucky goats. Therefore, KSU, in conjunction with the University of Kentucky has established a forage research and demonstration trail at the KSU Research and Demonstration farm. This project is providing information needed on the various forages and how they may be effectively utilized in goat production.

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 teams or work groups which integrate Research and Extension Activity.

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.

Bioinstrumentation - Animal Health

A critical need for assessing animal health and well-being, and to evaluate various livestock and poultry management systems, is the ability for real-time monitoring of key physiological and related parameters. Researchers and Extension faculty along with students at the University of Kentucky in Biosystems and Agricultural Engineering, Animal Sciences, and Veterinary Sciences have developed and tested an assortment of bioinstrumentation for horses, cattle and poultry. Devices include real-time monitoring of core body temperature and heart rate; recording of positional data for cattle on pasture; water consumption of pastured cattle as affected by water temperature; and the development of surrogates for core body temperature using radio frequency temperature/identity ear tags. Another project involved the development of an Individual Bird Unit system to quantify feeding, drinking and non-stereotypical pecking by birds in individual cages, providing an objective assessment of bird well-being under various management scenarios

BMPS for Water Quality on Horse Farms – Water Quality

With nearly 200,000 horses in Kentucky, an interdisciplinary team is needed to provide the horse owner with the training and information needed to implement sound management decisions that enhances horse well being and protects the environment. In cooperation with the Department of Animal and Food Sciences, Best Management Practices (BMPs) for water quality protection are being implemented on several suburban horse farms in the central Kentucky area. These farms will be used as the site for educational programs and demonstrations to transfer and promote the knowledge that will be essential for practical strategies and techniques to improve manure handling and reduce mud and runoff, implementation of small composting operations, construction of managed stream crossings, limiting the access of horses to environmentally sensitive areas, and implementation of basic paddock management.

Sudden Oak Death Survey and Diagnostics - Forest Resource Management

Kentucky's forests and landscapes are vulnerable to *Phytophthora ramorum*, a pathogen that causes sudden oak death and ramorum blight on many other plants. *P. ramorum* is transported by the transporting of nursery stock and soil. Concerned with its spread outside regulated West Coast areas, the USDA funded national *P. ramorum* surveys. University of Kentucky Plant Pathology Department researchers, in collaboration with the Office of State Entomologist and the Kentucky Division of Forestry, conducted the Kentucky forest and nursery survey utilizing molecular diagnostics, an advanced disease diagnosis and pathogen detection system. This technique has been proven to be valuable in early detection of new disease infestations in the Commonwealth. Thirty forest locations and dozens of nurseries were sampled. No confirmed positive samples were found. The susceptibility of Kentucky native plants is being tested in collaboration with researchers in other states. Early detection and eradication of diseased plants are important to protect Kentucky's forest resources and the nursery and landscape industries. Having the most advanced and rapid diagnostic techniques helps to reduce the impact of plant disease on Kentucky crop products and the health of forests and landscapes. Losing oaks in the forests and landscapes of Kentucky would have a devastating effect on the forestry and landscape industries.

Bed Bug Infestations and Information – Human Health

Today's bed bug infestations are like the "perfect storm" of pest control. People of this generation are not accustomed to being bitten by bloodsucking parasites while they are sleeping. Infestations occur in the most intimate places like bedrooms, beds, couches and closets, where the pest control industry seldom has needed to spray. The arsenal of effective bed bug products is dangerously depleted and the forecast for the bugs developing resistance is worrisome. The University of Kentucky's Entomology Department is working on the front lines of this epidemic, and is considered the premier academic institution in the country for useful information and management advice. Kentucky has gone "high profile" in its efforts to get information out regarding this infestation. The Kentucky's Extension information on bed bugs is featured at the top of the list in Google™(Google on "bed bug"), receiving over 350,000 hits in 2005 (as compared to just 1300 hits in 1998). Our entomologists have been interviewed by numerous high profile media outlets on the subject including The New York Times, Washington Post, Wall Street Journal, Readers' Digest, CNN, Inside Edition, Dateline, CNBC and Pest Control and Pest Control Technology Magazines. The team has also been invited to participate as the main technical source in an upcoming National Geographic special on the problem. A team of research and extension faculty is working on answers to the problem, funded in part by the Kentucky pest management industry. Several field colonies of bed bugs are now in culture and experiments are under way with promising results to be reported in the very near future.

