

Kansas

Annual Report of Accomplishments and Results

FY2006

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Introduction

The motto of K-State Research and Extension is “Knowledge for Life.” This is a great motto for a land-grant university, such as Kansas State University. It means developing new knowledge and empowering people with that knowledge, whether they are our youth in 4-H or our senior citizens. In order to accomplish this, K-State Research and Extension is focusing its efforts on five core mission themes: Natural Resources and Environmental Management; Healthy Communities: Youth, Adults, and Families; Safe Food and Human Nutrition; Competitive Agricultural Systems; and Economic Development through Value-Added Products.

Additionally, K-State Research and Extension and the College of Agriculture, as well as Kansas State University, are developing areas of focused excellence. We cannot be everything to everyone; therefore, we have to focus on serving the highest priorities. Obviously, this also requires that we have the breadth to address other issues. Whether we develop the knowledge within K-State Research and Extension or work with another land-grant university or an industry partner to develop that knowledge, we must disseminate that knowledge in the classrooms on the K-State campus and the informal classrooms in all 105 counties across the state of Kansas.

It is essential that we stay connected to the people and address their wants, needs, desires, and dreams, whether those are related to production agriculture, the environment, family, or community. This report provides a snapshot of the activities and accomplishments of K-State Research and Extension. We have highlighted projects and programs that resulted in true impact for ranchers, farmers, youth, families, and communities within Kansas.

In fiscal year 2006, total funding in support of the programs described in the plan totals \$97,599,799. (See Appendixes A and B). This total and the program efforts included in this report represent all funding streams—not just Federal dollars.

A. PLANNED PROGRAMS

GOAL 1 – AN AGRICULTURAL SYSTEM THAT IS HIGHLY COMPETITIVE IN THE GLOBAL ECONOMY

Overview (includes sections a, b, c, and d)

K-State Research and Extension (KSRE) responds to immediate and future food and fiber production issues that affect Kansas agriculture, families, and communities. KSRE develops improved, efficient, and profitable cropping and livestock production systems while protecting the environment. Agricultural technologies, risk-management strategies, and information systems are best management practices that agricultural producers use to produce profitable, safe, and appealing food and fiber products.

Kansas has a strong agricultural tradition that predates its statehood, and it continues to be a significant contributor to the state's economic well-being. In 2005, cash receipts from farm markets totaled nearly \$10 billion. Kansas ranks sixth in agricultural exports with exports of agricultural products valued at more than \$2.7 billion.

Kansas farmers consistently produce more wheat than any other state in the nation and, in 2005, Kansas wheat accounted for more than 18 percent of all wheat produced nationwide. Kansas also ranks first in grain sorghum produced, second in cropland and prime farmland, and third in land in farms and sunflowers produced. The state ranks fifth in hay produced, sixth in summer potatoes, seventh in corn grain, 13th in dry edible beans and oats, and 17th in upland cotton. Other Kansas crops include soybeans, corn, and dry edible beans. Value of horticultural related crops is ranked fifth in Kansas crop production. Pasture and range acreage (18,262,000 acres) is utilized to support our beef industry. Cotton and ethanol production are gaining in importance to Kansas Agriculture,

Kansas is a leader in beef production, with more than 22 percent of all US beef originating from Kansas beef processing facilities. The state ranks second in cattle and calves on farms and in cattle and calves on grain feed, ninth in hogs on farms, 10th in market sheep and lambs, 18th in milk produced and in sheep and lambs on farms, and 19th in meat and other goats. KSRE faculty is responding to producer interests by providing an understanding of the available technologies and options for assuring a safe food supply at the production level. Animal health is vital to the profitability of the beef industry. Many of the nutrition, diet, and management systems used in animal care and feeding can be traced to KSRE programs.

Kansas has one of the fastest growing dairy industries in the nation (60% production increase since 1998) with new annual product sales that exceed \$80 million. Producing 450,000,000 pounds of pork, (1.65 million head), Kansas ranks 9th in state swine production with 310 operations producing 95% of the state's pork. Swine production has remained fairly constant in Kansas. A new swine processing plant opened in 2006 in the northeast corner of Kansas. Consultations with the swine industry have resulted in adoption of rations with reduced phosphorus in the diets, lessening the environmental impact of swine waste.

Agriculture and agribusiness contribute to the total economy of Kansas, both directly and indirectly. One in five Kansans, rural and urban, work in jobs related to agriculture and food production.

