

# Annual Report of Accomplishments and Results

Kentucky  
FY02

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 962,683 contacts (including duplications) with clientele related to improving production, processing, and marketing. An additional 201,305 contacts with clientele related to the adoption of resource management technologies. 257,582 contacts were related to home gardening and landscape. Kentucky State University's Small Farm Program made 15,953 contacts with limited resource farmers. Twenty-five percent of these contacts were with women.

These efforts resulted in 19,746 farmers adopting one or more production practices recommended by Extension. Adoption of these practices resulted in \$19,002,536 of additional profits to farmers. 8,653 producers utilized new marketing opportunities and 34,696 individuals reported changes in knowledge, opinions, skills, or aspirations related to the impact of public policies on agriculture and the environment. Three new produce marketing cooperatives supported by Extension have experienced a 60 percent growth in sales since 2000.

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. One is highlighted in this report.

The Kentucky Agricultural Experiment Station conducted 42 projects related to this goal. External funds to support research increased by 70% over 2001. Key areas of emphasis related to the following research topics: plant bioengineering to understand genomic control of plant productivity, quality traits and adaptability, understanding the forage-animal interface, addressing mechanisms of transmission and incidence of West Nile Virus, discovering that the eastern tent caterpillar had a role in Mare Reproductive Loss Syndrome.

Expenditures	Federal Extension Funds	\$2,930,757
	Federal Research Funds	\$3,306,607
	State Contribution	\$23,896,185
FTEs	Extension	154
	Research	60



## **Key Theme – New Uses for Old Agricultural Products**

Soybeans are the second largest food crop in the U.S. with about 3 billion bushels produced in 2001. Only about 1.5 percent of the protein from soybeans was used in human foods largely because of their characteristic flavor. Methanethiol and dimethyl trisulfide (DMTS) are among the most potent odorants found in soy protein isolates, concentrates and soymilk. This project will improve our understanding of the mechanisms, and reactants, involved in the formation of methanethiol and DMTS so that commercially practical solutions to the longstanding flavor problem associated with soy proteins can be developed.

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 although the diet often supplies excess protein. Hepatic conversion of excess protein (amino acids) to glucose can support more rapid calf growth. University of Kentucky research is helping to optimize this process of conversion and strengthening 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**

Adding value to feeder calves is a viable method of increasing agricultural income in Kentucky. The Kentucky Certified Preconditioned for Health (CPH-45) feeder calf program adds value by producing healthier, heavier calves for shipment to feedlots. Calves which are marketed in CPH-45 feeder calf sales generally have a net return to the farmer of \$40 per head more than those sold at weaning. These sales have increased from 7,000 to 40,000 head in two years. Forty thousand calves return an additional \$1.6 million annually to Kentucky producers with additional income generated by support industries like feed and pharmaceuticals. Research at the University of Kentucky has led to increased use of feed by-products in beef cattle rations. Soy hulls and corn gluten feed have become common feedstuffs in Kentucky, with savings of 10¢ per pound of gain realized by beef producers. A savings of 15¢ per day would be about \$15 per head. An estimated 30,000 head of beef cattle being fed by-products returns a savings of \$450,000 to Kentucky beef producers.

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

## **Key Theme – Biobased Products**

Continued dependence on fossil-based fuels will have negative impacts on the environment, economy, and national security. The conversion of biomass by microorganisms to bio-based products and bio-energy is a sustainable alternative. However, there are still significant barriers that prevent the economical implementation of bio-based technologies. Our studies combine the information contained in genomic databases with the emerging field of proteomics to examine the metabolism of anaerobic bacteria under industrially relevant conditions. The results of this work will be useful in designing economically relevant bio-based processes. The University of Kentucky Mass Spectrometry Facility is a partner in this project.

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

## **Key Theme – Agricultural Profitability**

A key to the long-term economic viability of independent pork producers is maintaining access to market space. To address this issue, Swine Specialists with Kentucky Cooperative Extension Service have provided assistance and leadership to a group of independent producers in the Central Kentucky area in the development and implementation of a marketing cooperative. The size of operation for producers in the cooperative ranges from 50-600 sows. Programs and projects targeting improved genetics have resulted in added carcass premiums of about \$5 per pig for the approximately 25,000 pigs marketed annually. The nutritional program that is tailored specifically for these producers has 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. To help with targeting specific markets with their pork, present programs and educational efforts are helping these producers move towards antibiotic-free pork production.

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

## **Key Theme – Diversified/Alternative Agriculture**

With over 165,000 horses in Kentucky, the potential for a cash hay market is substantial throughout the state. In many areas of the state warm season grasses have the potential to be grown and harvested as quality horse hay. This project was initiated to investigate the potential for native warm season grasses to be used by horses, as they are not traditionally used for horse feeding programs. In addition to evaluating the different grasses, the project will identify those criteria that hay producers can use to produce a product suitable for the horse hay market. Production of quality hay for the cash hay market will not only provide hay growers with additional farm income but also provide horse owners with quality locally-available feed. This project is supported by the Forage for Livestock Initiative.

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

## Key Theme – Agricultural Profitability

To be successful managers, dairy farmers must *understand* and be able to apply feeding and nutritional management concepts to effectively utilize available land, time, labor, consultants (nutritionists and veterinarians) and economics. To accomplish this objective, the University of Kentucky College of Agriculture has conducted workshops (Managing the Nutrition Program for the Milking Herd and other area meetings), field days (Southern U.S. Dairy Heifer Field Days attended by 150 farmers) and demonstration projects (Dairy Profits Projects) to accomplish these goals. In addition, written materials in the form of (21) articles for newsletters and 5 peer-reviewed fact sheets have been developed to educate farmers on improving their feeding and management programs. Feeding programs represent 40 to 60 % of the cost of producing milk and improvements can not only save feed costs but also substantially improve farmers' net income.

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

## Key Theme – Agricultural Competitiveness

The purpose of the Allied Inputs and Marketing (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, three AIM alliances are functioning in Kentucky. Together they encompass 187 producers who own approximately 12,000 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**.

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

## **Key Theme – Agricultural Profitability**

Adding value to feeder calves is a viable method of increasing agricultural income in Kentucky. The Kentucky Certified Preconditioned for Health (CPH-45) feeder calf program adds value by producing healthier, heavier calves for shipment to feedlots. Calves which are marketed in CPH-45 feeder calf sales generally have a net return to the farmer of \$40 per head more than those sold at weaning. These sales have increased from 7,000 to 40,000 head in two years. Forty thousand calves return an additional \$1.6 million annually to Kentucky producers with additional income generated by support industries like feed and pharmaceuticals. Research at the University of Kentucky has led to increased use of feed by-products in beef cattle rations. Soy hulls and corn gluten feed have become common feedstuffs in Kentucky, with savings of 10¢ per pound of gain realized by beef producers. A savings of 15¢ per day would be about \$15 per head. An estimated 30,000 head of beef cattle being fed by-products returns a savings of \$450,000 to Kentucky beef producers.

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

## **Key Theme – Emerging Infectious Disease**

Mosquitoes of the *Culex pipiens* species complex and *Aedes albopictus* mosquitoes have attracted attention due to their role vectors of the West Nile encephalitis virus (WNV), which was recently introduced into the United States. Clinical cases of WNV infection in horses can cause ataxia, inability to stand, multiple limb paralysis, and acute death. In addition to WNV transmission, *Culex* mosquitoes have been implicated in the transmission of livestock pathogens including eastern equine encephalitis, western equine encephalitis, and Japanese encephalitis. The current recommendations for reducing equine outbreaks of WNV include the reduction of vector mosquito populations and vector-avoidance practices. A recent USDA report however, highlights problems with currently available vector avoidance measures, including the difficulty of complete animal coverage with insecticides and the requirement of frequent applications. In addition to problems with efficacy, insecticidal spraying campaigns have been met with public criticism and legal opposition, based on environmental and public health concerns. Alternative strategies for vector control are also of interest due to problems related to insecticide resistance. Problems associated with WNV are likely to worsen, given the expanding geographic range of WNV in the U.S.

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

## **Key Theme – Plant Health**

Presently, there are no commercially available soybean cultivars that are resistant to Bean Pod Mosaic Virus (BPMV). To develop efficient virus control strategies, it is essential to unravel the extent of diversity among BPMV isolates and to gain an understanding of the molecular basis of symptom severity associated with infection with BPMV reassortants and sequence variants. Our success in elucidating the nature of diversity among BPMV isolates and in delineating the genetic basis of symptom severity should allow the development and selection of soybean germplasm with broad resistance to BPMV, and provide opportunities for development of novel approaches for virus control.

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

## **Key Theme – Plant Health**

Hemibiotrophic pathogenic microbes switch during their life cycles from a non-damaging mode of parasitic growth on plants (biotrophy) to a damaging one (necrotrophy). Our work is focused on understanding the genetic basis for this transition in the hemibiotrophic fungus, *Colletotrichum graminicola*. Mutagenesis identified *C. graminicola* genes involved in infection and colonization. One of the nine mutants found was studied in detail. This mutant causes no symptoms on corn leaves or stalks. It initiates the biotrophic phase of the disease normally, but is unable to switch to necrotrophy. The mutant appears deficient in one component of the signal peptidase enzyme responsible for cleavage of signal peptides from proteins destined for transport through the endoplasmic reticulum membrane system of the cell. Our current hypothesis is that the mutant is unable to secrete sufficient quantities of one or more proteins necessary for the switch between biotrophy and necrotrophy.

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

## **Key Theme - Urban Gardening**

Master Gardeners are trained volunteers who assist Extension Agents in 25 Kentucky counties with programming and outreach in the area of urban horticulture. To assist in developing a state-wide network of volunteers, the premier Kentucky Master Gardener Conference was held in Elizabethtown in September, 2002. The meeting was attended by over 100 Master Gardeners, county Extension Agents, and Extension Specialists and provided a venue for continued training of volunteers, and more importantly, an atmosphere of comradery between volunteers of different areas of the state. A possible outcome of these conferences is to mobilize and coordinate Master Gardener volunteers to assist with statewide urban horticulture programs.

