

FY2004

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)

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 967,040 contacts (including duplications) with clientele related to improving production, processing, and marketing. Additionally, 197,073 contacts were made with clientele related to the adoption of resource management technologies. 290,074,461 contacts were related to home gardening and landscape. Kentucky State University's Small Farm Program made 11,274 contacts with limited resource farmers. Twenty-six percent of these contacts were with women.

These efforts resulted in 19,017 farmers adopting one or more production practices recommended by Extension. Adoption of these practices resulted in \$30,951,591 of additional profits to farmers. 8,854 producers utilized new marketing opportunities while 26,898 Kentuckians learned about the impact public policy on agriculture and the environment.

The Kentucky Agricultural Experiment Station conducted the full-time equivalent of 83 projects related to this goal during 2004. 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 \$25 million. More than \$4.75 million of this extramural support was secured by faculty members who have a primary appointment to 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 two are reported on here: Development of Alternative Aquaculture Species for Ethnic Live Markets and Reservoir Ranching of Paddlefish in Water-filled Coal Strip Pits.

Expenditures	Federal Extension Funds (UK)	\$2,057,057
	Federal Extension Funds (KSU)	\$425,000
	Federal Research Funds (UK)	\$2,574,888
	Federal Research Funds (KSU)	\$687,743

FTEs	Extension (UK)	145.0
	Extension (KSU)	12.0
	Research (UK)	83.0
	Research (KSU)	10.3

Key Theme – Aquaculture

The U.S. is one of the largest markets for seafood in the world. However, over 70% of the seafood consumed is imported. This is especially true of shrimp, which is the number one seafood item in the U.S., and which over 90% of which is imported. Demand for live products in urban ethnic markets far exceeds supply. Kentucky is within a half-day drive of one half the population of the U.S. and many major urban centers in the Mid-West, Northeast and Canada. Each of these areas has substantial demand for live fish and shrimp products. KSU has worked to develop efficient and economical production methods for species of high demand in these markets. These include freshwater shrimp and largemouth bass. KSU has also conducted research on efficient transport technologies to deliver live product to these markets. Kentucky largemouth bass producers are currently exporting approximately 5,000 lbs of live largemouth bass per week to markets in Toronto. A recent commercial scale trial delivered over 1,000 lbs of live freshwater shrimp to Philadelphia and New York with over 90% survival.

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

Key Theme – Aquaculture

In several of the Midwestern states, such as KY, IL, TN, MO, there are thousand of acres of water that were formed after the strip-mining of coal. Use of paddlefish, a filter feeder, as a biological indicator in this type of water assists coal companies in demonstrating that their reclamation practices (heavily regulated) are environmentally effective and safe (water quality). Most of the water (including surrounding reclaimed land) is sold to private landowners for further development. Stocking of paddlefish and raising them to maturity (>7 years) can provide a valuable fish, having black caviar and boneless white meat (value-added products). A female fish (35 lbs with 3 lbs of caviar) currently has a retail value of over \$600 or an estimated value per acre of over \$3,000 (depending on stocking density). This is a sustainable, extensive aquaculture operation requiring little management, no feed cost (feeds on zooplankton) and relatively easy to harvest in entanglement nets that are not detrimental to sport fish with potentially a high dollar return (enhancement of sustainable communities). A pilot study was initiated in fall 1996. Gynogenetic paddlefish (presumptive females) were stocked at 5 fish/acre into a 70-acre strip pit lake in Southern Indiana. In the February 2005, one hundred and six fish were removed. Average weight of the fish was 35 lb. Total fillet meat production was about 1000 lb with a retail value of \$7.99/lb or about \$8,000. Sixty-one percent of the females had eggs with over 120 lbs of processed caviar produced with a retail value of \$24,000. Harvest of additional gravid females will occur next year. A community of 13 landowners have developed the Big “E” Fish Farm, LLC and sold shares according to water acres owned around the 70-acre lake. Further, the university conducted a statewide survey in Kentucky on the use of reservoir ranching of paddlefish in public waters (over 26,000 acres useable water with a potential economic impact of 7 million dollars per year). We had a high return rate of nearly 20% with over 70% of the public in “favor of stocking paddlefish” for generating jobs and revenue. Kentucky State University is the leader in paddlefish research for aquaculture. We have developed a system for producing a high percentage of female fish (about 80%) with on-going research in brood stock development, cryopreservation of sperm, molecular DNA microsatellite

studies for improvement of brooders. Outreach programs continue to be conducted to provide information on ranching paddlefish and its potential value (i.e. caviar and meat) in existing water bodies.

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

Key Theme – Agricultural Competitiveness

Because soybeans are the second largest food-crop grown in the US, soy proteins with improved flavor characteristics will provide economic benefit to farmers and processors. During 2004 we identified specific components of a sulfate-to-cysteine reaction pathway (sulfate>sulfite>sulfide>methanethiol) associated with isolated soy proteins (ISP). We confirmed the presence of large amounts of sulfate (0.15%) in defatted soybean flakes (the raw material for ISP) and relatively small amount of sulfite; ca. 1 part per million (ppm). We developed a method of quantifying sulfites in soy products that prevented over-estimation of sulfites due to interfering compounds, and demonstrated a specific point during soy protein processing that sulfites are being formed, resulting in ISP with sulfite contents of 21-33 ppm. A basic understanding of the mechanism, and reactants, involved in the synthesis of methanethiol in ISP is necessary for the development of commercially practical solutions to the longstanding flavor problem associated with soy protein products.

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 is 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. If only a 0.9 kg gain/calf (0.4% of body weight) is realized from this research, than 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 - Agricultural Profitability

Swine Extension Specialists have provided assistance and leadership to a group of independent producers in the Central Kentucky area in the development, implementation, and economic viability of a marketing cooperative. The size of operation for producers in the cooperative ranges from 50-600 sows. Programs and projects targeting improved genetics and marketing management have resulted in added carcass premiums of about \$5 per pig for the approximately 30,000 pigs marketed annually. The swine nutritional program that is tailored specifically for these producers have lowered feed costs by close to \$5 per ton. Taken together, these programs have resulted in a total economic impact of approximately \$180,000 for producers in the marketing cooperative. Programs and educational efforts have also helped this group move to antibiotic-free pork production. This has enabled the group to make arrangements with Swift & Co. and a meat processor in Union County to market hams and loins from their market animals under a Kentucky grown label, resulting in additional premiums of close to \$3.50 per pig marketed for the group.

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

Key Theme – Adding Value to Old Agricultural Products

Lipid and color oxidation are major causes of quality deterioration in meat products during storage, costing the industry over \$700 million annually. These reactions lead to off-flavor, discoloration, and loss of nutritive value, ultimately decreasing consumer confidence in the product. The University of Kentucky Muscle Foods Lab is conducting meat quality research using products supplemented with natural antioxidants such as oregano extract and hydroxytyrosol, a byproduct compound from the olive oil industry. These natural additives can effectively offset many negative qualities of oxidation and are being investigated for antimicrobial properties as well. In addition, consumers are accepting of the addition of natural substances, such as oregano, to meat products and trends indicate natural additives are preferred to chemical additives. Additional work demonstrates that the inclusion of antioxidants in meat products delays the accumulation of harmful lipid oxidation by-products, such as hydroxynonenal, an aldehyde implicated in a variety of medical diseases. Perhaps future studies will confirm that antioxidants serve not only to improve meat product quality, but also positively impact human health.

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

Key Theme – Animal Production Efficiency

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. One hundred seventy-one producers have registered and/or participated in Cow College. These producers represented approximately 11,300 commercial cows, 1,950 purebred cows, and 10,300 stocker cattle. Size of operation ranged from 10 to 900 cows. The average rating for each session was 8.8 on a 1 to 10 scale.

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

Key Theme – Plant Germplasm

Bean pod mottle virus (BPMV) is a member of the genus Comovirus. It has a bipartite positive-strand RNA genome consisting of RNA1 and RNA2. BPMV is widespread in the major soybean-growing areas in many of the southern and southeastern states. A recent severe outbreak in BPMV incidence in the north central and northern Great Plains states is currently the cause of serious concerns to the soybean industry in this region. Concomitant with the increased incidence of BPMV has been an augmentation in disease symptom severity and the emergence of apparently new and unusual severe strains. Studies on molecular characterization of such severe BPMV isolates revealed that they are reassortants/recombinants between two distinct subgroups of strains. Some of the most severe isolates, which were collected from various locations in the United States, were determined to be partial diploid reassortants containing two distinct types of RNA1 and one type of RNA2. At present, disease management of BPMV through genetic resistance is not possible, because no soybean cultivars with resistance to BPMV are commercially available. Therefore, a concerted effort is currently underway to screen available soybean germplasm for resistance/tolerance to BPMV infection. Knowledge of the genetic diversity among BPMV isolates, established in the research summarized here, is necessary to ensure that selected or newly developed soybean germplasms may offer broad protection against the full range of BPMV strains found in nature.