Kansas is one of the top ranked states in the US with regard to agricultural exports to international countries for wheat, feed grains, live animals and meat products, and hides. KSRE projects have studied US and export food markets and evaluated the benefit of improving the quality and marketability of Kansas' agricultural grain and meat products. Research in food processing and marketing is necessary to determine which value-added products or processes are economically sustainable in Kansas. Educational

programs are essential to teach Kansans about the advantage of value-added opportunities. KSRE has explored many value-added projects for the benefit of the state and its citizens. In the area of wheat, for example, value-added projects have included pasta, starch, gluten and oriental noodle production; shellfish diets; non-food and non-feed uses; new food products; and utilizing wheat-milling by-products. A value-added project has developed industrial adhesives and resins from soybeans. The project resulted in patents being issued to K-State, and has now reached the industrial scale proof-of-concept stage in partnership with a major resin manufacturing company. Another project has explored processing sorghum for improved marketability.

Through all of these efforts, educational support has been provided to entrepreneurial farm families seeking alternative sources of farm product sales as a means of enhancing income. The Kansas Center for Sustainable Agriculture and Alternative Crops has worked with Kansas producers to develop local food systems and local markets in Kansas. Locally produced meat, vegetables and flowers are increasingly sold to local markets.

The United States Department of Agriculture granted \$3 million to K-State to establish a National Agriculture Biosecurity Center. The grant was authorized in the Public Health Security and Bioterrorism Preparedness and Response Act of 2002. K-State has partnered with Texas A&M and Purdue universities to:

- Evaluate disposal methods of potentially contaminated animal carcasses in case of a serious contagious disease outbreak;
- Assess execution, management, and effectiveness of current agroterrorism exercises; and
- Analyze ways that agricultural pathogens might enter and be distributed within the country.

K-State is a lead institution to improve early detection and rapid response methods for plant pests and diseases. This multi-state project with the National Plant Diagnostic Network (NPDN) is supported through special USDA CSREES funding to enhance the capacity of scientists to detect and report unusual occurrences of plant associated problems. These problems could be the result of a planned terrorist action to affect the nation's ability to produce food or may develop from unintentional transfer of a pest or pathogen into the country.

For more than 100 years, K-State has provided knowledge to solve or alleviate problems. For example, the droughts of 2003 and late 2005, through 2006 required special study and strategies to improve conditions created in these unusually severe droughts. The Kansas Weather Data Library (KWDL), operated by KSRE, is the official source of climatological data for the state. The KWDL took on new responsibilities during the drought and provided critically important drought status reports to state and local governments. Weekly and bi-weekly crop and forage teleconferences among agents and specialists were used to keep everyone aware of changing drought conditions and issues. Information was gathered and developed for use in radio broadcasts, newsletters, newspapers, and KSRE publications. A drought resource Website <http://www.oznet.ksu.edu/drought> was developed to transfer timely resource materials to farmers and the public.

A series of K-State supported meetings brought livestock producers together to discuss and share new ideas for planning and decision-making. With an identified need for pasture and hay exchange information among ranchers, KSRE cooperatively supported a Website on the Kansas Farm Bureau server that enabled farmers with available pasture and hay to connect with livestock producers who needed forage. Current and historical weather data from the Weather Data Library of KSRE was provided

to state and federal agencies. Agents and specialists consulted one-on-one with producers on the critical drought-related decisions.

Agricultural risk management is vital to profitable farming and ranching operations of Kansas. A team of K-State Agricultural Economics faculty and staff has developed the www.Agmanager.info Website for improved decision making. Newsletters, decision aids, policy briefings, information updates, and current educational program offerings are provided to the agricultural business professionals, farmers, and ranchers all across Kansas. Decision-making tools to aid farmers such as budget spreadsheets and data sets are available to improve management of their operations. Information about upcoming seminars, such as the annual K-State Risk and Profit Conference, also can be found. Topics on the Agricultural Economics department Website include crop and livestock marketing and outlook reports; crop insurance; farm management; agricultural policy; human resources; income tax and law; and agribusiness. The Website contains several pages that are updated weekly as market prices and conditions change.