Back to the Future with Kentucky Grapes and Wine– Diversified/Alternative Agriculture

Before prohibition, Kentucky was the third largest grape and wine producing state in the nation. As an alternative crop, producers found tobacco. Kentucky farmers are faced once again with finding alternative crops. Wineries are now being developed as a way to market Kentucky grapes planted by former tobacco producers. Research by the University of Kentucky is being conducted which will provide information specific to Kentucky growers on grape production. Among projects currently under way are variety trials and training systems. There is also little depth of knowledge in the wine producers of the techniques for safely and surely converting grapes into wine. Approximately 40 wineries, producing 40,000 cases of wine in 2005 worth approximately \$39 million dollars, are struggling with quality control issues to gain and maintain acceptance in the Kentucky wine market. The production value anticipated for 2006 is approximately 60 million dollars. An educational program with individual contacts with winery personnel demonstrating effective winery procedures has resulted in an increased survival and quality of their wines. Without successful wineries, there is no market for Kentucky's grapes.

Wheat Science Group Aggressive with Issues – Plant Production Efficiency

The University of Kentucky Wheat Science Group (UKWSG) is comprised of 16 individuals from 6 departments in the UK College of Agriculture. The WSG works closely with the Kentucky Small Grain Growers Assn, county agricultural agents, wheat consultants and agribusinesses for the benefit of Kentucky's wheat producers. Due to problems related to a "European approach" to increasing yields which had developed since the late 1980's, it was clear that the University's wheat science program needed to develop and present a unified systems approach to effectively deal with the issues Kentucky wheat producers were facing. Through a defined research agenda, a series of newsletters, a Comprehensive Guide to Wheat Management in Kentucky, No-till Small Grain Production Guides, a Kentucky Winter Wheat Calendar and an annual Research Report Book, the WSG has become recognized as the premier source of wheat science information in Kentucky. Proof of this fact is evident by much higher levels of grower participation in Extension field days, meetings and requests for materials. A recent end of year survey asked wheat producers what practices they had changed as a result of programs involving the wheat science group. Responses included changes in Planting Dates, Variety Selection, Tillage Practices, Fertility Programs, Planter Calibration, Scouting Soil Compaction and Scouting for Fungicide Use. There are between 400,000 and 600,000 acres of wheat planted in Kentucky each year. Implementation of only one of the above improved practices on ½ the planted acres would improve the income to Kentucky wheat producers by over 5 million dollars per year.

Asian Soybean Rust – An Integrated Approach to Management

Grain production is the number two agricultural crop for Kentucky (behind tobacco) and soybeans represent the most planted acres of grain in this state. A recent threat to this crop has brought a rapid response by Extension throughout the grain growing regions of the U.S. Asian soybean rust (ASR) is a wind-borne fungal disease recently introduced into the southern and southeastern U.S. It is a very aggressive pathogen, with significant yield losses recorded in the absence of fungicide control. Disease scouting to detect fungal lesions followed by timely application of fungicides is needed for effective control.

In addition to numerous county level meetings, eleven regional trainings by Extension Specialists were held across Kentucky in January-March 2005 for producers, county Extension agents, crop consultants and agricultural dealers with over 1,000 in attendance at these meetings. Ninety six percent of the participants reported increased understanding about ASR and felt better prepared to make fungicide use and Asian Soybean Rust Management decisions and would use what they learned on their farm enterprise if Soybean Rust becomes an issue during the growing season. As a result, Kentucky grain producers monitored the situation through local county extension offices, news articles, web pages, as well as the University of Kentucky Ag Weather Center recently added a forecast for fungus spraying conditions to assist in addressing the soybean rust problem. In a follow-up survey with county Extension agents, a conservative cost estimate of \$18 per acre for fungicide and application could mean that Kentucky soybean producers did not spend \$8,424,000 on unnecessary fungicide applications. It also indicates that the environment was spared fungicide use on 39% of Kentucky's 1.2 million soybean acres.

Livestock Discovery CD – Youth Development/4-H

Livestock Judging and Livestock Skillathon are two of the major livestock programs offered by the Department of Animal and Food Sciences to youth. These two programs provide excellent opportunities to educate youth on a variety of topics related to livestock evaluation and production. However, a significant problem identified by County Extension Agents and local Volunteer Leaders was finding and securing good, easy to use resources that could be used when training youth to take part in these programs. Developing a resource of this scope required the involvement of individuals from several different University of Kentucky subject matter areas as well as the UK Agricultural Communications Services and the Kentucky Dept of Agriculture. The scope of the Livestock Discovery CD was so large that it took nearly two years to develop. It contains 27 detailed study guides, 15 on screed audio presentation, five new publications and over 170 "Did You Know" facts about livestock and meat products. In eight months following its completion, nearly 3000 have been sold to 4-H and FFA youth and youth educators in 14 states. Final evidence of the importance as an educational resource is its use as the major educational resource for the newly established Kentucky 4-H Livestock Volunteer Certification Program. In short, its existence has resulted in increased knowledge about livestock among Kentucky's youth and beyond.