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



## **Key Theme – Home Lawn and Gardening**

Demonstration and trial gardens at nine Kentucky locations have been a successful Extension program for the last four years. This project was initially supported by the board of the Kentuckiana Greenhouse Association and the Kentucky Department of Agriculture and has been continued through the support of the New Crop Opportunities Center. The gardens have been integrated into the Master Gardeners program in eight counties across the state. The master gardeners prepare the trial beds, plant, maintain the trials, and evaluate the plants. Overall ratings are distributed to consumers and greenhouse and landscape industry members through newsletters, published reports and at county, regional and statewide meetings. This program is of high importance to the greenhouse industry because bedding plants and perennials are the source of 90% or more of the profit earned by these businesses each year.

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

## **Key Theme – Niche Market**

Four years of field trials with triploid (seedless) watermelons, followed by educational meetings and demonstrations resulted in 10 acres of seedless watermelons produced for the Department of Defense school lunch program. The growers grossed \$30,000 from this acreage and had a net return of \$2 per melon. The growers and schools were very pleased with the Revolution variety that had performed exceptionally well in UK trials. Growers will be expanding their acreage next season.

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

## **Key Theme – Plant Health**

The deformylase gene was cloned from *Arabidopsis thaliana*, which was the first eukaryotic example of a gene encoding this enzyme. A detailed kinetic characterization for two cloned peptide deformylase enzymes and the first *in vitro* evidence that nuclear encoded peptide deformylase is capable of chloroplast import are results of a research project identifying and characterizing new molecular targets for designing novel broad-spectrum herbicides.

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

## **Key Theme – Diversified/Alternative Agriculture**

Kentucky commercial winegrape acreage has increased nearly four-fold over the past 4 years to 77 growers that have at least a half acre of grapes totaling 282 acres. A total of 11 wineries are selling wine and 20 are licensed. Grapes are now recognized as an attractive alternative crop to tobacco due to the capability of marketing large grape volumes to wineries and avoiding the packaging and marketing problems associated with fresh market grapes.

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

## **Key Theme – Innovative Farming Techniques**

The concept of a controlled water table irrigation system (CWT) continues to be adapted for the commercial greenhouse industry as well as for plants in an around the home. CWT irrigation is automatic; thus labor costs are reduced and near optimum air and water in the growing medium reduces periods of water stress resulting in optimum growth rates. A new narrow trough with a uniform water distribution system increased commercial feasibility. A greenhouse bench manufacturing company will be contacted for manufacturing of a prototype with the trough extruded as part of the bench structure.

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

## **Key Theme – Plant Production Efficiency**

Three Best Management Practices (BMP) workshops for nurseries, garden centers and landscape managers and employees were presented in 2002. The workshops were supported by grants (Barhardt and IPM) and registration fees. A BMP workshop participant survey indicated the program has resulted in the production and sales of better quality plants with fewer pesticides and fertilizers being used (100% altered their production practices and 95% saved money, fertilizer, labor and/or water).

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

## **Key Theme - Agricultural Competitiveness**

The research on overshooting shows that agricultural prices will overreact to monetary policy changes, increasing their volatility over time. U.S. agricultural policy formation should recognize this tendency for agricultural prices to cycle based on economic policy shocks. The analysis of the Japanese beef market lends useful insights into the competition that U.S. beef producers face in this market. The highly differentiated nature of products and the stiff competition make this huge market essential to the future of U.S. beef production. U.S. beef exporters have obviously made important strides in gaining market shares by keeping their offer prices low to the Japanese.

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

## **Key Theme – Managing Change in Agriculture**

The importance and complexity of the 2002 Farm Bill provided opportunities to partner with USDA agencies and work with clientele on optimal program options. Unlike previous farm bills, where farmers just simply had to sign-up to participate, this farm bill consists of farmers making some very important decisions that will have a significant financial impact for thousands of Kentucky farms for the next 6 years. A series of fact sheets and a decision-making spreadsheet tool were developed for a farm bill website and to be used in educational trainings across the state. So far, over 1000 farms have been entered into the U.K. spreadsheet tool indicating that the average benefit of selecting the optimal Farm Service option is around \$10/acre. Given the thousands of grain farms across this state, this educational program can easily add millions of dollars to the Kentucky agriculture economy over the next 6 years.

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

## **Key Theme – Managing Change in Agriculture**

Kentucky is the most tobacco-dependent state in the nation. Consequently, the current economic environment for tobacco is providing a major financial challenge to thousands of small family farms across the state as well as the future of Kentucky agriculture. In response to the current situation, farmers, farm group leaders, health group officials, policymakers, and educators are working together across the tobacco growing regions for a tobacco quota buyout which provides economic relief for existing tobacco quota owners and growers to exit the industry, while modifying the current tobacco policy to enable expanded market opportunities for those who chose to remain. Economic analysis is important in identifying the likely consequences of various policy options within a buyout. The economic benefits of the various buyout proposals are enormous, with the potential of providing over one billion dollars to Kentucky tobacco farmers and rural communities for the next 5 years.

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

## **Key Theme – Agricultural Profitability**

Extension personnel (specialists and agents) at UK have been providing technical assistance to the Green River Cattle Company (GRCC) since December 2001. The GRCC, a Limited Liability Corporation owned by farmers in Greensburg, KY, is attempting to replace lost tobacco income by finishing and marketing high quality, Kentucky produced beef. The GRCC matched private investment capital with tobacco settlement funds to conduct two studies. The first, compared cattle finishing in Kentucky with Kansas to find that while finishing costs were significantly lower in Kansas, because the Kentucky cattle were marketed locally, they were more profitable. The second study investigated marketing opportunities and identified target markets and pricing strategies. The GRCC retails product in Greensburg and has penetrated the Louisville restaurant market. The GRCC has been willing to share their information and experiences with others interested in similar endeavors to add value to livestock.

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

## **Key Theme – Agricultural Profitability**

A key to the long-term economic viability of independent pork producers is maintaining access to market space. To address this issue, Swine Specialists with Kentucky Cooperative Extension Service have provided assistance and leadership to a group of independent producers in the Central Kentucky area in the development and implementation of a marketing cooperative. The size of operation for producers in the cooperative ranges from 50-600 sows. Programs and projects targeting improved genetics have resulted in added carcass premiums of about \$5 per pig for the approximately 25,000 pigs marketed annually. The nutritional program that is tailored specifically for these producers has 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. To help with targeting specific markets with their pork, present programs and educational efforts are helping these producers move towards antibiotic-free pork production.

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

## **Key Theme – New Uses for Agricultural Products**

Faculty from the Colleges of Agriculture and Pharmacy are collaborating on a project entitled “Improved Recovery of Engineered Proteins from Tobacco Extract”. It has been recognized that the tobacco plant can be used as a source for the production of proteins that have potential as pharmaceuticals. One of the most difficult and expensive tasks associated with this technology is to isolate the product of interest from the hundreds of other chemicals found in the tobacco plant. They propose to use a biotechnology-oriented approach in which we will genetically alter the part of the tobacco plant so that it can be easily isolated from tobacco plant extracts using a technique called foam fractionation. If successful, this technique will improve the efficiency of producing drug products from tobacco plants and enhance the output of "molecular pharming" by Kentucky's tobacco growers.

Source of Federal Funds: Hatch (and State)  
Scope of Impact: State-Specific

## **Key Theme-Animal Health**

In 2001 a storm of abortions in pregnant mares resulted in a \$300 million loss to the Kentucky equine industry, Kentucky's number one agricultural industry. Research and education efforts discovered that a primary cause of the syndrome was the eastern tent caterpillar (ETC). In 2002 losses were reduced by 20% due to practices that were employed to reduce exposure of pregnant mares to ETC.

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

## **Accomplishments and Results for CSREES Goal 2**

### **Goal 2**

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

### **Overview**

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

During the past year, the 51,420 individuals indicated that they gained knowledge related to safe storage, handling, and preparation. Of these, 29,248 (or 57%) put what they learned into practice. In addition, 22,923 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 mechanism that control cardiovascular health.

Expenditures	Federal Extension Funds	\$752,645
	Federal Research Funds	\$717,443
	State Contribution	\$6,245,142
FTEs	Extension	40
	Research	11

## **Key Theme - Food Safety**

The issue of producing a safe, quality food supply remains paramount to all segments of the food chain. To meet consumer demand, two issues have arisen that must meet needs for the food industry; development of microbial intervention methods and product research and development. The University of Kentucky's Value-Added Processing Incubator has the mission of assisting small and very small food processors become or remain economically viable. The Incubator has worked with over 40 individuals and firms during 2002 enhancing the safety and quality of their food products. This has amounted to an economic impact of over \$200,000 with a potential through economic multipliers to reach \$1.6 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 potential litigation.

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

## **Key Theme – Food Security**

God's Pantry Food Bank is a member of America's Second Harvest. This past year, the food bank received a refrigerated truck that serves as a mobile food pantry for central and eastern Kentucky counties that are underserved for emergency food provisions as determined by the census and the 2001 Hunger in America Survey. Family and Consumer Science agents in three pilot counties have served as facilitators, hosting organizational meetings for the food bank and members of community agencies and non-profit groups working with at-risk populations. Each county developed a plan for organization, identification and distribution of emergency food boxes to best meet their county's need. In each county (Lincoln, Jessamine, and Johnson counties), 100 food boxes, each containing \$50 to \$75 retail value of food and other household products, are distributed each month since the program began during the fall. In addition, Kentucky agricultural products (tomatoes, cauliflower, broccoli, ground beef, and catfish) have also been distributed. Over \$100,000.00 worth of food was delivered to low-income Kentucky families thanks to the leadership provided by the Cooperative Extension Service during 2002.

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

## **Key Theme – Food Safety**

Mannan oligosaccharides have demonstrated the ability to enhance swine growth and production in the absence of antibiotic supplementation. A component of Brewers dried yeast is mannan oligosaccharides. Young pigs fed Brewers yeast or antibiotics performed equally well following challenge with antibiotic resistant *Escherichia coli*. These results indicate that mannan oligosaccharides may be a good option to antibiotic supplementation in swine nurseries.

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

## **Key Theme – Food Security**

Kentucky has the third highest percentage of children receiving free and reduced school meals, yet less than 12% of those children participate in the Summer Feeding Program. With school budgets being cut, school districts are reducing or eliminating summer school where most meals had been served. The Kentucky Department of Education (KDE) turned to the Cooperative Extension Service and EFNEP assistants to recruit sponsors, locate feeding sites, and promote the program. Kentucky, for the second consecutive year, has been recognized by USDA-FNS for increasing the number of children served by the summer feeding program. In 2002, the number of sites increased by 42% after Extension made non-profit, faith based organizations aware that they are eligible to participate in the program. Average daily participation increased 10%. For 2003, KDE and Extension have partnered to identify and organize leaders in counties where there is no sponsor and/or low participation to showcase successful programs that can be modeled. They will work to maintain last year's sites and encourage expansion of the days and times that the sites are open.