- e. Total expenditures by funding source and FTEs
- | | | | |
|--------|-------------------------|----------------------|--------------|
| FY2006 | Projected: \$66,304,218 | Actual: \$64,318,558 | FTEs: 262.32 |
|--------|-------------------------|----------------------|--------------|

Key Theme – Agricultural Profitability

Online Classes Help Improve Farm Businesses

- a. While many producers want to learn about how to better manage their farms and ranches, time, travel distance and economics have been reasons these producers are not able to receive needed education. The Management, Analysis and Strategic Thinking (MAST) program at Kansas State University offers two-day workshops to give producers high-level farm management information. Then for three months, participants learn through distance education methods and focus on various farm management tools and their application. Both crop and livestock insurance modules are available.
- b. Short-term Outcomes:
MAST participants reported that: (a) they learned up-to-date modern techniques to analyze the decision process using proven approaches; (b) many of their farms now focus on increasing capital and MAST has helped them plan for the future; and (c) the MAST program provided valuable information that has helped them progress with their own farms and increase their profit, productivity, and general well-being. Total Website visits now exceed 10,000. Crop insurance, farm programs, and public policy issues have been the major focus.
- c. Scope of Impact – State Specific

Risk and Profit Conferences, Combined Risk Management Workshops

- a. Risk and Profit 2006 was the 11th annual agricultural economics sponsored conference. The fee-based 1 1/2 day program focused on farm management/economic risk issues. The objective of the workshop was to teach farmers how to manage their combined yield and price risk before harvest. A case farm is used to explain the economic principles.
- b. Short-term Outcome:
Approximately 85 farmers were exposed to the idea that they would be better off focusing on traditional production and financial management tasks rather than on marketing—at least as long as they produce agricultural commodities. Several thousand farmers have participated in the Combined Risk Management Workshops that investigate both livestock and crop production price risk and profitability.
- c. Scope of Impact – State Specific

Key Theme – Sustainable Agriculture

Soil Management and Cropping Systems

- a. To effectively produce crops in semi-arid regions, efficient use of scarce water resources (precipitation and groundwater) must occur. Many factors affect water utilization by crops, and these must be considered in any cropping system. The goal is to efficiently capture and utilize precipitation and irrigation water, maintain or enhance the productive capacity of the soil, and maximize profit, while mitigating potentially negative environmental impact.
- b. Producers in western Kansas are changing their cropping practices as indicated by the increase in dryland corn and grain sorghum acreage. Another advantage of producing corn and sorghum is that they can be utilized locally as ethanol feedstocks or feed grains in the animal feeding industry, while wheat usually must be exported from the region. This improves the sustainability of the producers, local communities, and the region. Economic analyses of the higher nitrogen prices suggest that nitrogen application levels should be reduced by 10-15%; a savings of \$6,000 to \$9,000 on a 1500 acre wheat/milo farm.
- c. Scope of Impact – State Specific

Key Theme – Animal Production Efficiency

Ultrasound Helps Producers Boost Cattle Health and Profits

- a. The importance of ultrasound technology is the ability to predict future carcass potential and cluster cattle into outcome groups for more profitable marketing. The technology allows cattle in feedlots to be evaluated, and an estimate of the number of days to feed each animal for maximum profit is computed. Then, cattle can be sorted according to the optimal number of days they should be kept in feedlots. Sorting and selling the cattle in this fashion allows producers to maximize profit.
- b. Research has documented an improved profit for cattle producers of about \$15 per animal from using this technology. Annually there are about 30 million cattle contained in U.S. feedlots. If all feedlots utilized this technology, beef producers would realize \$45,000,000 per year in additional profit. In addition, it enables the industry to produce beef that better meets consumer quality expectations.

Also, there is enormous educational value from these applications because producers can learn about the importance of carcass quality and enable them to see the merit and variability in the live animal. Finally, this is a tool that focuses on the individual unit (animal) and brings “precision agriculture” from the field to the feedlot.

Success Story:

One producer reported earning a \$34 premium per head on a shipment to the IBP beef processing plant in Emporia, KS. Using ultrasound the past three years, producers report that 90% of the time, it pays to use ultrasound to scan the cattle. Even without the premium incentive, ultrasounding is cost beneficial because it indicates whether the cattle would benefit from additional feeding. This prevents adding inefficient gain.

- c. Scope of Impact – Multistate Integrated Research and Extension

Key Theme – Plant Production Efficiency

K-State Wheat Breeding Returns \$99M to Kansas Wheat Producers

- a. Wheat is the most important crop in Kansas. Nearly one-fifth of all wheat grown in the U.S. is grown in Kansas. A majority of wheat varieties planted in Kansas originate from K-State’s wheat-breeding

program. One of the newest varieties is the hard white wheat Lakin, which is adapted to southwest Kansas.