Reduction of Nitrosamines in Burley Tobacco – Agricultural Profitability

The study of the formation of tobacco specific nitrosamines (TSNAs) in various tobaccos continues as a topic of importance to the tobacco industry. Tobacco-specific nitrosamines (TSNA) are found only in tobacco products, and are considered highly carcinogenic. The significant formation of TSNAs in burley tobacco occurs after the yellowing phase of curing and is dependent on several factors, notably the fertility level during growth and the curing environment during the later stages of curing and post-curing conditions. Curing studies have focused on the relationships of curing environment and the resulting TSNAs of lamina. Research is being conducted to determine the effect of bale moisture content and the curing environment upon formation of tobacco-specific nitrosamines (TSNAs) in burley tobacco. Generally, lower levels of TSNA have resulted from curing in a more rapid drying regime than normal with the resultant leaf quality not as desirable to the buying representatives. Successful determination of moisture contents with minimal effect on leaf quality combined with the minimal formation of TSNAs will enhance the value and acceptance of Kentucky burley tobacco.

Record-keeping Programs – Economic Analysis of Beef Production Systems

A major emphasis of the IRM team has been to obtain software packages for production and economic analyses and encourage the use of these packages by Kentucky beef producers. For herd production analyses, the IRM committee chose CHAPS (Cow Herd Appraisal Performance Software), created by North Dakota State University. Data will be used to create a database of Kentucky beef production. Our team has developed a pocket record book to help with collection of data on-farm. The IRM team is also heavily involved in economic enterprise analysis of beef cattle operations. The Iowa State University Standardized Performance Analysis (beef cow business records) package was chosen for economic analyses of beef production systems. Our team has produced a beginner, and intermediate beef cow business record book designed to measure the cow calf enterprise, harvested forages enterprise and pasture enterprise. Our team also developed a beef backgrounding business record book. The goal is to develop state-wide production and economic databases that we can use to aid in our education. These databases will then be used to demonstrate the “real world” economic impact of incorporating certain beef production practices. Currently have distributed 450 copies of CHAPS have been distributed, over 500 cow-calf SPA records books, and over 3,000 pocket record books to Kentucky producers.

Weed Management in Horticultural Crops – Management Strategies

The New Crop Opportunity Center supported the Development of Organic Production Systems for Horticultural Crops project focused on organic weed management in bell peppers, which are one of the most profitable vegetable crops in the state; however, the results are applicable to a wide range of horticultural crops, from vegetables to cut flowers. This project was instrumental in defining the holistic management strategies that have been incorporated into all subsequent research at the Organic Farming Systems Research Unit at the UK Horticulture Research Farm.

Market Assistance and Promotion Program

A comprehensive, interagency and integrated research, Extension education, market assistance and market promotion program has contributed significantly to the Kentucky horticulture industries. Examples of the outcome include: Gross sales of vegetables in Kentucky are expected to have increased by about 5% in 2005. The state has seen an increase of 53% since 1997 in number of vegetable acres planted, the second highest increase in the U.S. More than 1,800 vendors sold in farmers markets in 2005, and the number increases each year. Farmers markets account for about one-fourth of all Kentucky farm produce sales. A Kentucky State Park produce purchasing program begun in August of 2004 could open up a \$500,000 market for Kentucky farmers. The floriculture/ornamental industry in Kentucky saw an increase of \$8 million (10%) in cash receipts in 2005.

U.S. Department of Agriculture
Cooperative State Research, Education, and Extension Service
Supplement to the Annual Report of Accomplishments and Results
Actual Expenditures of Federal Funding for Multistate Extension and Integrated Activities
(Attach Brief Summaries)
Fiscal Year: 2005

Select

One: Interim Final

Institution: University of Kentucky

State: Kentucky

	Integrated Activities (Hatch)		Multistate Extension Activities (Smith-Lever)		Integrated Activities (Smith-Lever)	
<i>Established Target %</i>	25%	%	10%	%	25%	%
<i>This FY Allocation (from 1088)</i>	\$3,888,083		\$8,188,760		\$8,188,760	
<i>This FY Target Amount</i>	\$1,315,822		\$818,876		\$2,047,190	
Title of Planned Program Activity						
Comprehensive Agriculture	473,693		716,824		1,770,304	
Safe Food and Fiber	184,216		5,257			
Health and Nutrition			12,972		1,231,022	
Agriculture and Environmental Quality	618,436		187,946		1,000,712	
Social and Economic Opportunity	39,477		197,972			
Total	<u>\$1,315,822</u>		<u>\$1,120,971</u>		<u>\$4,002,047</u>	
Carryover	<u>\$0</u>		<u>\$0</u>		<u>\$0</u>	

Certification: I certify to the best of my knowledge and belief that this report is correct and complete and that all outlays represented here accurately reflect allowable expenditures of Federal funds only in satisfying AREERA requirements.

Director

Date