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

## **Key Theme – Food Security**

Although USDA promotes eating five fruits and vegetables per day, low income families do not have access, especially to fresh product. The Kentucky Association of America's Second Harvest Food Banks (7 organizations serving Kentucky) promotes 5-a-day and wants to provide it. To accomplish this goal, the food banks have pledged to increase the usage of Kentucky agricultural products. After legislation failed to leave committee during the 2002 legislative session, the food banks were able to secure funding from the tobacco settlement funds for purchase of refrigeration equipment. Small non-profit community food pantries do not have refrigerators and/or freezers to store fresh agricultural products. During 2002, the food banks bought catfish, tomatoes, ground beef, cauliflower, and broccoli from Kentucky producers. To fulfill the match for the grant, the food banks will purchase a minimum of \$50,000 in Kentucky agricultural products. Extension has served as a link between the farmers and the food banks to locate product, provide educational materials (storage, preparations and food safety), and create awareness.

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



## **Key Theme – Food Security**

Food Security was a topic of this year's 4-H Issues Conference. High school leaders were made aware of the lack of food and hunger that children in Kentucky are facing. Since the fall forum, ten 4-H groups have implemented local programs where backpacks are filled with non-perishable, kid friendly foods that can be eaten with no preparation. The backpacks will have enough food for several meals. Backpacks will be distributed as needed, with Fridays being a time of most need since many children have little or no food on days that there is no school. The pilot program will be completed and evaluated during May and June 2003.

Source of Federal Funds:     Smith-Lever  
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 178,494 contacts related to promoting healthy lifestyle practices. An additional 97,092 contacts related to helping Kentuckians know and understand the Food Guide Pyramid. Agents and specialists made 97,595 contacts related to injury reduction and 15,890 contacts related to the development of comprehensive health management systems. Extension collaborated with other organizations and agencies to co-sponsored 1,450 different events or activities which focused on comprehensive health maintenance.

These efforts resulted in 36,027 citizens making lifestyle changes for the purpose of improving their health. An additional 29,923 individuals implemented personal health protection practices appropriate for their life cycle stage (preventive health practices, participation in screening and detection opportunities, immunizations, etc.) and 24,617 people adopted at least one new safety practice (bicycle helmets, fire extinguishers, tractor roll bars, radon testing, smoke detectors, proper ATV operation, etc.)

Human nutrition and health is a focus area of research and extension at Kentucky State University. Diet modifications, the use of functional foods to improve human health, and determine the effect of human exposure to pesticides are long range goals. Kentucky State University currently supports three research projects related to human nutrition and health. One is featured in this report.

Expenditures	Federal Extension Funds	\$1,642,136
	Federal Research Funds	\$912,596
	State Contribution	\$9,513,990
FTEs	Extension	86
	Research	13

## Key Theme - Human Health

Our results suggest that long-term, low level exposure to pesticides most commonly used in the US modify metabolic enzymes in experimental animals and that such changes can have serious effects on health. The increased activities of endogenous antioxidant enzymes after pesticide exposure and the enhancement of these effects by low Ca, Zn and Cu diets suggest that Americans whose diets supply low levels of these minerals could be at higher risk from pesticide exposure. Since farm workers are continuously exposed to mixtures of pesticides they would be at greater risk than other population groups. Our studies characterize these risks and help protect farm workers from excessive exposure by identifying a specific indicator to monitor exposure.

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

## Key Theme – Human Health

Approximately 65% of Kentucky adults are overweight and participate in no leisure time physical activity. Up to 38% of Kentucky children may be overweight and at increased risk of type 2 diabetes. The prevalence of diabetes in Kentucky increased 33% from 1994 to 2000. In 2001-2, Kentucky CES focused on diabetes prevention and control. We co-produced an October 2001 broadcast on Kentucky Educational Television reaching an estimated 25,000 viewers and received 281 phone calls from 5 states. *The Wildcat Way to Wellness* introduced a new program, 'Control Your Diabetes for Life' and we introduced the West Virginia Extension Program, **Dining with Diabetes**. County Extension Agents and public health educators from 93 Kentucky counties attended this in-service training. Diabetes education programs were delivered in 114 of the 120 Kentucky counties as result of this training, reaching an estimated 8,600 clients and establishing 82 new local partnerships. Since 1999, *The Wildcat Way to Wellness* has reached 50,000 Kentuckians to help improve health in the Commonwealth. **The Wildcat Way to Wellness** received recognition as Outstanding New Kentucky Extension Project and as a USDA Base Model Program for Nutrition, Diet and Health.

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

## **Key Theme – Human Nutrition**

Cooperative Extension, the Kentucky Department of Agriculture (KDA) and the Women's, Infant and Children Program (WIC) have worked to increase fruit and vegetable consumption by encouraging families, especially low-income, at-risk people, to utilize farmer's markets. Extension has participated in the application process for Senior Farmer's Market Nutrition Program, encouraged Expanded Food and Nutrition Program (EFNEP) families to attain and redeem WIC Farmer's Market coupons, and has developed and distributed educational materials (Farmer's Market Flyers) for farmers and consumers to use. During the coming year, EFNEP assistants will increase their skills for demonstration and be equipped to provide educational programs at remote locations such as farmers' markets.

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

## **Key Theme – Human Health**

Kentucky Cooperative Extension Service and Kentucky Department for Public Health conducted a survey of 400 Kentucky schools to assess the nutrition and activity environment. The response rate of 85% exceeded expectations, and survey data regarding foods sold through vending machines and physical activity opportunities has served as the basis for new programs. In fall 2002 we trained 450 educators to use the tools provided for action at county level to promote a healthy weight for youth through environmental and policy interventions. We provided leadership on this issue with a position paper and expert testimony to the Kentucky State Legislature in 2002. A pilot test was conducted for a new 4-H/Youth curriculum, **The Clover Cat Way to Wellness**. Over 100 Extension Agents and Program Assistants were trained in use of the new curriculum. It has been distributed to all 120 counties and is available online.

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

## **Key Theme – Human Nutrition**

Kentucky schools continue to increase their purchases of Kentucky agriculture products through the Department of Defense (DOD) Fresh Program. More farmers are selling their products to DOD who routes those products to local schools. This year, Extension hosted the "Growing Healthy Kids Conference." Over 400 Extension agents, EFNEP assistants, school food service directors, and health department dieticians attended the in-service training. With the child obesity issue in the forefront, schools in southwestern Kentucky (high dairy producing counties) have replaced soda machines with milk machines. Those counties have shown that milk products can generate the money that economically distressed school depend on from soda machines while providing the children with a healthy alternative. These machines are being stocked with Kentucky dairy products, water and 100% juices.

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

## **Key Theme – Human Health**

Kentuckians are experiencing a high incidence of nutrition-related health problems, such as obesity, cardiovascular disease, diabetes and hypertension. These and related health problems may be due in part to overconsumption of calories and especially fat, and lack of protective nutrients such as antioxidants. 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 antiatherogenic 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**

An important issue of tremendous interest in this country involves the environmental impacts and safety to humans associated with the feeding of genetically modified crops to food producing animals. Research at the University of Kentucky is focusing on this area. Recent studies have shown that soybean meal from herbicide tolerant soybeans (Roundup Ready) is essentially equivalent in composition and nutritional value to conventional soybean meal, and the genetically altered DNA and specific protein that makes the soybeans tolerant to herbicides are not transferred into pork following consumption of the biotech soybean meal by pigs. Other studies have shown that pigs and chickens fed diets containing low-phytate corn and low-phytate soybean meal excrete about half as much phosphorus into the environment. Environmentally friendly diets containing such genetically enhanced crops are being demonstrated to be completely safe for animals, and for humans consuming meat, milk, and eggs from these animals.

Source of Federal Funds: Hatch  
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 125,358 contacts related to promoting the effective stewardship of natural resources. An additional 23,902 contacts related to the maintenance of a safe, accessible, and economically affordable water supply. 21,800 contacts related to the management of waste through reduction, reuse, or recycling and 33,614 contacts related to the management of forests and woodlands.

As a result of these efforts, 30,079 individuals adopted practices that protect the water. 3,477 individuals began using new forest management practices. 33,502 individuals adopted one or more practices related to conserving, sustaining, or protecting soil resources. Conservation tillage practices were used on an additional 567,507 acres of land.

Research into water quality on small farms, use of integrated pest management, and the use of sustainable cropping practices remain active goals areas at Kentucky State University. Kentucky State University supports three research projects related to this goal. Two of these are featured in this report.

The Kentucky Agricultural Experiment Station conducts research on environmental aspects of animal agriculture with respect to concentrated animal feeding operations for poultry and cattle as well as riparian zones for grazing animals. For crops, effects of vegetative buffers for mitigating effects of agricultural chemicals are studied using precision agriculture techniques. Decisions relating to economics of conservation practices are analyzed for producers of all farm sizes.