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

Key Theme - Agricultural Profitability

The purpose of the AIM program 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 297 producers who own approximately 18,000 cows. Purchased costs of these products were from 20-30% lower than available over the counter. Financial analyses have indicated that production costs were reduced \$45 per cow in the first year alone. Cooperative marketing efforts have also been successful. Feeder calf sales 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. If revenues increase approximately \$75 per cow, then AIM has increased profitability by approximately \$1,350,000.

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

Key Theme – Agricultural Profitability

Most small producers simply have neither the time nor the separate handling facilities to properly develop heifers. The Kentucky Heifer Development Program was designed to give both large and small beef producers the opportunity to develop their heifers by establishing regional heifer development centers. Currently, one heifer development centers have been established and over the past 5 years approximately 2,000 heifers have been developed. The first heifer development center established was the Eastern Kentucky Heifer Development Center (EKHDC). The EKHDC has developed 1,925 heifers since its inception. The EKHDC's sales have been successes. The added value to each heifer sold ranged from \$100-250 so the economic impact of this center ranged from \$200,000 to \$500,000. Over the last 4 years, five additional sales have been developed. In 2004 alone, approximately 2,500 heifers were marketed in 6 promoted heifer development sales in Kentucky. All heifers in these sales were developed under guidelines established by myself and other personnel of the Beef Extension Group. Heifers in these sales averaged approximately \$1,150. Producers in these sales likely increased their profitability by \$100-250 per head. Thus, the economic impact of heifer development sales in Kentucky this year was approximately \$5.175 million and profitability increased \$1.125 million.

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

Key Theme – Plant Genetics

Hemibiotrophic, plant-pathogenic microbes switch during their life cycles from a relatively non-damaging mode of parasitic growth (biotrophy) to a relatively damaging one (necrotrophy). Research has focused on understanding the genetic basis for this transition in the fungus *Colletotrichum graminicola*, which causes anthracnose disease of corn. A nonpathogenic mutant was identified during a large-scale screening experiment. The mutant initiates the biotrophic phase of the disease normally, but appears to be unable to switch to necrotrophic growth. The mutant is evidently deficient in one component of the signal peptidase enzyme responsible for cleavage of signal peptides from proteins destined for transport through the cell. The signal peptidase gene was mutated by an insertion of foreign DNA. A species of *Colletotrichum* pathogenic to the model plant *Arabidopsis* has been obtained, and work has been initiated with this species in order to better understand plant components that participate in hemibiotrophic and necrotrophic development of fungal stalk rot fungi. These studies will help us to understand how stalk rot fungi cause decay symptoms in their host plants, and how those symptoms relate to fungal infection and colonization. An improved understanding of the processes involved may help to identify effective therapies against these very important diseases.

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

Key Theme – Risk Management

A new research area deals with losses that are created by natural disasters. While special insurance exists for helping markets share risk for hurricanes, earthquakes, crops, and floods, these markets generally involved heavy government support. In some cases, policy makers have provided direct intervention. Such intervention can be detrimental when it causes decision makers to take on more risk resulting in greater exposure when the next disaster occurs. This research has found new ways to mix markets, governments, and charity to protect against natural hazard risk in both the developed and the developing world. The work has implications for improving efficiency and saving taxpayer dollars for the U.S. crop insurance program. This project has generated new products that are being introduced in Mongolia, Peru, and India. Should these models prove effective, it could have profound implications for U.S. policy in sharing natural hazard risk for agriculture and for other sectors.

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

Key Theme – Precision Agriculture

The Economics of Precision Agriculture - Agricultural economic analysis at the University of Kentucky continues to highlight the potential impacts of precision agriculture practices and technologies on the profitability and risk experienced by farmers. Research has shown that using yield maps and economic criteria can improve profits and reduce risk by correctly choosing land to enroll in the Conservation Reserve Program (CRP), demonstrating economic benefits to farmers and environmental benefits to society. Farmers should be aware of the potential of precision agriculture technology for risk management and for strategic, or long run, decisions because this can sometimes be more valuable than the increase in profit or use of precision agriculture for tactical or short run decisions. As an example, a farmer can experience a substantial reduction in risk (33 to 19 % CV) for a slight mean net returns reduction (down about 4%) by using different seed variety and variable seeding rate.

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

Key Theme – Plant Genetics

The University of Kentucky Advanced Genetic Technologies Center (UK-AGTC) is facilitating high throughput genetic analyses of plants, plant and animal pathogens, plant endophytes, and viruses. Several clone libraries have been constructed representing genomic DNA and copy DNA (cDNA) derived from messenger RNA. Deep-coverage libraries of genomic DNA and cDNA clones are essential “reagents” for genetic research on the plants, fungi, bacteria and bacteriophage from which they were derived. The unique organisms investigated are important in the health and profitability of agriculture in Kentucky. Knowledge gained about genetic constitutions and gene expression will facilitate improved management of agricultural plants and livestock, their beneficial symbionts, as well as their pathogens and pests. The UK-AGTC is a vital facility, not only for the information generated, but also because it advances the accomplishments and reputations of Kentucky faculty in genomics research, allowing researchers to leverage more effectively major competitive grants.

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

Key Theme – Plant Production Efficiency

Acquiring sufficient carbohydrate in the form of sorbitol is essential for successful apple fruit set. Sorbitol dehydrogenase (SDH) is expressed and is actively metabolizing sorbitol in both apple seed and cortex tissue during the first few weeks of fruit growth. SDH activity in seeds increased while that in fruit cortex was generally lower and constant. The high SDH activity in apple seeds may be essential for successful fruit set in apple.

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

Key Theme – Plant Production Efficiency

A grant-funded on-farm demonstration and consulting program has made significant impact on farmers transitioning from major dependence on tobacco production. Among the 2004 impacts are: Early detection of an insect outbreak in trees through scouting and education on control measures prevented the loss of at least \$200,000 in sales and pruning technology education will likely result in a \$750,000 increase in the value of marketable trees. Application of technology and cultivar recommendations resulted in a 12,000 lb/A increase in cabbage production. Marketable cantaloupes delivered to one of the marketing cooperatives increased 10% with the cull rate down 26%.

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

Key Theme – Managing Change in Agriculture

Following seven years of political debate, the tobacco quota buyout became a reality in 2004. Extension educators worked closely with farm group leaders, policymakers and other constituents throughout this period in policy development and analysis of various buyout bills. The tobacco quota buyout is probably the most significant and far-reaching piece of agricultural policy legislation for Kentucky farmers and rural communities since the development of the federal tobacco program in the 1930s. The \$10.14 billion buyout will send around \$2.5 billion to Kentucky tobacco quota owners and growers over the next 10 years. These dollars will be funneled into 117 of Kentucky's 120 counties, creating a total economic impact of approximately \$4 billion and more than 1,500 jobs. Extension educators are currently working with farmers, agribusinesses, financial institutions, and local economic development leaders on investment opportunities for buyout recipients.

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

Key Theme – Plant Health

Botrytis cinerea is the casual agent for grey mold the most economically important disease of strawberry fruit. E-2-Hexenal, a natural component of fruit, can influence the growth of the pathogen. Studies on the enzymes which produce E-2-hexenal should provide a conceptual model for altering strawberry fruit production of the biologically active compound. Research with volatile marker compounds for food borne bacterial pathogens revealed that ten *E. coli* strains tested (all undesirable on food) were characterized by a specific marker compound. Moreover, the level of the marker can be increased significantly by providing a chemical precursor. These results advance the potential for developing a useful test for detection of bacterial contaminants on food.

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

Key Theme – Plant Production Efficiency

Pawpaw is a highly perishable climacteric fruit, softening rapidly once ripening commences which may limit its marketability. Pawpaw fruit exhibited adequate firmness and ripening upon removal from cold storage through 4 weeks, but at 8 and 12 weeks fruit were very soft and did not ripen. A change in fruit aroma volatile profile suggested ripening problems might have been developing by 4 weeks of cold storage even though other symptoms were not evident.

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

Key Theme – Plant Production Efficiency

Modified atmosphere (MA) storage of blackberries may maintain quality and increase storage life, but there is limited information about how eastern thornless cultivars respond to MA's. Because there is also a growing interest in the health benefits of antioxidants in blackberries, it would be useful to know how those levels might change during MA storage. Refrigerated MA storage of blackberries did not extend their shelf life, while the antioxidant levels in the fruit did not change during storage.

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

Key Theme – Animal Production Efficiency

In November 2002, the Kentucky Agricultural Development Board approved a model program to provide cost-share funds for constructing hay, straw, and commodity storage facilities. The main goals were to reduce hay storage losses; improve livestock feed quality and feeding programs; and enhance hay, straw & grain marketing opportunities. During the past 2 years, over 80 counties have participated and about \$12.2 million in county Ag. Development funds have been committed to the program. Participating farmers have matched that amount on a 50/50 cost share basis bringing the total investment to over \$24 million. By far, the greatest portion of that investment has been used to construct hay storage structures. Although precise numbers are not available, a current estimate is that over 3000 new hay storage structures have been built, providing a one-time storage capacity for about 360,000 tons of hay. Assuming a modest 10% savings from reduced hay storage losses and an average hay value of \$60/ton, direct benefit to farmers in hay savings alone calculates to about \$2.2 million per year. Program participants are also accruing additional economic benefits in the form of improved feed quality, additional marketing opportunities, and reduced feed cost.