- b. An economic analysis of K-State wheat-breeding programs revealed that this research has been increasing producer revenues by about \$99 million annually since 1977. For each dollar invested in varietal development, nearly \$12 was earned by Kansas wheat producers. An analysis of 10,000 samples of wheat has shown that through new variety development, the protein content has increased 2.5% over 10 years. Higher protein levels in wheat enhance bread quality and thus, export possibilities.
- c. Scope of Impact – State Matching, Hatch Act Funds, and Grants

Enhancing Soybean Production Efficiency and Stability through Breeding and Genetics

- a. Yield losses from pathogens, particularly Soybean Cyst Nematode, reduce farm income in Kansas by over \$5 million per year. The Agronomy, Plant Pathology, Entomology, and Animal Sciences departments have worked together on an aggressive cultivar development program that strives to develop procedures and strategies to improve the selection efficiency of important traits, and to develop strategies for enhancing the durability of resistance to such pathogens as Soybean Cyst Nematode through selective deployment of resistance genes. The Kansas Agricultural Experiment Station released nine soybean cultivars. Two varieties possess resistance to Soybean Cyst Nematode (SCN). Several Roundup Ready varieties are nearing release.
- b. Genetic improvement of soybean varieties in Kansas increases yields by about .2 bushels per acre per year, and farm revenue by over \$3 million per year. Public releases and germplasm from Kansas State University contribute to the yield improvement and protection of the yield potential by the direct utilization of the new varieties and indirectly through the use of the new improved germplasm in other public and private breeding programs. Information from this project on variety performance and SCN nematode population dynamics is essential to reduce SCN losses and enhance the durability of resistance sources.
- c. Scope of Impact – State Matching, Hatch Act Funds, and Grants

Key Theme – Adding Value to New and Old Agricultural Products

Hard White Wheat Products Now on the Market

- a. After approximately 30 years of work at K-State by faculty in many departments, both on- and off-campus, to develop hard white winter wheat for Kansas and the region, we are finally seeing quite a few hard white wheat products hit the grocery store shelves.
- b. Wonder Bread-brand bread from Kansas City's Interstate Bakeries Company features two types of bread made from hard white wheat flour. "White Bread Fans 100% Whole Grain" and "Wonder Made with 100% Whole White," are widely available in major grocery stores. Sara Lee has unveiled "Soft and Smooth," a 100% white wheat loaf.
- c. Scope of Impact – AES Funds

Economic Implications of GM Wheat

- a. The impact of introducing genetically modified (GM) wheat will depend on acceptance in both the export and domestic markets. Our objective was to investigate consumer acceptance of GM wheat products, and to quantify the extent to which purchase decisions are influenced by information about the risks of biotechnology, and information about current GM content in wheat products.
- b. Respondents were largely unfamiliar with the concept of GM foods with 65% indicating that they had either "never heard of" or "had heard a little" about them. However, a majority of respondents (68%) indicated they would accept GM wheat based products. Furthermore, almost three quarters would not pay more to avoid GM wheat. Results from regression analysis indicated that socio-demographic characteristics do not have a significant influence on acceptance. Individuals receiving information

about a negative perspective on GM were less likely to accept GM wheat and were willing to pay \$0.12 more per loaf of bread to avoid GM wheat. Providing information about GM ingredients currently in wheat products had no impact on acceptance of GM wheat.

- c. Scope of Impact – USDA CSREES Special Grant

GOAL 2 – A SAFE AND SECURE FOOD AND FIBER SYSTEM

Overview (includes sections a, b, c, and d)

K-State Research and Extension (KSRE) is a national leader in food-safety programs. An estimated 76-million foodborne illnesses occur in the United States every year causing 325,000 hospitalizations, and 5,200 deaths in the U. S. annually. Related medical costs and lost wages are significant, accounting for a yearly loss of up to \$17 billion. In Kansas, the main bacterial causes of food-related illness are Salmonella, Escherichia coli O157:H7, Campylobacter, and Shigella. Viral pathogens, specifically Norovirus (formerly known as Norwalk-like virus) and Hepatitis A virus, are also major causes of foodborne illness in Kansas. Food-related and other diarrheal illnesses remain underreported throughout the U.S., including in Kansas. Most diarrheal illnesses resolve within 24 to 48 hours without any medical attention. As a result, many food-related illnesses are not diagnosed and associated foodborne disease outbreaks are often not recognized. This poses a challenge for public health professionals to maintain the knowledge and resources to educate and respond to this consumer health issue. Food safety education is necessary to help maintain health care cost, to help ensure public health and maintain quality of life for all Kansans.