Expenditures	Federal Extension Funds	\$885,279
	Federal Research Funds	\$1,677,292
	State Contribution	\$8,982,133
FTEs	Extension	45
	Research	35

## **Key Themes - Water Quality, Pesticide Application**

The potential of using soil amendments to improve soil quality, detoxify contaminants, and reduce erosion was explored in this research project. Soil erosion and pesticides in runoff are recognized as one of the most serious problems facing agriculture today. Pesticide residues in soil were higher in compost treatments compared to no-mulch treatments which indicate that the organic fraction of the soil treated with yard-waste compost is primarily responsible for adsorption rather than clay. This means that a substantial amount of pesticide is being trapped by the organic fraction in compost along the hill slope that would otherwise have been transported down hill. Adsorption studies showed that compost amended soil adsorbed more compared to native soil (no-mulch soil). Incorporating compost into the soil provided nutrients needed to sustain vegetation. Potato yield was lowest in no-mulch and tall fescue and highest in compost treatments. Yield obtained from the bottom of the plots was greater than that obtained from the top of plots. Application of carbon-rich waste to soils may be useful for reducing pesticide leaching to groundwater

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

## **Key Themes – Sustainable Agriculture**

Use of hairy vetch/rye, bicultural living cover crop in conventional pepper and cabbage production can eliminate or reduce the use of inorganic nitrogen fertilizer costing about \$30 per acre. Legumes nitrogen sources are especially important to organic growers because commercial organic fertilizers are costly and low in nitrogen content. Organic growers spend more than \$100 per acre (and probably considerably more) if they depend on commercial organic nitrogen fertilizers. Using legumes instead of inorganic nitrogen fertilizer reduces nitrate pollution of ground water, the most widespread water quality problem caused by agriculture. Such pollution has been documented over most of the eastern United States, and the major cause is inefficient use of inorganic nitrogen fertilizer. In the U.S., 46% of counties contain groundwater susceptible to pollution from agricultural products. Groundwater is the source of drinking water for 90% of rural households and 75% of the cities in the U.S. Results indicated that peppers and cabbage can be grown successfully using no-tillage or strip-tillage. Use of no-tillage can reduce soil erosion by about 90% compared to tillage. Over 40% of the crop land in the U.S. is losing topsoil in excess of its NRCS soil loss tolerance level. Forty-six percent of the cultivated crop land in Kentucky is classified highly erodible, and the soil loss rate in Kentucky is three times the tolerable level. Thus, use conservation tillage can greatly impact soil erosion losses.

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

## **Key Theme – Forest Resource Management**

Insect and mammalian herbivory, and prescribed fire, affect oak seedlings. Seedling growth was greatest on burned sites, but herbivore pressure was not affected. Arthropod feeding did not impede seedling growth. Following a catastrophic wildfire, chestnut oak seedlings had higher foliar nitrogen and water, higher initial tannin levels, and transient declines in carbohydrates. In spite of differences in leaf chemistry, there were no differences in growth or development of gypsy moth caterpillars fed foliage from burned versus non-burned seedlings. Although seedlings from burned sites were smaller, they grew more. Overstory chestnut oak, scarlet oak, and red maple differ in growth and in most foliar characteristics, and show variable response to prescribed fire. Caterpillars fed the preferred scarlet oak grew larger and developed more rapidly than did those fed red maple, but there were no differences in caterpillar development based on burn treatments.

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

## **Key Theme – Forest Resource Management**

Throughout the central hardwood forest region, researchers and managers alike have noted the lack of oak seedling success beneath oak-dominated forest canopies. The ability of oak forests to regenerate has thus become a critical area of research and a concern for forest management. Based on our knowledge of Native American burning and its apparent relationship to forests dominated by oak, the use of prescribed fire in oak-dominated forests is increasingly being touted as a method for improving the growth of oak seedlings and saplings. However, until recently there has been very little research examining the connection between prescribed fire and oak seedling success. In addition, there is still much we do not understand about the effects of fire on forests in the central hardwood region, including residual stem damage, increased light to the seedling layer, and changes in seedling and sapling growth and survival. A collaborative project between the Daniel Boone National Forest, the U.S.F.S. Southern Research Station, and the Department of Forestry will examine the effects of frequent and infrequent prescribed fires on trees, saplings, and seedlings. Results of this project will help to inform forest managers about the use of prescribed fire as a management tool in oak-dominated forests of the region.

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



## **Key Theme - Pesticide Application**

A multi-state research and education effort is underway among Missouri, Illinois, Indiana, Ohio, and Kentucky for control of codling moth, commonly referred to as the worm in the apple. During the past several years the number of codling moth control failures in commercial has been increasing. Codling moth populations in some areas have become resistant to several commonly used insecticides. In a few orchards, codling moth is not responding to pheromone traps or mating disruption as they once had and few chemical controls remain effective. A regional testing protocol is being developed among these Midwestern states to coordinate and develop research efforts. These states continue to coordinate integrated educational programs and jointly publish several pest management handbooks and spray guides.

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

## **Key Theme – Natural Resource Management**

It is generally recognized that environmental education not only increases awareness of environmental issues, but also may lead to responsible use of natural resources throughout students' lives. Therefore, the best way to impact long-term public policy is to educate our youth. In 2002, extension professionals provided environmental education for first graders to high school students and teachers through environmental day and overnight camps, environmental field days, Earth Day programs, and teacher education programs. Program topics included recycling; point and non- point pollution sources, curriculum development, cultural heritage, environmental issues such as mining and solid waste, environmental stewardship, soil erosion, and the water cycle. The programs resulted in increased content knowledge, awareness, and appreciation of Kentucky's natural resources.

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

## **Key Theme – Agricultural Waste Management**

There is great societal pressure to diminish antibiotic use in animal agriculture. A full understanding of their value is necessary. Given that P is an issue in waste management, the impact of virginiamycin on the digestibility of P in pigs was evaluated. An improvement in P digestibility ( $P < 0.01$ ) from 30.4% to 38.8% was observed with supplementation. The improvement represents an increase in the utilization of phytate P. An absolute improvement of 8% in P digestibility could save 840 lbs of dicalcium phosphate in a single turn of a 1000-head finishing barn. In addition to cost savings for P, there would be a reduction in P excretion. Based on this example, there could be 155 lbs of P not going into the diet and not being excreted in the waste with each turn of the building.

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

## **Key Theme – Agricultural Waste Management**

Excess phosphorus application from fertilizing cropland with poultry manure is a major environmental concern. One approach to alleviate this problem is to reduce phosphorus excretion by adding the enzyme phytase to poultry diets. This increases utilization of phosphorus in feed ingredients and permits use of lower levels of total dietary phosphorus. In studies at the University of Kentucky, laying hens fed diets deficient in phosphorus had normal egg production and egg quality if supplemented with phytase. The level of available phosphorus in these diets was only 1/3 of the level normally utilized for commercial hens. Additional studies with brown-shell laying hens demonstrated that adding 25-hydroxy-cholecalciferol, a normal metabolite of vitamin D, to phosphorus-deficient diets was also helpful in restoring egg production. These results will be useful in showing the poultry industry how much phosphorus can be decreased in commercial diets fortified with phytase.

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

## **Key Theme – Biological Control**

The results of our studies with the cabbage looper moth suggest that it would be prudent to carefully consider the potential for the evolution of resistance to mating disruption in species for which this tactic is currently being used. Resistance could result from changes in the pheromone blend produced by females, the specificity of the behavioral response of males to pheromone blends, or some combination of these aspects of communication. Knowledge of the potential for resistance could result in resistance management or adapting mating disruption to the changes in the chemical communication system.

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

## **Key Theme – Biological Control**

Conserving and enhancing natural enemies can reduce the need for insecticide applications to lawns, sport fields, and golf courses. Tiphia wasps are lethal parasites of root-feeding white grubs, the most destructive turf insect pests in the United States. This project has documented the importance of Tiphia wasps in reducing grub populations and is clarifying, for the first time, their seasonal biology and habits. We are evaluating means by which homeowners and other turf managers can enhance biological control by providing supplemental food (e.g., nectar producing flowers, sugar water) for the wasps. It shows that by slightly modifying treatment schedules, lawn care companies, homeowners, and golf superintendents can conserve these natural buffers, rather than eliminate them. This work may enhance the success of establishing these natural enemies into areas where the Japanese beetle and other invasive grub species recently have spread.

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

## **Key Theme – Forest Resource Management**

“What is Forestry” is an a comprehensive forestry education program that has been used with a vairiety of audiences across Kentucky. In 2002, the program served as the core for a statewide retreat designed to help women learn how to better manage forested land they own. Four of the thirty-five women who attended the retreat have already used the information for personal issues. Six others contacted others for advice. One participant wrote an article for a local paper about what they had learned from the retreat. A female reader of the article who was in the process of getting a divorce petitioned for a timber cruise and raised her divorce settlement considerably. In addition, women who participated in the training have taught forest management to fifteen veterans, twenty-five senior citizens, and nineteen members of a local church group. A spin-off program, called “Forest Connections” emphasizes the role of families in forest management decisions. A set of mini-lessons are available for use with various groups.

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

## **Key Theme – Forest Crops**

Because the forest products industries have different needs (depending on whether they are primary or secondary wood processors), this program comprises several different educational activities. Two areas of emphasis have been Dry Kiln education and Wood Pallet Phytosanitation education. Short courses have been conducted to teach both industrial personnel and serious-amateurs how to dry hardwood lumber to the correct moisture content for further processing with minimal degrade. Training in the use of both industrial steam-heated dry kilns and industry-type solar dry kilns was included. Pallet phytosanitation is just becoming an important topic at the end of this reporting session, but as Kentucky has about 100 companies making pallets or pallet parts it is important that all parties understand the new international standard that requires pallets to be treated in some manner to eliminate insect pest migration from country-to-country. Communication with individual pallet producers about the new standard and the reasons why they need to comply is the thrust of this program module.

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

## **Key Theme - Recycling**

The forest products industries are essentially invisible to most Kentuckians, even though the industry is directly responsible for 1 out of every 9 manufacturing jobs. The purpose of the “Win with Wood” program is to raise awareness of the importance of wood and wood products in everyday life. The program answers questions about such things as forest sustainability, why paper is recycled, the difference between “pre-consumer” and “post-consumer” products, how different wood products are manufactured, the importance of the wood industry in Kentucky, and why different products are made from different kinds of wood. One popular handout developed for this program lists about 700 different uses for wood and has been used extensively by teachers and 4-H agents.

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

## **Key Theme – Forest Crops**

The University of Kentucky's Department of Forestry and the Wood Utilization Center Team has contributed to the economic development of the forest products industry in many forms including: developing specific training programs for start up plants, product design, and product development. The most significant development to date (in the year 2002) has been the location of a hardwood dimensional plant in the Coal Fields Industrial Park located only nineteen miles from the University of Kentucky's Wood Utilization Center. The success of this economic development project can be attributed to the cooperative effort of many people and organizations. The Department of Forestry and Wood Utilization Center Team's contributions have included: a core post-hire training program that addressed lumber yield, species identification, salvage procedures, drawing interpretation, system training, basic wood terminology, and process training on various woodworking machines for all of the initial hires. The programs offered by the UK Department of Forestry Extension personnel, The UK Wood Utilization Center personnel, and our many partners all strongly influenced the company's decision to locate the plant nearby in Eastern Kentucky. This plant is a 25 million dollar investment and will provide 300 plus jobs, pumping over 9.5 million dollars into the local economy in the next three years in direct salaries alone.