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

Key Theme – Niche Markets

Establishing a local market for farm-raised vegetables is vital to the diversification of the Commonwealth's tobacco-based rural economy. The farmers need a profitable venue to sell crops. We must allow farmers to meet and set goals for their future. Kentucky State University's Small Farm Program works with a group of Mennonite and Amish farmers to help establish markets for their produce. The Small Farm Program helped the farmers with quarterly field days and farm tours. The purpose of the field days was to encourage individuals to see how the produce was grown and to patronize the auction. The Fairview Produce Auction began in 1997 with sales two days each week. Produce was harvested in the morning and sold in the afternoon. The first year the Fairview Produce Auction, Inc. generated more than \$100,000.00 in sales. In 2004, 71 growers sold more than 1.2 million dollars of produce at the Fairview Produce Auction, Inc.

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

Key Theme – Small Farm Viability

The ongoing Small Farm Program works annually with limited resource small farmers in five counties in the areas of new enterprise development, farm production practices, sustainable agriculture systems, budgeting, record-keeping, the use of USDA agencies, farm safety, and marketing, including alternative marketing systems. Currently 125 farmers receive one-on-one information in these areas, plus many more will be reached through meetings, field days, and statewide activities. The Trigg County Farmers Market was developed in 2004 as a result of this effort. Historically, families enrolled in the Small Farm Program have increased their gross farm income while reducing their input costs. The the Breckinridge Graded Cattle Markets and mineral program resulted from this program. Counties with Small Farm paraprofessionals report that participating farmers average \$10,000 increased annual incomes. County programs range from \$150,00 - over \$1 million increased income as a result of the program, with most counties averaging an increase of \$250,000 - \$350,000.

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

Key Theme – Small Farm Viability

KSU’s “Third Thursdays” continued to receive state, regional, and national recognition as a model farmer-professional education program. Approximately 850 participants attended the workshops in 2004. As a result, the SARE program sponsored KSU to take 75 to the Southern Sustainable Agriculture Workers Conference. The Third Thursday sustainable agriculture workshops focused on marketing issues including certified kitchens, 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; farm equipment and safety; sustainable fish and shrimp production for small farmers; livestock production systems; and sustainable and organic vegetable production.

Source of Federal Funds: Smith-Lever, Other Federal

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 19 counties in the areas of farm production practices, financial management, sustainable agriculture systems, marketing, farm safety, health screenings, and the use of USDA agencies. This program serves over 150 families one-on-one annually, plus many more through field days, meetings, and outreach activities. Farm families were assisted with eight home improvement projects. Partially as a result of the program, Kentucky has the lowest USDA-FSA loan delinquency rate in the South. Historically, families enrolled in the OASDFR program have increased their gross farm income while reducing their input costs.

Source of Federal Funds: Smith-Lever, Other Federal

Scope of Impact: State Specific

Key Theme – Risk Management

The Small Farmer Risk Management Education projects provide resources for low literacy, farmer and research based, and web-based educational programs. These projects target sustainable production and marketing systems, farm management, record-keeping, financial management, marketing, insurance needs, and goat and beef cattle production and marketing systems. One project focuses on retirement planning options and estate planning for farm families. These projects are sponsored through competitive projects with USDA-Risk Management Agency’s Outreach, Education, and Under Served Commodities Programs and the USDA-CSREES Southern Region Risk Management Education Center. The web-based Estate and Retirement Planning for Small Farm Families website is up and is being used by Extension and others. Risk Management meetings were held at the “Third Thursday” workshop, Small, Limited-Resource/Minority Farmers Conference, Meade County, Lincoln County, and Fairview.

Source of Federal Funds: Smith-Lever, Other Federal

Scope of Impact: State Specific

Key Theme – Animal Production Efficiency

Kentucky is currently the second largest volume producer of meat goats. Kentucky State University through its research and extension programs has taken the lead role in goat production education. These activities include developing and teaching production practices, marketing strategies and alternatives, risk management issues, sustainable/environmental production alternatives, and breeding. Partial funding of this initiative is through competitive projects with the USDA-Risk Management Agency Under Served Commodities Program and the USDA-CSREES Southern Region SARE-PDP and SARE-On Farm Research programs. KSU sponsored goat workshops were held at “Third Thursdays” and in Russell County, Logan County, Trigg County, and in Owsley County.

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

Accomplishments and Results for CSREES Goal 2

Goal 2

A safe, secure, food & fiber system. To ensure an adequate food and fiber supply and food safety through improved science based detection, surveillance, prevention and education.

Overview

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

During the past year, the 37,920 individuals indicated that they gained knowledge related to safe storage, handling, and preparation. Of these, 27,802 (or 73%) put what they learned into practice. In addition, 24,057 people adopted practices to increase access to food or make it more affordable.

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 FY04.

Kentucky State University research projects discussed under Goal 2 in the FY00-04 Plan of Work are now reported on under Goal 3 and Goal 4.

Expenditures	Federal Extension Funds (UK)	\$632,946
	Federal Extension Funds (KSU)	\$100,000
	Federal Research Funds (UK)	\$578,036
	Federal Research Funds (KSU)	N/A
FTEs	Extension (UK)	48.0
	Extension (KSU)	0.5
	Research (UK)	7.0
	Research (KSU)	N/A

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 constitute 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 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. Resource materials and county programs are offered that showcase locally grown 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 are partnering to support farm friendly legislation. House Bill 391 allows Kentucky farmers who grow and harvest produce to process value-added products and sell them from designated farmers markets, certified roadside stands, and the processor’s farm. Over 80 farmers will be selling low risk items such as jams, jellies, cakes, and pies. But to sell acidified or low acid foods, farmers must attend a Home-based Microprocessor Workshop. UKCES has been instrumental in the development and delivery of workshop materials. Over 160 farmers have studied food safety, sanitation, and USDA-recommended home canning procedures.

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

Key Theme – Food Quality

Bruising strawberry fruit induces the production of unique volatile products that can impact the development of postharvest mold problems. Following gentle bruising, strawberry fruit emitted wound volatiles within 15 minute but levels were low within an hour. Rapid changes in relevant lipid substrates and enzyme activities were consistent with increased wound volatile production. The rapid changes in wound volatile production suggest that the volatiles would only influence mold organisms for a brief period after a bruise event.

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

Accomplishments and Results for CSREES Goal 3

Goal 3

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

Overview

During the past year, the Kentucky Cooperative Extension Service made 618,459 contacts related to promoting healthy lifestyle practices. This represents a 25 percent increase over the previous year. An additional 53,155 contacts related to helping Kentuckians know and understand the Food Guide Pyramid. Extension collaborated with other organizations and agencies to co-sponsored 1,770 different events or activities which focused on comprehensive health maintenance.

These efforts resulted in 37,939 citizens making lifestyle changes for the purpose of improving their health. An additional 26,481 individuals implemented personal health protection practices appropriate for their life cycle stage (preventive health practices, participation in screening and detection opportunities, immunizations, etc.) and 27,559 people adopted at least one new safety practice (bicycle helmets, fire extinguishers, tractor roll bars, radon testing, smoke detectors, proper ATV operation, etc.).

In FY04, the Kentucky Agricultural Experiment Station conducted the full-time equivalent of four projects 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 has 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 determine the effect of human exposure to pesticides are long range goals. Three research projects are currently supported by KSU Research and one is reported on here: Food Choices and Eating Habits of Adolescents

Expenditures	Federal Extension Funds (UK)	\$1,107,655
	Federal Extension Funds (KSU)	\$105,000
	Federal Research Funds (UK)	\$683,134
	Federal Research Funds (KSU)	\$371,774
FTEs	Extension (UK)	80.0
	Extension (KSU)	6.0
	Research (UK)	4.0
	Research (KSU)	7.0

Key Theme - Human Health

The alarming increase in childhood obesity rates over the past decades reflects both nutritional and behavioral risk factors. Analysis of dietary intakes of children indicates that most exceed fat intake guidelines, while too few meet the recommended levels for calcium, iron, and folate intake. Although many adolescents fail to meet the minimum recommended energy intakes for active youths, their sedentary lifestyles result in excessive weight gain. Focus group discussions conducted with forty sixth-grade students has revealed that taste and hunger overwhelmingly influence food choices, while health benefits of food choices ranked considerable lower. Most students reported eating lunch in the school cafeteria, but a number complained about the school lunch offerings. A follow up study with 743 sixth-grade school lunch participants in three middle schools examined their initial food choices and subsequently discarded plate waste. We found plate waste was highest overall for fruits and vegetables; students who purchased prepackaged items in the cafeteria (primarily chips, snack cakes, cookies, fruit drinks and sports drinks) had significantly greater plate waste and significantly lower intakes for most nutrients other than energy. An interactive educational package that focuses on making better food choices has been developed and will be distributed to schools and teachers. Findings from this study have been presented at state and regional professional meetings and in a guest lecture for students in a graduate nutrition program. An article describing the impact of competitive food choices on nutritional intakes from school lunch was published in the February 2005 Journal of the American Dietetic Association, the largest organization of food and nutrition professionals in the nation. Sharing our findings with such a wide audience has a huge potential to influence the type of competitive items offered with school lunch program items in school cafeterias. The educational package also has the potential to influence children's food selections by giving them specific nutrient content information with which they may evaluate alternative choices.