K-State's Food Sciences Institute was created in 2002 to more efficiently draw upon food science expertise. It combines faculty in education, research, and extension to improve the coordination, visibility, and capacity of KSU's food sciences program. The Food Science Institute also offers a variety of academic programs through various KSU departments and via distance education.

ServSafe teaches the principles and practices of food safety in foodservice establishments. The course content includes: food safety hazards, how to provide safe food, the safe food handler, HACCP, keeping food safe from purchasing and receiving through preparation and service, and maintaining sanitary facilities and equipment. The manager level training course concludes with the 80-question certification exam. In 2006, 26 Manager's Level Certification training sites with 300 participants and 40 Employee level training sites with 650 participants were held throughout the state. K-State Extension collaborates with the Kansas Restaurant and Hospitality Association, Kansas Department of Health and Environment, local health departments and others to promote and conduct this program. ServSafe is recognized nationally as a leader in food safety and sanitation education.

In 2006, there were 18 counties participating (this includes 100 trained volunteers) in the Kansas Master Food Volunteer Program, which provides a foundation of knowledge to volunteers in the subject areas of food safety, food science, food preparation, and food preservation. The Extension Master Food Volunteer Program allows people with interests in food, cooking, and nutrition to take their expertise to a higher level while developing new avenues for helping in the community.

e. Total expenditures by funding source and FTEs				
	FY2006	Projected: \$2,929,494	Actual: \$2,841,762	FTEs: 17.2

Key Theme – HACCP

Meat Safety and Quality

- a. The purpose of the Meat Safety and Quality program is to provide technical assistance and support to the Kansas meat industry to enhance the quality, safety, and variety of Kansas meat products. In 2000, USDA provided funding for a three year cooperative project between Kansas State University, the University of Nebraska, the University of Missouri, and South Dakota State University to provide support, training, and technical assistance to meat and poultry facilities in a four-state region. This project has been funded for another two years. One primary goal was to provide programs, training,

and assistance to Kansas meat-processing businesses so they could meet the challenges set by regulators and remain in compliance with additional mandates required.

- b. The majority of companies serviced through this program are small meat processing businesses, many with fewer than 10 employees. Had this program not been available, these companies would not be able to afford these types of services. In the past year, processors and entrepreneurs realized a savings of over \$47,500 while enhancing the quality and safety of meat and meat products for Kansas' consumers.
- c. Scope of Impact – Multistate Integrated Research and Extension
 - With MO, NE, SD

Key Theme – Food Safety

Food Safety Consortium

- a. The primary focus of the work at Kansas State University continues to be methods development for the isolation, detection, and quantification of microbial and chemical hazards and the elimination of those hazards.
- b. That research has also most recently resulted in significant information and technology transfer relative to risk assessment, economic, policy, and trade information and has laid the foundation for reaping additional insights in those areas. Furthermore, our food safety work has prepared us to address food security that may be the result of bioterrorism and/or natural disasters. Thus, funding for the Consortium has fortunately prepared us to address and communicate solutions to the interdisciplinary challenges in today's changing world.
- c. Scope of Impact – USDA CSREES Special Grant

GOAL 3 – A HEALTHY, WELL-NOURISHED POPULATION

Overview (includes sections a, b, c, and d)

Kansans are concerned about their personal health and safety as well as that of their families and communities. Statewide surveys, forums, and other data revealed that citizens have a keen interest in programs delivered by local and state organizations. Public health planning documents, such as Healthy Kansans 2000 and Healthy People 2010, call for reductions in the incidence and prevalence of certain types of morbidity and mortality. Cardiovascular-pulmonary diseases, cancer, and cerebrovascular disease leading to strokes account for 63% of Kansas' deaths that are primarily preventable by adopting healthy and safe lifestyles. Eating disorders and other weight issues are increasing problems. Arthritis affects 40 million Americans, and osteoporosis is present in 9 out of 10 women and 1 in 3 men by age 75. Limited-resource and near-poverty individuals and families, those without health insurance, the very young, and the aged are most at risk for poor health and early death.

In 2006, the Family Nutrition Program (FNP) completed its 11th year in providing nutrition education to more than 180,000 food-stamp eligible citizens in 83 counties. Participants were encouraged to increase their consumption of fruit and vegetables. They learned to choose and prepare nutritious meals and snacks; balance the food they eat with physical activity; use safe food handling practices; and manage their food resources and achieve food security. In 2006, FNP provided nutrition education to Kansans of diverse ethnic and racial backgrounds: 19,800 African American contacts; 25,200 Hispanic contacts; 540 Native American contacts; and 540 Asian contacts. Individual clients often have multiple "contacts" through a series of lessons.