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

## **Key Theme – Forest Crops**

This technical training series has been designed to teach hands-on methods for lumber grading, moulder set-up and operations, profile knife grinding, maintenance applications, computer numeric control software, hardwood lumber drying, hardwood log grading, and computer aided design. These technical training's have been successful in establishing a base of knowledge for entrepreneurs to start new endeavors as well as help those who are currently producing primary forest products to develop vertically integrated new value added secondary wood products. Since 1995, there have been several of these trainings conducted impacting Kentuckians all across the state. These programs have directly impacted the forest product industry over 20 million in dollars earned or saved.

Source of Federal Funds:     Smith-Lever  
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 610,335 contacts related to the development of life skills in youth and adults. 445,691 contacts related to community capacity building, 227,770 related to decision-making, and 141,298 related to the development of interpersonal communication skills. An additional 199,704 contacts focused on character education.

227,298 Kentucky youth participated Extension 4-H Youth Development programs and 21,862 individuals were members of Extension Homemaker Clubs affiliated with the Kentucky Extension Homemaker Association.

As a result of these efforts, 83,166 individuals demonstrated informed and effective decision-making. 75,642 youth and adults demonstrated the application of practical living skills. 68,217 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 12,213 prepare to enter the workforce. 6,767 dependent care providers (adult or child care providers) reported changes in knowledge, opinions, skills, or aspirations as a result of programs conducted by Extension. 24,040 individuals reported changes in knowledge, opinions, skills, or aspirations related to parenting or personal relationships and 22,972 individuals adopted one or more practices to improve their financial wellness.

Expenditures	Federal Extension Funds	\$5,245,713
	Federal Research Funds	\$158,259
	State Contribution	\$23,738,752
FTEs	Extension	274
	Research	4

## Key Theme - Home-Based Business Education

This statewide community outreach program entered its thirteenth year following the basic training of 27 new initiates, and six addition workshop sessions for 50 ongoing volunteer participants. A total of 22 individuals from the Class of 2000 were honored and recognized as new *Certified Master Clothing Volunteers*. These individuals represented counties across the Commonwealth. Combined program participants are credited with volunteering in excess of 12,645 hours to their communities across the state saving tax payers an estimated \$202,952. Statistics are important, but do not adequately tell the story as it relates to building individual self-confidence, improving human capital, touching the lives of others in the community, stimulating home-base business ventures, rekindling interest in sewing, and revitalizing the economy in small town Kentucky. Interest in participating in the program beyond state boundaries continues, stimulating future explorations of multi-state partnerships.

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

## Key Theme – Aging

During the next 25 years, Kentucky will witness a huge growth in older persons that will spark major changes in families, health care, the workplace, and the economy. Healthy and positive aging has never been more important! To prepare for this unprecedented age wave and in response to statewide grassroots requests, we recently created an in-depth, web-based curriculum called *Aging Gracefully: Making the Most of Your Later Life Adventure*. Already 13,500 Kentuckians have participated in *Aging Gracefully* group learning sessions. Follow-up evaluations were mailed to a convenience sample of participants from 23 geographically diverse counties. With a response rate of approximately 61 percent, post-session evaluations were received from some 145 individuals. Close to 70 percent of the respondents reported making positive behavioral changes as a direct result of their participation. Reported practice changes range from: “Made will, power-of-attorney, and living will”; to “My husband and I have started walking for exercise”; to “Taught program to church group—best feedback ever.”

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

## **Key Theme – Workforce Preparation**

Historically, science test scores have been low throughout Kentucky and many teachers find science to be a difficult subject to teach. Science education is of state and national importance and is one of the academic areas that is measured in the 4th grade. Many teachers request assistance from 4-H/youth development agents to provide a science enrichment program to help promote science skills needed by youth. Through a series of hands-on and activity-based demonstrations agents teach lessons on soil, soil erosion, the water cycle and water conservation, windowsill gardens (which covers parts of a seed, germination, and growth), solid waste management, weather, simple machines, water quality, understanding that organisms resemble their parents, organisms have life cycles that are different for different organisms, organisms' patterns of behavior are related to the nature of its environment, and organisms change the environment. The programs resulted in increased content knowledge of important science concepts.

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

## **Key Theme – Leadership Training and Development**

Volunteers are an integral component of Extension programming. Volunteers greatly expand Extension's programmatic outreach and enable agents to reach audiences who would otherwise be unserved. While agents are generally hired for their subject matter expertise, they spent the greatest amount of time generating, educating, mobilizing and sustaining the volunteers who will deliver programs. Compounding this problem is the fact that the majority of professional development activities offered to extension professionals focus on expanding subject matter expertise, as opposed to developing skills in working with volunteer audiences. Therefore, the Volunteer Administration Academy (VAA) was developed. The VAA, is an intensive, year-long, series of professional development workshops designed to equip and empower Extension Agents with the tools, resources and knowledge necessary to assess their current programs, envision opportunities and possibilities, garner support from key stakeholder groups and develop the volunteer resources necessary to achieve previously unrealized goals. Achieving these goals has made a significant positive impact upon youth and adults at the community and county level by transforming the county program from an agent-delivered to a volunteer-delivered program. The VAA is a series of three, 3-credit hour graduate courses that is also offered as in-service training for those agents who have already earned a Master's degree. Two classes (2001 and 2002) have already graduated. Evaluation data gathered from the first class indicate that the competency level of agents increased significantly ( $P < .05$ ) for 66 of the 72 volunteer administration competencies and for 16 of the 18 GEMS phases tested. Additionally, frequency of use increased significantly ( $P < .05$ ) for 65 of the 72 volunteer administration competencies as well as 16 of the 18 GEMS phases tested.

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



## **Key Theme – Home Safety**

Health officials are concerned about high obesity and cardiovascular disease levels (Kentucky State of the Heart, March 2000). One countermeasure is to increase physical activity through bicycling and walking (Ky. Strategic Plan on Cardiovascular Health, May 2001). Highway safety officials support the national multi-modal transportation goals of increasing the total number of trips made by bicycling and walking while reducing the number of deaths and injuries. In 2000, there were 1,706 bicycle or pedestrian collisions with vehicles resulting in 56 deaths and 1,484 injuries (Kentucky Traffic Collision Facts). In partnership with the Governor's Highway Safety Program, BAE Extension is providing a bicycling and pedestrian resource for Kentuckians through helmet programs, classroom programs, safety fairs, 4-H projects, Walk Across Kentucky, and media communications. The annual state Extension youth report indicates that 30,000 children were in some type of bicycle program through the Extension Service outreach efforts. As interest continues to grow based on these increasing trends, BAE Extension will provide for bicycling and pedestrians issues in Kentucky.

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

## **Key Theme – Leadership Training and Development**

The Kentucky Natural Resources Leadership Institute was designed to develop leaders capable of working collaboratively to address natural resources issues. The focus of the curriculum is on personal, interpersonal and groups skills (including facilitation, conflict resolution and public participation), and developing familiarity with policy-making processes. A participant cohort representing a diversity of natural resources perspectives provides participants with opportunities to develop understanding of different interests, and to develop unique networking relationships with new partners. The 18-month program starts each January with six months of seminars, then one year in which each participant applies the skills learned to a project. June 2002 saw the completion of the 7th class of seminars and the graduation of the sixth class following a project year. To date 165 participants have completed the program. In the 2001-2002 year participants applied their skills to a number of projects, including: facilitation of breakout group discussions at a Department of Energy Symposium on Terrestrial Carbon Sequestration; developing secondary wood industry computer-based training, managing 350 acres of land donated to Floyd county for “developing or expanding educational and recreational opportunities”, coordinating a cleanup on a stretch of the Green River, working with the community of Frenchburg to secure a clean water supply, organizing an informational seminar on the PACE (Purchase of Agricultural Conservation Easements) program for landowners from 8 counties, exploring the potential for an institutional utility procurement consortium, and development of landowner outreach techniques for a state forest stewardship program.

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

## **Key Theme – Family Resource Management**

Kentucky State University played a vital role in the Earned Income Credit and the Child Tax Credit campaigns during 2001 and 2002 by assisting families that were eligible for this special tax program. The Earned Income Credit (EIC) is a special tax benefit for working people who earn low to moderate incomes, and file a federal tax return. Many low-income families also got cash back from the Child Tax Credit (CTC) if they earned income and claimed dependent children. Kentucky State University's Family Economics and Management Specialist provided training to staff of the Family Development and Management Program (FDM) and Nutrition Education Program (NEP). In addition, information was provided to Family and Consumer Science Agents in each Kentucky county as well as other community resources such as churches, day care centers, and nursing homes. As a result of the efforts of these individuals, more than 870 families received information on EIC, and more than 500 families applied for the Earned Income Credit. It is estimated that Kentucky clientele families received more than \$1,000,000 through EIC. Families were able to use the money to make much needed purchases or to pay for items that were meaningful in their situations. Families reported using their refunds for the following: paying bills, purchasing furniture; getting car repairs; purchasing a range; using funds for down payments on homes; and purchasing mobile homes. The state of Kentucky benefited, as many of the refunds were returned to the Kentucky economy and local communities.

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

## **Key Theme – Workforce Preparation**

Collaborative effort between the University of Kentucky Department of Forestry, Hazard Community College, and American Woodmark resulted in a computer-based training (CBT) program for a secondary wood industry dimension plant located in Kentucky. The program is comprised of several interactive CDs. Each CD represents a separate process in plant. The company uses the CDs to train all of their new employees for the particular processes of which they are assigned. They also use the tool to train current employees that want to move from one position in the plant to another. The development of this project has created a level of experience needed by the Department of Forestry staff to develop more CBT programs for other Forest Products Manufacturers. The CBT has been such an effective tool for the plant that the company requested a second phase in the development to include sub-assembly functions in their door department. The company is currently using the training program in all three of their dimension plants and has begun developing other CBT components for use in all thirteen of their plants. The company has used the program to train over 490 people in their dimension plants saving them \$783,980.40 in dollars earned or saved.