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

Key Theme - Human Nutrition

The state of Kentucky has above average national rates of diet-related diseases, such as diabetes, heart disease, high blood pressure, stroke, and some cancers. Research shows that a diet rich in fresh fruits and vegetables, lower in fat, and lower in sodium can reduce the risks of diet-related disease. The University of Kentucky Cooperative Extension Service has been instrumental in the development and delivery of education materials that address food safety, methods of food preparation, getting the most value for their food dollar, and quick, delicious meals. Being able to handle and prepare food correctly encourages Kentuckians to use Kentucky grown foods and take charge of their own health. Activities that showcase Kentucky's best and that emphasize improving health through proper food preparation include the Pride of Kentucky Cookbook, Fall Harvest Cooking School, Memories in the Making Cooking School, Master Cattleman Program, Farm to Table Program, and many others.

Source of Federal Funds: Smith-Lever
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, 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

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. Autism leads to developmental delays and nutrition can be an intervening actor in slowing the poor outcomes of cognitive and physiological delay. Autistic treatment modalities propose a variety of psychoactive medications which affect both appetite and nutritional status, restrictive diets such as the gluten free/casein free diet, and complementary and alternative medicines not based on research testing. 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. The research program evaluates nutritional status and medication interactions in an effort to help parents normalize autistic symptoms in their child. The project assesses the child's nutritional needs and guides parental decision making about specific nutrient needs. Few parents have the skills to address the nutritional issues of these children without support. The program gathers and provides research-based information to help manage behaviors that restrict health and reduce the many nutritional risk factors that evolve from treatment of autism. We have delivered information to over 17,000 persons yearly in parent support groups and professional organizations in KY, OH, IN and at national and international professional meetings.

Source of Federal Funds: Hatch, 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 in-service training in January and are actively working to launch programs in their communities. Based on participation from July 1, 2004 through February 1, 2005, it is estimated that approximately 33,000 Kentuckians will participate in the Get Moving Kentucky program for the current fiscal year.

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

Key Theme – Human Health

An exciting new program called “LEAP for Health” (Literacy, Eating and Activity for Pre-schoolers) consists of a series of ten lessons using children’s storybooks to teach children about staying healthy and eating more fruits and vegetables. Each lesson in the series includes a facilitator’s guide, reinforcement activities and a family newsletter. Developed through partnerships with the Kentucky Cardiovascular Coalition and Kentucky Department of Education, the program is being implemented through county Extension offices. Over 140 county Extension agents, program assistants and community partners attended regional trainings for implementing the program. Collaborations at the county level include Extension Homemakers, public libraries, health departments, family resource centers and other community partners. Since August 1, 2004, approximately 6,050 children have been reached with the program. The Kentucky Department of Education has provided over \$10,000 in funding to purchase the complete set of storybooks for each county Extension office. The Foundation for a Healthy Kentucky has selected the LEAP for Health program as a featured Models that Work collaboration with Kentucky Educational Television.

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

Key Theme – Human Health

“Weight: The Reality Series” is a recently introduced, 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. The series has been piloted in ten counties with over 150 participants with an average weight loss of 5% of initial body weight. County Extension agents will receive the final version of the curriculum at a training scheduled for May 18-19, 2005. Agents will be encouraged to implement the program in their community with local partners.

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

Key Theme – Human Health

Kentucky was one of seven states to receive a National Breast and Cervical Cancer Grant grant funded by National Institutes of Health (NIH), National Cancer Institute (NCI) and Centers for Disease Control (CDC) with administrative support from USDA/CREES. This pilot program involves county Extension agents in developing local strategies to increase screening and early detection of breast and cervical cancer for rarely or never screened women in nine targeted counties (Breathitt, Elliott, Floyd, Johnson, Lawrence, Martin, Magoffin, Powell and Wolfe). Extension’s Health Education through Extension Leadership (HEEL) program is partnering with Markey Cancer Center, Mid-South Cancer Information Services and the Kentucky Cancer Program to develop strategies for implementation. USDA is providing a \$2500 stipend to each selected state. The counties are forming local coalitions and will be piloting a newly developed breast and cervical cancer curriculum.

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

Key Theme – Human Health

Cancer of the skin is the most common of all cancers. *Melanoma* is the most serious type of skin cancer. It accounts for about 4% of skin cancer cases, but it causes about 79% of skin cancer deaths.¹ In the United States, the percentage of people who develop melanoma has more than doubled in the past 30 years.² More than 850 cases were diagnosed in Kentucky in 1996- a 46% increase over the number reported in 1991. The American Academy of Dermatology conducted a nationwide survey in 1995 to test just how much they knew about melanoma and the risk factors associated with it. Several of the findings indicated that as much as 42% of the respondents had no knowledge of *melanoma*, with the awareness being the lowest in the 18-24 year olds. Approximately 50% of the male respondents and 35% of the female respondents reported that they had not even heard of the term *melanoma*³ Based on these data, skin cancer education and prevention has been put in the forefront of our cancer programming in extension. The state age-adjusted rate for skin cancer, is 2.83 (558 cases) with a crude adjusted rate of 2.80. There are

several counties that have rates above 2.83. These rural communities due to their agricultural economic base are exposed to the harmful rays of the sun and are at increased risk for skin cancer. A Dermasan machine which uses ultra-violet light to help one see their lifetime exposure to the sun was purchased and could be checked out for agents to use for skin cancer education and prevention in their counties. It is not a diagnostic tool but rather a tool to help you see the damage to your skin from unprotected exposure to the sun. The Dermasan machine along with handouts, fact sheets, a table top display and samples of sunscreen were all part of the skin cancer education session. The Seventeen counties have used the Dermasan for skin cancer education awareness and prevention with audiences that included local businesses, industry, homemakers, public schools, summer camps, and local health fairs. This program has touched the lives of 4,176 Kentuckians. Skin cancer can affect any age group or ethnicity. All races and age groups have been targeted for skin cancer education and prevention. The average age of the participants was over the age of 50 and Caucasian. Kentucky will continue to have skin cancer education and prevention programming in efforts of preventing skin cancer deaths.

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

Key Theme – Human Health

Extension’s Health Education through Extension Leadership (HEEL) program supported the development of a \$108,000 grant from HRSA (Health Resources Services Administration) to the College of Medicine to create a rural training track within current curricular structure for students with a desire for rural practice. Through this partnership with the UK College of Medicine and the Area Health Education Centers, county Extension agents are coordinating a community immersion segment for medical students participating in rural medicine rotations during their third year of medical school. The goal is to provide the medical students with an understanding of the rural community in order to better serve their patients. The community orientation includes interaction with local government, businesses, educational institutions, health services and community agencies. Medical students are currently placed in Perry, Knott, Leslie, Letcher, Bath, Menifee and Rowan counties.

Source of Federal Funds: Smith-Lever, Other Federal
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 past year, the Kentucky Cooperative Extension Service made 154,675 contacts related to promoting the effective stewardship of natural resources. Cooperative Extension also made 14,403 contacts related to the management of waste through reduction, reuse, or recycling and 20,884 contacts related to the management of forests and woodlands.

As a result of these efforts, 14,655 individuals adopted practices that protect the water. 4,414 individuals began using new forest management practices. 28,388 individuals adopted one or more practices related to conserving, sustaining, or protecting soil resources. New conservation practices were used on an additional 878,592 acres of land.

The Kentucky Experiment Station conducted the full-time equivalent of 20 projects 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: Soil Conditioners and Constructed Wetlands for Water Quality Improvement.