The Kansas Nutrition Network (KNN), a sister program to FNP, is a partnership of state-level public and privately funded nutrition education and food assistance programs. Led by K-State Research and Extension, KNN provides nutrition education emphasizing the dietary guidelines, reliance on integrated community-based efforts, state flexibility, and use of innovation social marketing.

The Expanded Food and Nutrition Education Program (EFNEP) is available in four Kansas counties for youths and homemakers with limited resources. EFNEP reached 1153 Kansas families with 1637 children in 2006. Over 5249 youth contacts were made through the EFNEP youth program with 601 pregnant EFNEP participants receiving prenatal nutrition lessons. Of the EFNEP families enrolled, 65% were enrolled in one or more food assistance programs in 2006. EFNEP participants completing the multi-lesson series improved nutrition, food behavior, and food safety practices. As a result of participation in EFNEP, 91% improved in one or more food resource management practice; 84% seldom or never ran short of food before the end of the month; and 96% improved in one or more nutrition practices.

In 2006, K-State Research and Extension implemented a program called Kids A Cookin' and Movin', which encourages basic cooking skills, good nutrition, healthy food choices, food safety, and physical activity. The curriculum helps kids make healthy eating choices, includes food quizzes, and more.

From 1999 to 2006, 3083 Kansans living in 65 counties who attended a KSRE presentation about diabetes responded to a survey regarding diabetes management. Of these, approximately 64% attended Diabetes Awareness and Management and 35% attended Dining with Diabetes. Of those in attendance, 34% had diabetes, 59% did not, and 7% did not know if they had diabetes or not; 77% were age 55 years or older; 88% were female; 94% were white and non-Hispanic; 74% reported that their health was good or excellent.

Of those who attended one Diabetes Awareness and Management program, What's Cookin' with Diabetes, 64% reported finding the information useful, 66% rated the program as excellent, and a statistically significant number of participants intended to use MyPyramid and Nutrition Facts Labels more often.

A 5-year USDA-funded "Kansas Teen Leadership for Physically Active Lifestyles" project is working with teen leaders in three Kansas counties. Teens use the nationally recognized, evidence-based CATCH Kids Club curriculum in their roles of afterschool staff as well as leading community engagement campaigns to promote healthy lifestyles throughout their rural communities. Another grant, "Powerful YOUth on 4-H Trails" funded by the Sunflower Foundation, will result in the "seeding" of walking trails across Kansas through energized youth leaders from Kansas 4-H clubs, youth groups, scout troops, and school classes. The trails will add value to Kansas communities while motivating citizens to be more active. Kansas kids will not only be motivated to use these trails through Web-site prompts and leader curriculum, but they will also lead community health promotion campaigns to increase access to and use of walking trails and paths.

- e. Total expenditures by funding source and FTEs
- | | | | |
|--------|------------------------|---------------------|-------------|
| FY2006 | Projected: \$4,687,191 | Actual: \$4,546,821 | FTEs: 39.53 |
|--------|------------------------|---------------------|-------------|

Key Theme – Human Health

A Health and Fitness Program for Almost Everyone

- a. Walk Kansas, a fitness challenge, has become a premier K-State Research and Extension program. This is an easy and inexpensive fitness program developed to encourage people to increase healthful physical activity. The eight-week research-based program encourages teams of six (family, friends, neighbors, coworkers, or others in the community) to log miles--or equivalent minutes of physical activity--to cover the 423 miles across Kansas. Participants receive a mileage log and newsletters with food, nutrition, and health tips during the program. Walk Kansas helps Kansans initiate and maintain a regular regime of physical activity and good nutrition. The objective of each team member is to do moderate intensity physical activity for 30 minutes a day, five days a week. Many teams choose to keep a log of the amount of fruit and vegetables consumed. In its first year (2002), 43 counties—and more than 7,000 people participated.
- b. Almost 20,072 people representing 98 of the 105 counties signed up for the 2006 program. The Walk Kansas program costs vary slightly from county to county but are usually \$10 or less.
- c. Scope of Impact – State Specific

Key Theme – Human Nutrition

Kansas Kids A-Cookin' & Movin'

- a. The Kids a Cookin' program seeks to affect a family's health and health behavior through the child, while teaching and modeling food skills and positive nutrition choices. This television program pairs a host "cook" with kids, who together prepare a simple recipe that is both healthy and fun. The VHS tapes and DVDs of Kids a Cookin' in English and Spanish are currently used in after-school and ESL programs, as well as middle school and high school FCS (Family and Consumer Sciences) classrooms, summer child programs, public libraries, and a variety of extension settings. Indirectly, the program

has also been effective with senior audiences, persons for whom English is a second language, and teen parents.