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

## **Key Theme – Tourism**

Kentucky Cooperative Extension has had a significant impact on the formation of policy related to Agri-tourism in the state of Kentucky. An Extension specialist served as co-chair of a statewide committee charged with looking at the issue of agri-tourism. Efforts of that group resulted in the publication of a white paper which was distributed to our state legislators. This resulted in passage of House Bill 654 calling for the formation of an Office for Agri-tourism. This will be a joint effort between the Tourism Cabinet and Department of Agriculture. The group has applied for tobacco settlement monies to assist in forming this office. This effort will give farmers an opportunity to diversify their operations, make additional income, and save farmlands in Kentucky. In our continuing effort to get agents involved in tourism, agents in Buffalo Trace region held their second annual Tourism Conference. Agents in Carter County held their fourth annual conference. Both efforts are extremely successful in educating their local citizens about the importance of tourism on their economies. Community and Economic Development staff have held several meetings in Wolfe, Lee, Owsley and Jackson counties to assist them with ideas for their future economic development and to take advantage of their renewable communities designation.

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

## **Key Theme – Jobs/Employment**

The Kentucky Business Retention and Expansion Program assists local communities to conduct surveys of local businesses and apply the results to strategies for retaining local businesses. The program is conducted jointly by Kentucky Cooperative Extension and the Kentucky Cabinet for Economic Development. During the past year, programs were completed in Oldham County, Logan County, and Taylor County. One-hundred-ten businesses were included in these programs. Local projects resulting from the program included collaborative worker recruitment and training, local housing studies, a local solid waste study, joint plant managers training sessions, and local government and business planning committees.

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

## **Key Theme – Family Resource Management**

More than 16 percent of Kentuckians live in poverty and more than 43 percent of female-headed households with related children live in poverty. To address several of the family issues faced by many limited resource families who live in poverty, the State Specialist in Family Economics and Management at Kentucky State University organized workshops entitled, Family Management: “Using What You Have To Get What You Want.” More than 130 Extension Assistants and Agents participated in three areas of the state. The workshops were a collaborative effort between the KSU Family Development and Management Program (FDM), KSU Nutrition Education Program (NEP), KSU Small Farm Program, and the University of Kentucky’s Expanded Food and Nutrition Education Program (EFNEP). The effort was supported by grants from the USDA Risk Management Project and the University of Kentucky Agricultural Alumni Association. Resource notebooks and flip charts were produced for counties. As a result of the workshops, over 4500 clientele enrolled in Extension educational programs for limited resource consumers received information related to various aspects of family management. Topics included promoting positive family relationships; improving family communications; helping small farm families manage seasonal income and cash flow; and promoting better management of money and resources. The expected outcome of the program is to help limited resource Kentuckians strengthen their family relationships and improve their quality of life through better management of resources. Also, the project was highlighted as the outstanding project in the USDA Risk Management newsletter.

Source of Federal Funds: Smith-Lever, EFNEP, USDA Risk Management

Scope of Impact: State-Specific

## **Key Theme – Impact of Change on Rural Communities**

“Kentucky: By the Numbers” presents customized data in an easy-to-use format for each county, thematically organized around socioeconomic and demographic issues facing counties and community leaders, and does so within a comparative state framework. Currently, there are 21 profiles containing state and county information for all 120 counties across the Commonwealth for 356 different variables, including 14 statewide maps. In the last year, 3 additional issues of “Kentucky: By the Numbers” for each of Kentucky’s 120 counties (Housing, Race and Ethnicity, and Poverty 1998). “Kentucky: By the Numbers” has facilitated planning efforts of county Extension agents (e.g., 5 year plans, civil rights plans, programming), county Extension councils (annual plans of work), and county review teams. The series “Kentucky: By the Numbers” is also used by county Extension agents to respond to informational requests by local agencies for their own planning activities as well as for grant proposals. The entire series is available on the web at the Social N’ Agricultural Resource Library website.

Source of Federal Funds: Smith-Lever

Scope of Impact: State-Specific

## **Key Theme – Community Development**

Assistance in the area of community planning continues to be a service of Kentucky Cooperative Extension. For example, a public services summit gathered nearly 70 people from local government, public and private agencies, and industry to develop a vision for the future of Greenup County. A challenge to reaching that vision identified by participants was the lack of working relationships among the officials in the 8 incorporated places in the county. An agreement was reached at the summit to begin discussions and city officials from all the municipalities have met three times in the last 12 months. In Garrard County, one of the five fastest growing rural counties in Kentucky, a group of 12 citizens (Garrard County Tomorrow) have been working together for nearly two years to stimulate community assessment and planning. Garrard County Tomorrow has sponsored a mail survey with nearly 300 participants and a public services summit with 50+ participants (from local government, public and private agencies and business). GCT then identified another 15 citizens to develop the strategic goals for a community plan. Together, they have presented the results at 3 community forums and have obtained approval of the Fiscal Court for the goals. In Mt. Washington KY, a growing community outside of Louisville, local officials have been involved in two days of planning to create a capital improvements budget. City officials identified and then ranked infrastructure improvements ranging from sidewalk repairs to a new lift station to a new police building. They then identified potential sources of funding and developed a plan for completing projects within a time frame and a budget.

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

## **Key Theme – Parenting**

More documented evidence is needed on the effectiveness of Extension age-paced parenting newsletters in enhancing children's developmental outcomes. To address this need, Kentucky Extension faculty and staff are exploring the impact of Kentucky's *Parent Express Newsletters* within a national Extension age-paced parenting education web site. A Kentucky specialist participates in a national work group of Extension family life specialists who are creating a web-based national age-paced parenting newsletter series called *Just in Time*. Work group members have organized a symposium on evaluation of the effectiveness of age-paced parenting newsletters for the 2003 National Council on Family Relations (NCFR) meeting. Together with a Kentucky Extension agent, this specialist has submitted a paper on the documented positive effects of the *Parent Express Newsletters* on Montgomery County parents' attitude and behavior changes, which has been accepted for the symposium. If NCFR accepts the symposium proposal, Carole and Peggy plan to present the paper as part of the symposium at the 2003 NCFR meeting.

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

## **Stakeholder Input Process**

In February 2002, Kentucky Cooperative Extension initiated a comprehensive process of self-examination. This process of “re-envisioning” was designed to help the organization more quickly respond to the rapidly changing needs of Kentucky’s citizens. Central goals of the re-envisioning process were to:

- Strengthen support for local programming by improving linkages between campus, specialists, other faculty, and county Extension agents.
- Strengthen the advisory council system.
- Broaden the scope of Extension programming while cultivating working relationships and partnerships with other segments of campus and external partners.
- Develop more flexible, adaptable, and responsive policies and structures.

### **Strengthening County Extension Councils**

One major emphasis of re-envisioning was to strengthen the system of stakeholder input into programming decisions. Previously, independent councils for each Extension program area (4-H, FCS, ANR, Horticulture, CED) were loosely connected through an overall County Extension Council. County Extension Councils tended to focus more on budgets, policies, and structures and less on programming. As a result of re-envisioning, County Extension Councils will assume a greater role in programming and will be the central mechanism for receiving stakeholder input into programming decisions. Efforts will be made to make County Extension Councils more representative of the populations they serve. The work of program area councils will be more closely linked to priorities set by the County Extension Council.

Beginning in the fall of 2003, County Extension Councils will begin a process of identifying high priority program thrusts that will drive programming throughout the next state and Federal planning cycles.

### **A Regional Programming Approach**

High priority issues and needs identified by these rejuvenated County Extension Councils will either be acted upon locally by county Extension staff or shared with one of three newly-created Regional Issues and Programming Committees. These regional committees will be composed of county, district, regional and state Extension faculty and staff. Instead of waiting for state-level groups to respond, these regional committees will be empowered to create program development committees which will address issues and concerns which affect a significant number of counties in a given region. While the overall Regional Issues and Programming Committees will involve only faculty and staff, these program development committees may involve both organizational collaborators and private citizens.

## **State-Level Advisory Structures**

A restructured State Extension Council will continue to provide advice and direction to state Extension programming. However, a newly created Council on Agricultural Research, Extension, and Teaching will more broadly serve all three mission areas of the College of Agriculture. This new council will broadly represent the interests of citizens, commodity groups, and agricultural producers. It will also provide the resident instruction and research mission areas with a formal system of stakeholder input that they had previously not had. State work groups of faculty and staff will provide leadership to a coordinated statewide response to the needs and issues identified by these state-level groups.

Overall, this streamlined process is seen as a mechanism for making Kentucky's research, teaching, and Extension programs more responsive to locally identified needs.

## **Program Review Process**

The process of organizational renewal described in the section on Stakeholder Input is expected to strengthen the process by which Kentucky Cooperative Extension conducts merit reviews of its programs. While the current process includes the review by “experts” which is required by AREERA, we see the new organizational structure providing increased opportunities for external partners and private citizens to comment on the relevance and soundness of Extension programs.

As of now, however, there are no significant changes in the review processes described in the Plan of Work which has been approved by CSREES.



## **Evaluation of the Success of Multi and Joint Activities**

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

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

During FY02, the Kentucky Cooperative Extension Service supported more than 150 different Multi-State Extension activities, each of which was clearly linked to one of the state's six strategic goals. In planning and conducting each activity, key consideration was given to either increasing efficiency (through such things as economies of scale) or effectiveness (by contributing the resource our state each partner was best equipped to provide). For example, Kentucky frequently contributes the expertise and services of its award-winning Educational Media unit to multi-state projects. In other cases, Kentucky relied upon out-of-state expertise in subject areas not well supported by our current array of faculty and staff.

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

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

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

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

Both the Kentucky Agricultural Experiment Station and Kentucky Cooperative Extension Service expended in excess of 25% of qualifying funds on integrated activities in FY02.

## **Brief Summary of Multi-State Activities**

During FY02, the Kentucky Cooperative Extension Service supported more than 150 different Multi-State Extension activities, each of which was clearly linked to one of the state's six strategic goals. Approximately two-thirds of these multi-state activities were state-level partnerships led by state-level administrators, specialists, and associates. The remaining third were conducted by county Extension agents working across state lines. Virtually all of multi-state Extension activities involving state-level faculty and staff can best be characterized as on-going collaborations lasting a year or longer. These included such things as serving on national and regional committees, production of multi-state publications, and curriculum exchange agreements. 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.

### **Home-Based and Microbusiness**

Kentucky has partnered with other states in curriculum development, research, and in-service training in the area of home-based and microbusiness. A Kentucky specialist has participated in writing and updating a national curriculum in home-based and microbusiness education as well as in-service training for agents in five other states. Plans for the current year include a national training in business skills and Kentucky will be involved in teaching at this training. Research in home-based and microbusiness and also research involving bed and breakfast operations in Kentucky and the seven states surrounding Kentucky have been completed.