Expenditures	Federal Extension Funds (UK)	\$632,946
	Federal Extension Funds (KSU)	\$103,000
	Federal Research Funds (UK)	\$1,313,719
	Federal Research Funds (KSU)	\$418,785
FTEs	Extension (UK)	44.0
	Extension (KSU)	1.0
	Research (UK)	20.0
	Research (KSU)	7.7

Key Theme – Water Quality

The use of pesticides in plant protection releases large quantities of pesticides into rivers and streams through runoff water and sediment (following natural rainfall or irrigation) and into groundwater through infiltration (seeping). Loss of pesticides into the environment during and following pesticide spraying cannot be avoided, but can be minimized. Our objective at KSU/Water Quality research is to minimize environmental pollution by pesticides using soil management practices (different cropping systems, living fescue strips, soil mixed with yard waste compost, and soil mixed with sewage sludge). Due to geographic conditions, many of the lands in Kentucky are highly erodible. In Kentucky, where agriculture is a major industry, there exist at least 635 surface water bodies and 48 groundwater sources impacted by non-point source (NPS) pollution by pesticides. About 80% of the people in Kentucky depend on groundwater as a sole source of drinking water. Over 90% of the rural domestic water sources are groundwater. Research at KSU has shown that soil amendments (yard waste compost and sewage sludge) and cultivation of turf (living fescue mulch) across the contour of the land slope and between vegetable rows, successfully reduced runoff water and sediment and pesticide movement at the edge of the field and provided acceptable yield. KSU Water Quality Research has provided Kentucky farmers with information on use of different alternatives including cropping systems, planting living fescue strips, and the use of sewage sludge as soil management practices to reduce pesticides and sediment loss from agricultural fields into streams.

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

Key Theme – Agricultural Waste Management

An issue of tremendous interest in this country involves the environmental impacts and safety to humans 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 - Land Use

Setback distances are a common zoning device used to minimize the offsite impacts of a livestock operation. A model of livestock odor reduction benefits and costs shows that Kentucky's legally defined odor setback distances from swine production facilities are too short. Livestock production firms pay more with longer setback lengths, but the losses to surrounding home owners far exceed firm gains at the mandated setback lengths. Rural residences worth \$60,000 on an average of 2,000 feet from a swine production facility are being damaged as much as \$4.4 million per farm, although damages are assumed to be 0 at the state mandated setback distance of 1,500 feet. Kentucky has 81 farms with 1,000 or more pigs that were potentially required to comply with the 1,500 feet setback lengths. Buying all land within 2,000 feet of any residence would cost such a farm \$433,000 at 1,500 per acre.

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

Key Theme – Water Quality

All governments are dealing with water issues, everything from unfunded mandates on stormwater to the loss of riparian vegetation around streams. The KY Division of Water and the UK Cooperative Extension have collaborated in funding the Salt River Basin Coordinator's position. The Coordinator works to bring together partners in a watershed to meet and begin discussing issues pertinent to their watershed and then to begin actions for carrying out plans. One great example of a community coming together to do this is Sinking Creek Watershed effort in Hardinsburg. Partners include the Kentucky Division of Water, UK CES, Natural Resource and Conservation Service, local RC&D Office, Division of Forestry, US Geological Survey, Salt River Watershed Watch volunteers, residents, and many others. To date they have developed a watershed plan, video and brochure, presented at adult agriculture classes and other school classes, handed out information at county fairs and festivals, hosted tours and field days in the watershed, and trained volunteers to take water samples. This Council will continue to actively seek and implement funding for projects that will impact the health of the watershed in a positive way for the future.

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

Key Theme – Biological Control

Unequivocal evidence was presented for the viral etiology of the debilitating disease of the plant pathogenic fungus *Helminthosporium victoriae*, a pathogen of corn. This conclusion was based on the finding that transformation of virus-free fungal isolates with a full-length cDNA clone of the fungal virus, Hv190SV, induced a disease phenotype. This is significant information since most double-stranded RNA fungal viruses have been reported to be avirulent and associated with symptomless infections of their hosts. The availability of a full-length cDNA clone of the host gene coding for the broad-spectrum antifungal protein victoriocin, which is induced by virus infection, would allow the construction of appropriate plant transformation vectors for its expression in desired plant species and, subsequently, for its potential use for biological control of plant pathogenic fungi.

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

Accomplishments and Results for CSREES Goal 5

CSREES Goal 5

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

Overview

The Kentucky Cooperative Extension Service made 743,426 contacts related to the development of life skills in youth and adults. 482,082 contacts related to community capacity building, 210,493 related to decision-making, and 130,911 related to the development of communication skills. An additional 177,420 contacts focused on character education.

More than 210,000 Kentucky youth participated Extension 4-H Youth Development programs and nearly 21,000 individuals were members of Extension Homemaker Clubs affiliated with the Kentucky Extension Homemaker Association.

As a result of these efforts, 75,438 individuals demonstrated informed and effective decision-making. 85,824 youth and adults demonstrated the application of practical living skills. 84,596 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 7,281 prepare to enter the workforce. 7,712 dependent care providers (adult or child care providers) reported changes in knowledge, opinions, skills, or aspirations as a result of programs conducted by Extension. 22,019 individuals reported changes in knowledge, opinions, skills, or aspirations related to parenting or personal relationships and 22,489 individuals adopted one or more practices to improve their financial wellness.

In FY04, the Kentucky Agricultural Experiment Station conducted the full-time equivalent of five projects related to this goal. Kentucky State University research projects discussed under Goal 5 in the FY00-04 Plan of Work are now reported on under Goal 3 and Goal 4.

Expenditures	Federal Extension Funds (UK)	\$3,481,203
	Federal Extension Funds (KSU)	137,000
	Federal Research Funds (UK)	\$105,097
	Federal Research Funds (KSU)	N/A
FTEs	Extension (UK)	249.0
	Extension (KSU)	5.0
	Research (UK)	5.0
	Research (KSU)	N/A

Key Theme – Youth Development/4-H

As Kentucky farm families transition from tobacco to other enterprises, for many animal production is a viable alternative. Studies have shown that a majority of livestock producers initially became interested in livestock as children. This has made it imperative that livestock educational resources be readily available for use by Extension agents and adult volunteer leaders working with youth. A youth-friendly resource kit has been developed by 4-H and Animal Sciences faculty, county Extension agents, and lay leaders to help with educating youth on beef cattle, sheep, swine, and goats. This kit includes a comprehensive teaching manual (complete with over 100 individual lesson plans), teaching resources for use with the lesson plans (includes several laminated posters, DVD's, an interactive CD, and feedstuff kit), and fun learning activities to reinforce principles from the lesson plans. The Targeting Life Skills model was used in development of the lesson plans, and the KERA Competencies addressed in each lesson plan are identified. This resource will be used as the approved curriculum for livestock by all 4-H Livestock Clubs in Kentucky.

Source of Federal Funds: Smith-Lever
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 KERA.

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

Key Theme - Home-based Business Education

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

An Agritourism “Quick Response Team” provided leadership to four regional forums focusing on agritourism. The goal of these forums was to bring agritourism business persons together with tourism support groups on the local, regional, and state levels. Presentations and discussions focused on state and regional opportunities available for business promotion, capital access, and marketing networks. 100% of the 106 participants in the forums reported that at least one concept they learned at the forum would help make their enterprise more profitable. Results of the forums included the development of *Cave Region Agritourism* and the establishment of an endowment fund to provide a sustainable source of funding for agritourism marketing activities. The *Cave Region Agritourism* also provided leadership for the *Pride of Kentucky Showcase* in Bowling Green.

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

Key Theme – Child Care/Dependent Care

Due to the significant number of dual income families and single parent households, the number of latch key children continues to rise. Consequently, the Kentucky Cooperative Extension Service created a Quick Response Team on Child Care. The Quick Response Team reviewed and recommended training curricula for use Kentucky and conducted three training sessions to introduce the curricula county 4-H agents, program assistants, and volunteers. This year, 4,690 youth participated in the 4-H child care program compared to 3,206 the previous year. All of the 61 4-H agents who attended the training sessions indicated they would use parts of the information in their program.

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

Key Theme - Human Nutrition

Seventy-one Kentucky Expanded Food and Nutrition Education paraprofessionals taught 1654 limited resource families how to serve more nutritious meals, to keep foods safe, and to utilize local food resources effectively. Ninety-five percent of the families made an improvement in the nutritional quality of their diet. Seventy percent of EFNEP graduated families consumed a diet of higher quality because they planned meals using the food guide pyramid, considered healthy choices, and used the “Nutrition Facts” label. Fifty-six percent of families increased the frequency of moderate physical activity for 30 minutes per day. Fifty-six percent of the families began feeding their children breakfast while 68 percent demonstrated an improvement in safe food handling practices and hand washing behavior. Seventy-five percent of families learned to plan meals ahead of time and used a grocery list to guide food selections.

A 69 percent improvement was shown in food price comparison behavior. Families showed a 25 percent decrease in meals eaten away from home. Twenty-seven percent of families were able to use community food resources, such as food pantries, less often due to increased skill at food resource management.

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

Key Theme – Family Resource Management

The value of the Master Volunteer in Clothing Construction Program continues to be an important interdisciplinary outreach for Kentucky Cooperative Extension. With the near extinction of sewing/clothing construction classes offered through the public school system, few young people are being exposed to this important life skill. It is the mission of this program to provide ongoing, in-depth educational opportunities for adults enrolled in the program and train these volunteers as para-professionals to assist Extension professionals in planning, carrying out and evaluating programs related to sewing.