The Kids a Cookin' & Movin' curriculum compliments the television program with the addition of in-depth resources for educators including live-tours, food safety, and physical activity. The program also incorporates an award-winning Website www.kidsacookin.ksu.edu that features all of the recipes and health tips shown in the program.

b. Success Story/Short-term Outcomes:

A middle school teacher of family and consumer sciences and physical education has used the curriculum the past two years in her 7th and 8th grade FCS classes and with special needs students. “The students benefited by learning simple recipes that they could make at home for themselves or their family. They also learned to make simple, healthy snack recipes that could improve their eating habits and promote healthy lifestyles.”

c. Scope of Impact – State Specific

Healthful Eating Translates to Other Languages and Cultures

a. More than 40% of the residents of Wyandotte County are racial or ethnic minorities. According to the Kansas-based REACH Healthcare Foundation, approximately 16% speak a language other than English in the home. The Extension agent teaches weekly classes on diabetes education. Fluent in Spanish, she provided class materials in her students’ native languages, including French, Vietnamese, and Amharic (the language of Ethiopia). Her students are referred to her classes through a partnership with Riverview Community Services, which serves more than 1,500 clients yearly.

b. Success Story/Short-term Outcomes:

After two or three weeks, with changes in his diet, Larry lowered his blood sugar from a dangerously high 500 to 200, and he was able to walk without a cane.

c. Scope of Impact – State Specific

GOAL 4 – GREATER HARMONY BETWEEN AGRICULTURE AND THE ENVIRONMENT

Overview (includes sections a, b, c, and d)

Concern about the quality of the environment continues to guide K-State Research and Extension in developing programs that ensure quality and conservation of surface water and groundwater; promote community residential environmental management; develop systems for improved soil and air quality; and maintain plant diversity. Topics in this area have been making headlines recently because of new research and changing regulations. The Kansas Center for Agricultural Resources and the Environment (KCARE) coordinates research and extension efforts for this goal and has led a number of environmental efforts that have helped K-State Research and Extension's progress towards its five-year plan of work goals. Significant accomplishments are identified below for several key themes.

Water Quality: Watershed Restoration and Protection

KSRE continues to play a major role in supporting the development of Watershed Restoration and Protection Strategies (WRAPS) around the state. WRAPS are a locally led effort to bring together watershed stakeholders to identify concerns and issues regarding water quality and other natural resources, assess the condition of these resources and identify sources impacting them, and to develop an action plan that includes goals for watershed restoration and protection and best management practices (BMPs) and other activities to achieve these goals. KSRE continued its support of a WRAPS for the lower Fall River and lower Upper Verdigris watersheds in southeast Kansas. Following a successful outreach effort in late 2004 that included a watershed tour and workshop, a local leadership team was recruited in early 2005 to guide the development of the WRAPS. This team represents a collaborative effort between local stakeholders and agency staff, and includes participation by local residents, Extension, public water suppliers, county conservation districts, municipalities, SEE-KAN RC&D, Kansas Forest Service, Kansas Department of Health and Environment (KDHE), NRCS, and the Kansas Water Office. The leadership team has identified a variety of issues and concerns in the watershed, including TMDLs for fecal coliform bacteria, low dissolved oxygen, and eutrophication. Other issues include flooding, streambank stabilization, riparian areas, livestock production, and sourcewater protection. Restoration and protection goals have been established and preliminary strategies identified. The local leadership team continues to explore these issues and is identifying BMPs and other measures to address them. Anticipated project completion is by the end of 2006. WRAPS projects were also launched in the Neosho Basin in late 2005 with initial stakeholder meetings and watershed tours.