### **Public Deliberation**

There is an increased interest in creating a climate of civility in public life and encouraging citizens and leaders to pursue calm deliberation about controversial public issues. University of Kentucky and Ohio State University Extension Specialists cooperated to offer a three day public policy institute during the Summer of 2002 at the Ohio State University to encourage Midwestern citizens and leaders to deliberate in public settings. Those attending the Institute discussed sensitive issues such as race and the economy and learned how to explore choices rather than taking sides. The Institute was sponsored by the Kettering Foundation and the National Issues.

### **Keys to Great Parenting Caregiver Version**

A Kentucky Extension specialist is collaborating University of Connecticut family life specialists to develop a caregiver version of the nationally acclaimed *Keys to Great Parenting* curriculum which was developed in Kentucky. The goal of the effort is to help children increase their social and emotional readiness to learn well in public school.

## **Children's Environmental Health**

Since 2000, Kentucky has been one of eight states involved in a partnership project with the Environmental Protection Agency (EPA), Region IV, to address children's environmental health issues. Funding provided by EPA has been utilized to produce a variety of educational materials, which have been made available to Extension Agents for Family and Consumer Sciences. A multi-agency / organization state working group has been working to better coordinate programming across agencies, organizations and Extension programs. In 2002, a variety of outreach programs were conducted. Highlights include the production and distribution of a radio public service announcement packet which was utilized by more than a dozen radio stations across the state, reaching more than 300,000 households. Two 30-minute television programs were produced through Proclaim Broadcasting in Scottsville, Kentucky, and aired in a nine county area that includes more than 96,000 households. Approximately 20 educational programs were conducted at the county, area and state level, including health fairs, homemaker lessons, and exhibits at community, area and state events. Participants indicated they plan to take action to better protect their children from environmental hazards in their homes.

## **Kentucky Rural Health Works**

Kentucky Rural Health Works, a member of the National Operation Rural Health Works program, is an extension and applied research dedicated to providing timely and useful information about the role of health care in community economic development. This information has led to a number of county-based outcomes including its use in a new bond for a Knox County hospital, a networking agreement among rural health providers in Lee and Estill Counties, and strategic planning in Marshall County. To date, 22 rural Kentucky counties had had economic impact reports prepared.

## **CYFERNet**

The University of Kentucky Cooperative Extension Service provides leadership to program component of the Children, Youth, and Family Education and Research Network (CYFERNet). The goals of this effort are to provide technical assistance to CYFER-funded projects across the nation while providing the public with integrated research and Extension resources for children, youth, and families. Forty subject matter specialists representing 25 land-grant universities assist with this effort. One example of CYFERNet-supported programming is the Maltreatment and Adolescent Pregnancy Prevention Program satellite teleconference. More than 3,600 participants in 26 states participated at ninety different downlink sites. Evaluation data revealed that participants gained knowledge, developed an increased passion for the issue, and intended to change work practices as a result of their participation.

## **Sustainable Development**

Extension specialists in Kentucky and Tennessee developed and offered the Ken-Tenn Sustainable Development Institute. Nearly 40 participants from Kentucky, Tennessee and West Virginia participated in the two three-day workshops (April and October) to learn more about community and economic development strategies. About a third of the participants also received graduate credit for the independent projects they implemented based on the ideas from the workshops. The extension publication “Building a New Perspective: Asset-Based Development” (written by Kentucky Extension Specialists) was used as a training guide. The publication was also highlighted in *Rural Connections*, published by the State Rural Development Council in Maine.

## **Five State Beef Initiative**

Kentucky is aggressively implementing the feeder cattle component of the Five State Beef Initiative (FSBI), a USDA- funded collaborative effort of Indiana (lead state), Illinois, Michigan, Ohio and Kentucky. The objective is to develop a vertically coordinated beef supply chain, delivering a guaranteed quality product to consumers while increasing producer incomes. For feeder cattle to be eligible in Kentucky, they must come from a Beef Quality Assurance certified producer, have been through a health and preconditioning program and be source verified. During the first year of the Project, 2,300 cattle from 150 producers went through the program, with data collected on over 1,700 head. Current, over 5,000 cattle from 200 farms are in the program with data on 1200 head. These carcass and feedlot data demonstrate Kentucky cattle exceed the National Cattlemen's Beef Association "National Audit" benchmark. They are also used extensively in educational programs with Kentucky beef herd managers.

## **Forestry Education**

Four primary forestry extension programs were conducted in FY02. These were the Kentucky Master Logger Program, Woodlands and Water Program, Master Tree Farmer Satellite Workshop, and the Professional Forestry Workshops Program. Over 7500 individuals were participated in these programs. The majority of these were reached through the Master Tree Farmer program, a multi-state south-wide satellite workshop. Over 1.1 million acres of forestland were impacted through this program. The Kentucky Master Logger Program conducted over 22 training programs in FY02 impacting 125,000 acres in the state. 135 non-industrial private landowners participated in ten Woodlands and Water workshops. Eighty percent of participants in these workshops implemented best practices as a result of their participation. The Professional Forestry Workshops program was developed this year. It is a multi-state training effort for forestry and natural resource professionals in Kentucky and Tennessee. The initial training was at UK's Robinson Forest and involved a 3 day intensive training in cutting edge silvicultural techniques for upland hardwood forests. Thirty-one professionals including industrial foresters, forestry consultants and state agency foresters attended this training. Post-training surveys showed that over 1059 nonindustrial private forest landowners were provided information from this workshop impacting over 56,650 acres of forestland in Kentucky.

## **Early Childhood Education**

Recent research shows that 90% of brain development occurs in the first three years of life. Cornell Cooperative Extension has perceived a great need for parenting education to promote children's optimal development. The state of New York has mandated parenting education in its high schools. A Kentucky Extension Specialist conducted a one-day training on the Kentucky program, *Keys to Great Parenting: Fun and Learning with Your Baby or Toddler*, for FCS agents in seven pilot counties in the upper Hudson River area of New York in November of 2001. The trained agents have documented wide use of the program with teen and home-based parents, Head Start, Early Head Start, and Even Start parents, agency professionals, and FCS secondary education teachers. Comparison studies with selected Kentucky counties are envisioned during 2003-2004.

## **Beef Genetics**

The University of Kentucky Animal Sciences' beef group co-hosted a national beef genetics in-service training with Iowa State University, University of Georgia, Colorado State University and Cornell University. This was a seven session training targeting state Extension beef cattle specialists and allied industry professionals. The training covered all phases of beef cattle genetic management. The training was conducted via the internet, both real-time and in a downloadable format. Darrh Bullock from the University of Kentucky and Daryl Strohbenn from Iowa State University developed, coordinated and co-hosted the program. Genetic experts from across the country were utilized as speakers for the program. Over 100 people registered for the program from 33 states. Funding for the program was provided by the National Beef Cattle Evaluation Consortium. A survey was conducted at the conclusion with most participants rating the value of the program and nature of the delivery very highly.

## **Southern Rural Health Institute**

The Southern Rural Health Institute was conducted by the Southern Extension Research Activity Information Exchange Group 19 – Rural Health and Safety. The SERA Task Force Group includes Extension and research faculty from throughout the southern region, including nursing and Extension faculty from Kentucky. There were 25 Extension personnel in this year's institute from seven different states, including 4 Extension agents and one Extension specialist from Kentucky. Teaching faculty included eleven Extension and research faculty from seven states, including one nursing faculty and one Extension faculty member from Kentucky. Evaluation of the Institute indicated that participants gained in increased understanding of national, state, and local health systems, learned about Extension's role in community health service planning and delivery, and gained information about tools and strategies for working with individuals, families, and communities' health issues. Kentucky participants have implemented local programs in health education, community health service analysis and planning, and working collaboratively with other health agencies.

## **Outdoor Air Quality**

Odor and other airborne contaminants always have been associated with livestock and poultry production units. With the trend towards larger and more concentrated production sites, however, odors, gases, and dust are rapidly becoming issues that are even more important for animal producers and others involved with the agricultural community. The public's increasing intolerance for odors coupled with the economic importance of animal agriculture has resulted in an urgent need for all stakeholders to find adequate solutions. A prerequisite to a good solution is a thorough understanding of the problem. Faculty from Texas A&M University, University of Minnesota, Iowa State University and the University of Kentucky have collaborated on the development of a new publication on Outdoor Air Quality available through the Midwest Plan Service. It was prepared and reviewed under the auspices of the MWPS manure management committee. MWPS is a Cooperative Extension and research organization headquartered at Iowa State University and representing the 12 land-grant universities of the North Central Region of the United States.

## **Summary of Integrated Research and Extension Activities**

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

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

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

### **Fungicide Resistant Ryegrass Pathogens.**

Strains of the gray leaf spot pathogen on turfgrasses with resistance to this new, important group of fungicides have been documented in several locations in the Midwest and Mid-Atlantic regions. These were the first well-characterized QoI-resistant plant pathogens reported for North America. Two types of mutants have been identified based on sequence changes in the cytochrome b gene; these mutant types have been characterized for phenotype with respect to resistance or sensitivity to commercially available QoI fungicides under controlled conditions. Management programs for QoI-resistant strains have been developed and extended through various regional and national outlets.

### **SCN-Resistant Soybean Varieties**

A six-year study of various aspects of soybean production in relation to the effects of *Heterodera glycines* (Soybean Cyst Nematode [SCN] ) provided valuable, practical information for growers. Crop rotation investigations revealed that SCN "race 3" populations breached genetic resistance in soybean to SCN in the third year that the same SCN-resistant variety was grown, but not until year six when the same SCN-resistant variety was grown in alternate years with corn. Investigation of SCN-resistant/-susceptible blends provided results such that Kentucky soybean producers will use available SCN-resistant soybean varieties in a more appropriate and effective manner. The use of SCN-resistant/-susceptible variety soybean blends in place of SCN-susceptible varieties will help to maintain crop yields in fields where overall SCN populations are low, but "hot spots" exist.



## **Pawpaw Physiology**

A lack of information on the physiology of pawpaw (*Asimina triloba*) fruit ripening, and appropriate storage techniques to prolong shelf life, severely hamper its commercialization. Several key aspects of pawpaw fruit ripening have been characterized, including its regulation by ethylene and major enzymes involved in fruit softening, which will impact the potential for increased production and marketing this crop profitably.