During the past year, 73 active Certified Master Clothing Volunteers contributed over 11,800 volunteer hours in teaching clothing construction and related skills. This converts to an approximate value of \$195,000.00. Over 50,000 contacts were made by the 73 volunteers across the Commonwealth. Since it's beginning, fifteen years ago, the Kentucky Master Volunteer in Clothing Construction program has trained 236 volunteers. 19 new volunteers began their two-year apprenticeship in the fall of 2004 bringing the total number of active volunteers to 92. Forty-nine counties representing all seven districts (14 areas) have active volunteers. Sewing classes are being taught to adults as well as youth. The acquisition of sewing and clothing construction skills enriches the quality of life as both a stress reliever and a means for economic gain.

At the 2004 fall training, participants constructed over 100 turbans and head wraps that were given to the American Cancer Society and distributed to chemotherapy patients suffering hair loss. This project has been adopted as an on-going outreach project.

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

Key Theme – Youth Development/4-H

Employers are increasingly seeking one outstanding skill in their applicants. That is the skill to communicate effectively through a variety of verbal and non-verbal methods. In response to this need, Kentucky 4-H selected “communications” as a primary area of focus for their youth programs. A new curriculum, Building Bridges, was adopted by the 144 4-H Youth Development agents in Kentucky to increase the communications skills of their youth participants. In 2004, over 50,000 youth participated in these communications enhancing activities. In addition, the existing communications program was expanded to include programs that encourage record keeping, interviewing, citizenship, leadership and community service. All programs have been selected to complement school programs and the Kentucky Core Content.

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

Key Theme – Children, Youth, and Families at Risk

“Walk Your Land” is an educational program that addresses substance abuse issues in Eastern and Western Kentucky, particularly the production and use of methamphetamine. Materials developed included a pamphlet for identifying meth waste, a training manual, data maps indicating illicit drug use, abuse, production and sales, power point presentations, teaching outlines and evaluation tools. HEEL Staff have conducted trainings for approximately 300 county Extension agents and their community partners in Eastern, Central and Western Kentucky. Partnerships have been formed with Kentucky State Police, Operation Unite, and the Pennyrite Narcotics Task Force. This partnership focuses on the education to prevent the necessity of legal action in situations where farmers and other landowners find and dispose of waste that they may not realize is considered toxic. This effort will also increase the protection of soil and water from methamphetamine-related contamination.

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

Key Theme – Children, Youth, and Families at Risk

Kentucky Alliance for Drug Endangered Children is an advisory council that guides programming related to the methamphetamine production and its effects on children, elderly adults and the environment. This committee includes representatives from law enforcement bodies, emergency medicine, crime prevention, pediatrics, public health, Kentucky Board of EMS, Children’s EMS, Adult Protection, Child Protective Services, Environmental Health, Kentucky Injury Prevention Center and the College of Social Work. The DEC alliance is offering trainings across Kentucky led by the National Alliance for Drug Endangered Children for county Extension agents, Family Resource Center Coordinators, Emergency Room physicians, EMS workers, social workers and other first responders. Through the trainings, community teams will develop a protocol for responding to and treating vulnerable populations exposed to methamphetamine production. Over 1400 people are registered for the trainings.

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

Key Theme – Impact of Change on Rural Communities

“Failing to plan is planning to fail.” This is true in communities as much as it is true for our personal lives. Successful communities connect local assets -- what do we have, what do we know, what do we do well – to a community vision - what do we want to become -- as a basis for strategic planning - how do we use our assets to reach our vision and what other resources do we need. A team of leaders in Pendleton County have spent the last 6 months developing the draft of a comprehensive community plan that will guide decisions and investments for the next 20 years. The effort has already paid off with the establishment of a partnership with the UK Landscape Architecture 5th year students who are designing a vision for the future of Pendleton County. Local officials and interested residents in Wolfe, Elliott and Morgan counties have done the planning to establish the Tri-County Eco-Agro Tourism Initiative. This nonprofit organization will support the efforts of landowners in the three counties to develop new tourism enterprises. This is an innovative effort to expand economic opportunities and to respond to the ending of the tobacco support program.

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

Key Theme – Leadership Training and Development

Animal Sciences projects are one of the six components of the Kentucky 4-H Core Curriculum. Ninety-six Kentucky counties offer one or more projects in the animal sciences core content area. In order for agents to successfully recruit volunteers to lead livestock project clubs, the resources and curricula that volunteers will utilize must be developed. Many volunteers have the skills necessary to work with young people, but lack the subject matter expertise to teach animal sciences. Additionally, many livestock producers, who have a strong background in animal sciences, lack the necessary skills and resources to work with children. The Kentucky 4-H Livestock Volunteer Certification Program (KLVCP) was developed to meet these needs. The KLVCP consists of three components, the Kentucky 4-H Livestock Volunteer Certification Resource Manual, the Kentucky 4-H Livestock Volunteer Certification Resource Kit and the Livestock Discovery CD. The Manual contains nearly 70 lesson plans, including learning activities and assessment instruments. The Kit includes laminated posters, full color laminated photographs, DVDs, curricula and manuals on beef, goats, sheep and swine, feeds, meats, ethics, nutrition and health. The Livestock Discovery CD includes all of this plus information on dairy and horses. Introduced in January, 2005 at a weekend workshop, 195 volunteers from 75 counties have already been certified. Certification includes four hours of instruction in youth development, volunteer development, club management and teaching strategies, plus eight hours of content from the Manual, Kit and Discovery CD. Certification includes completing 12 hours of instruction, teaching a lesson from the curriculum, participating in a skill-a-thon activity, and scoring at least 70% on a written assessment. Certified volunteers sign a contract verifying that they will provide a minimum of six (6) hours of instruction to each 4-H member who participates in a livestock project in their county.

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

Stakeholder Input Process

Cooperative Extension

Cooperative Extension's program development process is based on a six-stage model which begins with the establishment of strong linkages with the various publics the organization is charged to serve. During 2004, each county in Kentucky was asked to conduct an assessment of local needs and program opportunities. Prior to the commencement of county analyses, support materials were developed on how to use secondary data sources, key informant interviews, focus groups, community forums, questionnaires, media scans to learn about the community. Agents were expected to involve members of the CEC in utilizing at least one of the data collection methods in conducting their county analysis.

After data collection activities were completed, those involved in data collection activities presented the findings to the broader Council. The CEC then established program priorities for which program plans would be written. In all, an estimated 3,600 people were involved in the process of establishing local program priorities for FY05-08.

High priority issues and needs identified by County Extension Councils are either acted upon locally by county extension staff or shared with one of three newly-created Regional Issues and Programming Committees. These regional committees are composed of county, district, regional and state extension faculty and staff. These regional committees are empowered to create *Quick Response Teams* which will identify or catalyze development of resources needed to address issues and concerns that affect a significant number of counties in a given region. Quick Response Teams have been appointed to address such topics as agritourism, methamphetamines, elder care, working with Hispanic audiences, and technology.

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 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 undergirding 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 FY04, the Kentucky Cooperative Extension Service supported more than 300 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.

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

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

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

Yet, even with all of these structural and functional attributes which promote integration activities, Kentucky used the mandates of the AREERA legislation as a catalyst 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 FY04.

Brief Summary of Multi-State Activities

The University of Kentucky Experiment Station engaged in 44 Multi-State Regional Fund (MRF) projects, including 17 in the Southern Region, seven in the Western Region, 13 in the North Central Region, two 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 FY04, the Kentucky Cooperative Extension Service supported more than 300 different Multi-State Extension activities. Approximately two-thirds of these multi-state activities were state-level partnerships led by state-level administrators, specialists, and associates. The remaining third were conducted by county Extension agents working across state lines. Virtually all of multi-state Extension activities involving state-level faculty and staff can best be characterized as on-going collaborations lasting a year or longer. These included such things as serving on national and regional committees, production of multi-state publications, and curriculum exchange agreements. 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.

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

Watershed Education

Four members of the Environmental and Natural Resource Issues (ENRI) Task Force are actively involved in the Watershed Education Network (WEN), one of four program teams of the CSREES Southern Region Water Quality Watershed Management focus area. The WEN is composed of Extension professionals and partner agencies from Kentucky, Tennessee, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Arkansas, Louisiana, Texas, Oklahoma, and New Mexico. One of the main objectives of the WEN is to develop and implement effective educational resources that can be used throughout the Southern Region. The University of Kentucky (UK) and the University of Tennessee (UT) developed a 4-H Regional Water Camp. The program was piloted with 15 4-Hers from Kentucky and Tennessee. Fifteen 5th and 6th graders from Kentucky and Tennessee engaged in various activities related to key water concepts drawn from national and regional curricula. Changes in students' scores in regards to an attitudinal evaluation form given before and after the three-day program were significant at the 0.10 level. UK and UT also led a planning meeting for a Regional Watershed Educator Academy in Spring 2004. Funding for such an academy has not yet been secured.

Control of Horticultural Pests

Local efforts associated with the national program to clear pest control agents for minor uses have benefited Kentucky's agricultural and horticultural industries by having available needed pest controls. Consumers also gain advantage through availability of abundant and safe fruits, vegetables, and ornamentals. The project involves a partnership among universities, federal agencies and agricultural stakeholders to gain Environmental Protection Agency-approved registration of safe and effective chemical and biological pesticides for use on minor crops (such as fruits, vegetables, ornamentals, forest trees and nursery crops). The program has contributed directly to the majority of pesticide registrations currently being used on minor crops in the Commonwealth. The pesticides involved are key components in weed, disease, and pest management. An additional benefit derives from the establishment of pesticide tolerances for minor-uses on major crops. The regional initiatives supporting registrations for sweet sorghum production, greenhouse production, and/or clarification of the need for greenhouse registration have been especially helpful to Kentucky growers in recent times.

Children's Environmental Health

The environment in which we live, work and play can impact our health. Children are typically most at risk from environmental health hazards due to their unique vulnerabilities. During 2004, Kentucky Cooperative Extension was pleased to continue as a partner in a regional children's environmental health project funded through the U.S. EPA Region 4 Children's Environmental Health Program and involving Extension in all eight states within the region. Outreach events were conducted throughout the year at the county, regional and state levels. Reports from Extension agents document more than 1,200 contacts made through workshops, lessons and presentations. Concerns regarding mercury in fish were added to the menu of children's environmental health issues covered through outreach materials, and Extension agents received training about this focus topic.

The main exhibit for the University of Kentucky, College of Agriculture at the Kentucky State Fair focused on two primary topics – energy efficiency & healthy homes. Eight feature topics related to healthy homes concepts and children's environmental health were addressed through exhibit graphics on display during the entire 11-day event – water & health, home safety, emergency preparedness, general indoor air quality, asthma & allergies, mold & moisture, lead, and radon. The first six topics listed were emphasized for one to two days each through featured programming and hands-on demonstrations. Extension Agents for Family & Consumer Sciences worked with state Extension specialists to staff the exhibit each day. Total gate attendance for the 11-day event exceeded 630,000.

Children's Health Month was once again observed during October. A news article related to children's environmental health concerns was provided to all Family and Consumer Science Agents for use in local newspapers and newsletters. Approximately 1,000 copies of the national Children's Health Month calendar were distributed to county Extension offices for use in outreach programs during October. These calendars were used with educational baby showers, parenting programs, and 4-H school programs.

Strengthening Extension Advisory Leadership

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 was 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 contains 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 will only be accessible via the Southern Rural Development Center web site and can be used for support in agent training and volunteer development. Additional modules are currently being developed for release at the 2005 SEAL Conference. This project will lead to the development of advisory councils with knowledgeable, effective leaders throughout the country.

2005 National Priester Extension Health Conference

This national conference targets professionals from across the nation involved in health research, education and policy from the Cooperative Extension Service, health care, federal organizations and agencies, private non-profit organizations and associations, school systems, Land Grant Institutions and other institutions of higher education. The conference will be held April 12-15, 2005 in Lexington, KY. Over 75 concurrent sessions and posters will be featured. The 2005 National Priester Extension Health Conference is sponsored by the United States Department of Agriculture-Cooperative State Research Education and Extension Service (USDA-CSREES), National Association of State Universities and Land Grant College's Commission on Outreach and Technology Transfer, Southeast Center for Agricultural Health and Injury Prevention and the University of Kentucky.

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. Future plans include the development of self-paced learning objects that clientele can use to further enhance their knowledge in particular areas.

Ammonia Emissions from US Poultry

Agricultural air quality has received increasing focus in the past few years. A multi-state (KY, IA, PA), multi-disciplinary project to quantify ammonia emissions has resulted over 16 months of high quality emissions data. Ammonia is being regulated as a contributor to poor air quality, and agriculture is one possible 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 measurements are a critical missing element. The grant is funded by the USDA IFAFS program, with the University of Kentucky as leader; it involves 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 release of ten units capable of determining building ventilation rates; and a portable, low-cost means of measuring total building emissions.

Aquaculture Curriculum Development

Kentucky State University began offering a master's of science degree in aquaculture and aquatic sciences in fall 1999. In order to facilitate the development of courses for this degree, a teaching capacity building grant was obtained from USDA to help prepare the courses Water Quality Management and Fish Diseases. The Water Quality Management and Fish Diseases class notes in PowerPoint were distributed in a 2-volume CD set to institutions that agreed to teach similar courses and are listed as cooperators in this project. The University of Arkansas at Pine Bluff, Virginia State University, Fort Valley State University (Georgia), University of Tennessee, University of Kentucky, University of West Virginia, and West Virginia State College are cooperators in this collaborative arrangement. These CDs were also distributed to Auburn University and Lincoln University (Missouri).

CYFERNet

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, in collaboration with twenty-six other states coordinates the process of soliciting materials, coordinating their review, and posting new resources. Last year, Over 1651 resources from throughout the nation were accepted and posted to the CYFERnet web site (1919 resources reviewed for an 86% acceptance rate). Focus groups were facilitated with CYFERnet personnel from multiple states to gather data which led to improvements and redesign of the web site and identification of content area gaps. Twenty multi-state telephone and web-based trainings were coordinated. Presenters and participants represented the public and private sector. More than 380 people participated in the trainings.

Professional Forestry Workshops

The Professional Forestry Workshops program was developed as a multi-state continuing education program for professional foresters and natural resource professionals by the University of Kentucky and the University of Tennessee. This multi-state training initiative was developed to provide increased education offerings to forestry and natural resource professionals in Kentucky and Tennessee silviculture and forest management. In FY04 the program provided a total of seven 2-3 day technical trainings. A total of 152 professionals attended. Post-training evaluations indicated 4,263 non-industrial private landowners were provided improved information on hardwood silviculture and forest management. A total of 133,741 acres was improved.

Cancer Screening Saves Lives

In 2004, it was estimated that 215,990 new cases of invasive breast cancer and 10,520 new cases of invasive cervical cancer would be diagnosed in the United States, and of those about 44,010 women would die of these diseases combined.¹ Kentucky has a cervical cancer incidence rate of 12.34/100,000 compared to the national rate of 9.25/100,000². Many of these deaths could be avoided by increasing the cancer screening rates among women at risk. NCI, CDC, USDA (CREES) formed a partnership to increase breast and cervical cancer screening rates in rarely or never screened women. This is the first time USDA (CREES) has been asked to participate in this type of national study. Research has shown that the lay health model is very effective in providing health education to these the hard to reach populations. Extension homemakers would act as the messengers in these communities in efforts of reaching these women. A state team was organized to address this preventive health issue. New partnerships with state and local agencies, non-profit groups, federal agencies and universities have been instrumental in making clientele aware of the seriousness of the issue. Kentucky is part of an eight state pilot to look at increasing the breast and cervical cancer screening rates of rarely or never screened women. The Appalachian region of Kentucky has some of the highest rates in the state and women should not be dying of cervical cancer due to the pap and mammography diagnostic tests. Eight counties were selected based on incidence and mortality data from the state cancer registry. Evidence based materials were modified from the Cancer Control Planet and tailored to our clientele. A media toolkit and breast and cervical cancer educational materials were developed for the Family and Consumer agent in the local county extension office. Four new health coalitions have come about as a result of this pilot. In addition new working relationships between extension and local agencies have been established in the counties addressing not only cancer prevention, but overall health and wellness. Nine agents have received training on the use of all the educational materials and media toolkit. Twenty community partners have also been trained on using the extension materials. In 6 months the pilot will be evaluated from the selected counties and compared to nine control counties across the state matched on similar demographics, SES, and population census.

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.

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

Swine Finishing Facilities

An adequate labor force has become a major issue for swine operations. Swine producers are exploring ways to reduce labor needs without sacrificing pig performance. To help address this need, Swine Extension Specialists conducted evaluations of swine finishing facilities designed to house pigs in groups of 500 head (finishing pigs have traditionally been penned in groups of 20-30 head per pen) in a commercial operation. In conjunction with the large pen design, the effectiveness of an electronic sorting scale has also been evaluated. These evaluations have looked at the optimal penning and gating designs, feeder and waterer space needs, and protocols for training pigs to utilize the electronic sorting scale. The results of these evaluations have shown that pigs can be grown in pens housing very large group sizes without reductions in performance. Also, the use of the electronic sorting scale to sort those animals that have reached market weight significantly reduces the labor needed to sort and load pigs at the end of the feeding period.

Plant Pathology

Presently, control of plant pathogens relies significantly on pesticide applications. In the long run, this strategy is likely to be untenable. Host resistance provides the grower a cost-effective and environmentally sound method to combat plant diseases. The outcome of interactions between plants and their pathogens is governed by several factors, including specific interplay between various host defense signaling pathways. Among various signaling molecules proposed to modulate defense responses, salicylic acid and jasmonic acid elicit distinct responses and undergo extensive "cross-talk". Studies are underway to decipher molecular mechanisms regulating plant defense responses to pathogens. Fatty acid metabolism is evidently key to both the salicylic and jasmonic acid pathways. By elucidating the signaling mechanisms through

which plant defense responses are activated, new strategies for more benign plant disease management practices can be tested.