## **Ammonia Emissions from Poultry Houses**

The amount of ammonia that is emitted from poultry houses varies with season, management practices, feeding practices, housing styles, and other factors. Little scientific-based data exists for poultry house ammonia emissions for modern U.S. poultry facilities, including laying hen houses and broiler chicken growout houses. This project involves a comprehensive team of engineers and animal scientists to systematically and thoroughly obtain baseline data for ammonia emission from poultry housing in the U.S. The team will assess the effects of manure management practices and dietary manipulation, as possible methods for reducing poultry house emissions. Research findings will be presented at international meetings, and published in peer-reviewed scientific journals. Results and conclusions from these field measurements (one year duration) will be disseminated to stakeholders in the poultry industry by various means including a special session at the Midwest Poultry Federation and the Multi-State Poultry Nutrition Conference. Of particular importance will be the impact the varying management and feeding practices may have on ammonia emissions.

## **Kentucky Nursery Update**

Kentucky Nursery Update, an on-line newsletter, was developed to create an awareness among nursery growers and county Extension agents of upcoming production tasks, pest problems, and related control measures. The impact of Nursery Update is that grower and county Extension agents have access to specific, timely nursery production information with which to manage and make economic decisions regarding their nurseries.

## **Peregrine Falcon Restoration**

Information from this program will aid in developing a better understanding of how peregrine falcons respond following release in cliff habitats. This is important as most releases of peregrine falcons in eastern North America, especially those that have been successful, were completed in urban or man made habitats. Our goal is to help develop protocols that will permit restoration of these birds in more natural settings, alleviating the dependence on skyscrapers and power plants by this species. These improvements are consistent with the long-term protection and restoration of forest biodiversity in the Commonwealth and across forests in eastern North America.

## **Cattle Handling Guidelines**

Cattle handling guidelines developed for the Governor's Office of Agricultural Policy and the Agricultural Development Board provided the basis for distribution of Phase I tobacco settlement funds to producers participating in county programs where cattle handling facilities are being renovated or constructed. Currently about \$8.5 million was spent in the Cattle Handling Facilities program impacting a large number of counties, producers, and equipment dealers and manufacturers.

## **Water Intake of Cattle**

Water supply systems are designed based on the peak demand, so that water is available even when a large number of animals come to drink at the same time. Individual cows will drink between 4.5 and 24.6 L/min. Water systems without adequate reserve or flow rate force cows to wait for the tank to be replenished. This is particularly important when sizing small movable systems. The ratio between the maximum hourly flow rate to the average hourly flow rate for the different monitoring periods varied between 6.22 and 7.67. If the mean water intake rate is about 5.0 L/1,000 kg LAW-hr, then a 300-kg steer needs to have up to about 250 L of water budgeted per day on a liberal water basis. Therefore, a 5-L/min well could provide enough water for 30 steers at peak demand. These values are significantly higher than values currently recommended for the design of cattle water supply systems. For example, both Wells (1995) and Anon. (2000) recommend maximum to average flow rate ratios between 1.5 and 2.0 for peak demand on hot summer days. Water intake rates were also found to be highly dependent on water and air temperature, as well as on THI (temperature and humidity index).

## **Converting Exotic Cool-Season Grasses to Native Warm Season Grasses**

Work continues on a project which focuses on converting tall fescue stands to native warm season grasses and converting of common Bermuda grass in Alabama, Bahia grass in South Carolina, quack grass in Indiana, and old world bluestems in Texas to native warm season grasses. An additional study on using herbicides to "restore" native grasslands by removing tall fescue was completed at the end of the year. The natural outgrowth of this work has been publication of 5 articles in scientific journals. In addition to writing traditional journal articles, this work has led to writing opportunities to reach large nonscientific regional audiences (*Wildlife Trends*) and national audiences (*Quail Unlimited Magazine*, *Birdscapes Magazine*, *Pheasants Forever*). Present work on using herbicides to restore native grasslands is reaching a different audience. This audience is the natural areas manager that reads popular publications like *Wildland Weeds*. Additional outreach activities in support of this programmatic goal were training more than 100 natural resource managers for the Ohio Department of Natural Resources, more than 80 natural resource managers with the USDA Forest Service and North Carolina Division of Wildlife, and individual assistance with numerous landowners throughout the country. Requests for assistance have been received from across North America including the Iowa Department of Transportation, South Carolina Department of Transportation, engineering consultants, private landowners, and state/federal resource management agencies. The impact of this work has been far reaching and have impacted tens of thousands of acres across the Eastern United States.

## **The Biotechnology Research and Education Initiative (BREI)**

The Biotechnology Research and Education Initiative (BREI) was created to provide cutting edge knowledge from the field of biotechnology to scientists, students, and the general public. BREI is comprised of a multi-disciplinary team of research, extension, and teaching professionals from the College of Agriculture at the University of Kentucky. BREI strives to provide unbiased, science-based information regarding discoveries, benefits, and risks concerning agricultural biotechnology. This past year, team members have made presentations on agricultural biotechnology issues to a number of audiences including civic, farm, and youth organizations. Other BREI activities include agent training, web site development, and authoring of 6 extension publications addressing various issues and aspects of biotechnology education.

## **Beef Production and Water Quality**

An integrated research and Extension project is studying effects of various best management practices on cattle production and stream water quality. BMPs being examined include off-stream water, movable shade, pasture enhancement, construction of stream crossings, and fencing. Two to three cattle in each replicated pasture are fitted with GPS collars that record their position every minute. Data from the collars allow us to monitor seasonal and daily trends related to stream water usage. Additional measurements include stream water quality, stream degradation, and cattle growth characteristics. Project staff are also monitoring changes in the stream corridor through digital imaging. Surveys have been conducted to determine operator attitudes concerning best management practices.

## **Horticultural Pests**

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

## **Soil Laboratory**

The mission of the soil laboratory is to help citizens in Kentucky maintain productive and economical plant growth operations by testing soil, water, greenhouse media, animal waste, and mine spoils and issuing fertilizer and lime recommendations which are based on the test results. Recommendations are made specifically for Kentucky conditions. Nutrient needs and fertilizer responses are determined by research conducted through the University of Kentucky College of Agriculture on crops and soils in Kentucky. Two University of Kentucky soil testing laboratories are maintained. Labs in Lexington and Princeton perform routine tests of pH, buffer pH, P, K, Ca, Mg, and Zn. Non-routine tests for B, organic matter, triazine residue in soil, pH and nutrients in greenhouse media and water, nutrients in animal waste, and acidity in mine spoil are performed in Lexington only.

## **Precision Agriculture**

Precision agriculture uses technologies such as GPS (global positioning system) and GIS (geographic information system) to manage crop production on a more economically and environmentally advantageous scale than traditional "field-average" management. Farmers using such technology can enhance overall profitability while minimizing the effects on the environment. Because of this integration of technology with soil and crop management and the resulting interaction with the economic and environmental stability of the farm operation, this project involves a multi-disciplinary team of seven engineers, six agronomists, and three economists. The goal of this project is to develop methodologies and guidelines for precision agriculturalists, while filling the void in research data regarding the potential economic and environmental benefits associated with these methods. The specific objectives to be addressed under Phase IV funding of this project are: 1) development of sensing technologies, decision tools, and educational programs to help farmers assess the economic viability of these practices; 2) development of standards and protocols for the collection, analysis and utilization of spatial and temporal data to enhance crop production; and 3) development and evaluation of spatial production technologies to enhance environmental quality. Results and conclusions from this project have been and will be disseminated to stakeholders by various means.

## **Production of Ethanol from Biomass**

Ethanol can be produced from biomass materials, such as corn stover, grasses, and trees, that would displace imported oil. Current research is focusing on the amount and quality of corn stover available for ethanol production due to production practices, collection methods, storage conditions, and other variables. The various components of corn stover, i.e. leaf, husk, cob, and stalk, have different chemical properties that will influence the final products that can be produced. The leaves, cobs, and husks are being emphasized because they have the highest concentration of sugars that can be fermented into ethanol. The costs and equipment for farmers to implement the collection of corn stover for additional farm income is being quantified. Changes in machine design are being tested to evaluate the quality and quantity of corn stover collected on farms. Conversion technologies to produce sugars on-farm are being investigated. This would eliminate the need to transport bales of corn stover long distances to ethanol plants and would provide farmers an opportunity add value to the corn stover by producing sugars that would be transported to ethanol plants for fermentation into ethanol.

**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**

<b>Title of Planned Program/Activity</b>	<b>FY 2000</b>	<b>FY 2001</b>	<b>FY 2002</b>	<b>FY 2003</b>	<b>FY 2004</b>
Community Development	46,914	48,087	49,337		
Sustainable Agriculture	445,620	456,760	468,635		
Leadership Development	47,667	48,858	50,128		
Nutrition and Health	66,491	68,153	69,924		
Life Skill Development	264,734	271,352	278,408		
Environment and Natural Resources	119,429	122,415	125,597		
<b>Total</b>	<b>990,858</b>	<b>1,015,625</b>	<b>1,042,028</b>		

M. Scott Smith  
 Director

3/1/03  
 Date

**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**

<b>Title of Planned Program/Activity</b>	<b>FY 2000</b>	<b>FY 2001</b>	<b>FY 2002</b>	<b>FY 2003</b>	<b>FY 2004</b>
Social and Economic Opportunity	46,000	47,150	48,375		
Competitive Agriculture	546,000	559,650	574,200		
Safe Food and Fiber	213,000	218,325	224,001		
Agriculture and Environmental Quality	707,000	724,675	743,516		
<b>Total</b>	<b>1,512,000</b>	<b>1,549,800</b>	<b>1,590,092</b>		

M. Scott Smith      3/1/03  
 Director                                      Date

**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**

<b>Title of Planned Program/Activity</b>	<b>FY 2000</b>	<b>FY 2001</b>	<b>FY 2002</b>	<b>FY 2003</b>	<b>FY 2004</b>
Sustainable Agriculture	2,714,712	2,782,579	2,854,926		
Nutrition and Health	299,442	306,928	314,908		
Environment and Natural Resources	598,884	613,856	629,816		
<b>Total</b>	<b>3,613,038</b>	<b>3,703,363</b>	<b>3,779,650</b>		

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M. Scott Smith

Director

\_\_\_\_\_  
3/1/02

Date