Biotechnology's Impact on Exports

Soybeans are a crucial commodity for U.S. agriculture. Export revenues from soybeans accounted for 20 to 30 percent of U.S. farm income during the past 30 years and are projected by USDA to maintain this level. Among leading U.S. soybean export markets, China ranks number one. In the U.S., 81% of soybeans planted were transgenic as of 2003. In addition, China has heavily invested in biotechnology research and development. Thus, any significant change in China's biotech policies could have extremely large impacts on the competitiveness of the U.S. soybean industry. An understanding of the evolution of China's biotech policies, regulations, and factors (attitudes of consumers', producers', environmentalists', and politicians') influencing China's future stance on policies and regulations regarding biotechnology adoption and commercialization as well as biotech product consumption, exportation, and importation is crucial for both U.S. producers and policymakers in order to maintain our global competitiveness.

Agricultural Policy

Changing world trade rules and shifts in the competitive advantage of nations are increasing pressure on traditional agricultural policy. Our work looks at various dimensions of current and alternative policies to determine the impact on farmers. Three key elements are: examination of how differences in pesticide regulations affect the relative costs of farmers in Canada and the United States; how well the European emphasis on multifunctionality of agriculture maps into the U.S. agricultural policy process; and examination of how income stabilization programs influence farmer behavior. Multifunctionality and income stabilization are both alternatives to current U.S. farm policy since they are more compatible with World Trade Organization rules. These policies are already being implemented in Canada and Europe and they have direct consequences for U.S. farmers even if they are not used here.

Food Systems Innovation Center

Continued emphasis on producing a safe, quality food supply remains paramount to all segments of the food chain. To meet these demands, two issues are currently being addressed by the Food Systems Innovation Center; development of microbial intervention methods for various food products and product research and development. The University of Kentucky's Food Systems Innovation Center has the mission of assisting small and very small food processors become or remain economically viable. The Center's Value-added Processing Laboratory has worked with over 50 individuals and firms during 2004 enhancing the safety and quality of their food products. This has amounted to an economic impact of over \$500,000 with a potential through economic multipliers to reach \$2.6 million in positive impacts for the Kentucky food industry. In addition, the inherent value of additional safety of the foods produced under enhanced microbial interventions is undeterminable in avoidance of possible product recalls, related food-borne illnesses and ensuing litigation.

Social science researchers from UK's Department of Community and Leadership Development have completed the first year of a three year study examining how the food system operates in several southeastern Kentucky counties. Understanding the intertwined perspectives of producers, wholesalers, distributors, processors, institutional buyers, restaurants, retailers, government officials, consumers and others will help us understand what opportunities are available for farmers and others in rural Kentucky's local food economy, as well as obstacles its further development.

Leadership Education

Community and Leadership Development faculty in collaboration with the National Association of Agricultural Educators staff, were awarded \$25,000 from the National FFA Organization to examine Leadership Activities of Rural Youth. This research project examined members' perception of leadership education activities in their local FFA chapter. A 64-item questionnaire was developed by the researchers to gather data from the youth. The instrument was reviewed for validity and reliability was established. Multi-stage cluster sampling was used to select 48 FFA chapters in 12 states to participate in the study. FFA members were most likely to view chapter leadership activities as being focused on furthering their understanding of self and were least likely to view them as opportunities to practice leadership in a community context. Youth said they were viewed more as partners in the leadership education process than objects, recipients, or resources.

Melon Research and Extension

Variety trial studies over the past four years have shown that high quality excellent flavored specialty melons can be successfully grown in Kentucky if certain soil applied insecticides are used and a stringent fungicide spray program is maintained throughout the season. Plants were supplied for five grower demonstration trials in South-Central Kentucky and these were successful in most cases. Growers reported that two canary melons, 'Golden Beauty' and 'Dorado,' an Asian melon, 'Sprite,' and a charentais melon, 'Serenade' were very well accepted at local farmer's markets and roadside markets once consumers tasted them. Prices were excellent and ranged from \$2.50 for larger melons to \$1.00 each for smaller melons. All producers plan to grow these varieties again in 2005.

Mini-seedless watermelon varieties and culture have been studied for the past two seasons at the Horticulture Research Farm in Lexington, KY. Based on strong consumer demand and our trial in 2003 the Green River Grower's Cooperative planted 18 acres of mini-seedless watermelons in 2004. Excellent prices and sales of mini-watermelons were the primary reason that the cooperative survived financially as growers received low prices for their cantaloupes and large seedless watermelons.

Fungicide Loading in Surface Water Runoff

Computer simulations of fungicide loading in surface water runoff were conducted with fungicides commonly used in golf course fairways and lawns in Kentucky. Spray programs were tested using a 21-year period of weather data for Lexington, KY. Predicted amounts of fungicide in runoff were determined, and predicted fungicide concentrations in runoff were compared with 50% lethal concentration values for rainbow trout and *Daphnia magna*, the water flea. Although actual amounts of fungicide loaded into runoff were relatively low, these simulations suggest that turf grass applications of fungicides with high intrinsic toxicity to indicator species could pose a risk to populations of primary and secondary consumers in aquatic ecosystems. This was the first study in the nation to evaluate the potential risk of fungicide runoff using application rates and scenarios representative of actual disease situations commonly requiring fungicide application. Clearly, the study provided important information for individuals concerned with golf course management.

Ammonia Emissions from US Poultry

Agricultural air quality has received increasing focus in the past few years. A multi-state (KY, IA, PA), multi-disciplinary project to quantify ammonia emissions has resulted over 16 months of high quality emissions data. Ammonia is being regulated as a contributor to poor air quality, and agriculture is one possible 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 measurements are a critical missing element. The grant is funded by the USDA IFAFS program, with the University of Kentucky as leader; it involves 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 release of ten units capable of determining building ventilation rates; and a portable, low-cost means of measuring total building emissions.

Riparian Zone Enhancement and Water Quality

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. We are studying management methods such as alternative shade, off-stream water, pasture enhancement, and low level herbicide treatments to reduce the impact of cattle on Kentucky's streams. Cattle position was tracked with GPS collars during 6 events. Positions were recorded at 5 minute intervals over 18 days during each event. Initial results indicate some stream bank degradation from cattle access. Cattle with limited access to the stream via an NRCS stream crossing spent similar amounts of time in the stream crossing as cattle that had free access to the stream. The data are being analyzed to determine which management strategies are the most effective for altering cattle position in the field.

Reducing Sediment Transport from Animal Traffic Areas

Locations where animals congregate such as shade locations, areas near gates, and feeding/watering areas are difficult regions to maintain vegetative surfaces. Once the vegetation is trampled, rainfall events make the areas muddy, which is not a desirable environment for the animals. Rainfall can also transport sediment to waterways and streams, which is a water quality concern. Research and extension efforts are underway to construct gravel pads over high traffic areas to reduce the formation of muddy areas and to limit sediment transport. Controlled traffic access points have been developed on ponds in Owen County to reduce bank erosion and sediment transport into ponds used as a water source for cattle. Traffic pads near gates and feed/watering pads are being constructed on suburban horse farms in Fayette and Woodford Counties to demonstrate the construction techniques. Site tours and a construction video are planned to educate farm operators about the design and construction of high traffic pads.

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

Institution: University of Kentucky

State: Kentucky

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

Actual Expenditures

Title of Planned Program/Activity	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004
Community Development	46,914	48,087	49,337	56,376	58,067
Sustainable Agriculture	445,620	456,760	468,635	536,231	542,318
Leadership Development	47,667	48,858	50,128	57,330	59,050
Nutrition and Health	66,491	68,153	69,924	79,976	82,375
Life Skill Development	264,734	271,352	278,408	318,353	327,904
Environment and Natural Resources	119,429	122,415	125,597	143,622	147,931
Total	990,858	1,015,625	1,042,028	1,191,888	1,217,645

M. Scott Smith
 Director

4/1/05
 Date

Form CSREES-REPT (2/00)

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Institution: University of Kentucky
State: Kentucky

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

Actual Expenditures

Title of Planned Program/Activity	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004
Social and Economic Opportunity	46,000	47,150	48,375	39,500	39,413
Competitive Agriculture	546,000	559,650	574,200	475,685	472,936
Safe Food and Fiber	213,000	218,325	224,001	184,211	183,922
Agriculture and Environmental Quality	707,000	724,675	743,516	618,723	617,448
Total	1,512,000	1,549,800	1,590,092	1,318,119	1,313,719

M. Scott Smith 4/1/05
 Director Date

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

Actual Expenditures

Title of Planned Program/Activity	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004
Sustainable Agriculture	2,714,712	2,782,579	2,854,926	2,903,460	2,990,564
Nutrition and Health	299,442	306,928	314,908	320,261	329,869
Environment and Natural Resources	598,884	613,856	629,816	640,523	659,451
Total	3,613,038	3,703,363	3,779,650	3,864,244	3,979,884

M. Scott Smith

Director

4/1/05

Date

Form CSREES-REPT (2/00)