A Watershed Restoration and Protection Strategy (WRAPS) was completed for the Little Arkansas River Watershed in November 2004. A watershed stakeholder group consisting of landowners, agency personnel, and other citizens developed this plan. K-State Research and Extension (KSRE) faculty guided the plan development and writing. This watershed is one of the most intensive agricultural watersheds in Kansas with 97% of the land in agricultural production (78% cropland and 19% grazingland). The watershed is also considered to be one of the most impaired in Kansas with TMDLs having been set for 52% of the river and stream segments and 50% of the lakes. In the WRAPS, KSRE was given the responsibility to develop a research and education program that would lead to best management practice implementation and water quality restoration. In response to this, KSRE has committed considerable resources to the watershed. In addition to support provided by county extension agents, state extension specialists, research faculty, a full time extension water specialist was assigned to the watershed to lead extension and demonstration efforts. Five subwatersheds were selected for intensive research and extension efforts. Educational programs were delivered with the objective of increasing the use of cropland best management practices (BMPs), particularly those targeted toward reducing pesticide contamination of surface waters. County faculty have made one-on-one visits to all farmers in the

watershed with greater than 600 acres of cropland (and selected farmers with less than 600 acres) to teach them how to implement cropland BMPs. Monies provided by the city of Wichita, Kansas and the Kansas State Conservation Commission were made available as incentive payments to help farmers implement BMPs. In 2006, it is expected that greater than 50% of the grain sorghum acres in the five subwatersheds will have implemented BMPs for pesticides as a result of this program, resulting in measurable water quality improvements. Integrated Agricultural Management Demonstration Sites were developed on farmer fields at two locations in the watershed. These demonstration sites showcase BMPs, In addition, monitoring equipment was installed at the demonstration sites to determine BMP effectiveness. Farmer schools, newsletters, publications, and a Website were also used in the educational program. Automated surface water monitoring equipment was installed at the base of the five subwatersheds to determine the effectiveness of BMP implementation on a watershed level. Stream bank and stream bed erosion were also considered to be a problem in the watershed. A research project is currently being conducted to quantify sediment and nutrient load attributed to stream bank and stream bed erosion. The Soil and Water Assessment Tool (SWAT) watershed model is being used to evaluate pollutant fate and transport at the watershed level. SWAT is also being used to estimate the effectiveness of alternative management practices in the watershed. Results of the stream bank, streambed, and SWAT modeling studies will be used to focus future watershed restoration efforts.

Additionally, KSRE provided technical support for the development of a watershed restoration and protection strategy (WRAPS) for the Smoky Hill River/Kanopolis Lake watershed. A watershed simulation model was developed to assess water-quality responses to potential watershed changes. These estimates of water-quality response are being used to refine WRAPS-document estimates of target implementation practices and areas needed to achieve specific reductions in pollutants toward meeting TMDL targets. For example with 100% adoption of reduced tillage on cropland, the watershed model estimated 29.5% reduction in annual average overland sediment yield and 8% reduction in annual average sediment yield at the watershed outlet (compared to a more-optimistic WRAPS-document target TSS reduction of 75%). Work is in progress to assess the impacts of many of the BMPs being targeted by watershed stakeholders in the WRAPS document. Prioritizing the watershed areas that should be targeted for implementing BMPs, rather than random or “first-come, first-serve” methods, shows promise for improving cost-effectiveness of water-quality improvement efforts. For example, a 10% reduction in overland sediment loss could be achieved with about 17% of cropland area in reduced tillage by using a targeted approach compared to 36% by a random approach. Similarly, a 5% reduction in sediment yield at the watershed outlet could be achieved with reduced-tillage adoption in about 17% of targeted cropland area as compared to 81% randomly selected area.

The major cause of water quality impairments in Kansas is fecal coliform bacteria. A major integrated research and extension project has been implemented in the Upper Wakarusa watershed, a high priority TMDL watershed in Northeast Kansas, to identify and abate key sources of fecal bacteria..

Heartland Water Quality Initiative Project.

The Heartland Initiative integrates research, education and extension on a regional basis among Iowa State University, Kansas State University, the University of Missouri, the University of Nebraska and the CSREES National Water Quality Program. The principal objective of the Heartland Initiative is to develop productive and efficient multi-state multi-agency teams to address regional priority water quality issues. The overall goal is to make research, education and extension resources of the land grant universities more accessible to federal, state and local water quality improvement efforts. The Heartland Project selected three of the CSREES Water Program’s national priority issues as the basis for regional coordination. They are Nutrient and Pesticide Management, Animal Manure Management and Community Involvement in Watershed Management. For each of these three issues, steering committees consisting of university

faculty, local, state, and federal agency personnel, and other interested citizens were established to determine priorities and needs. Each issue team has conducted educational meetings across the four states, helped in setting regulatory procedures, and developed working relationships between research and extension faculty of the four land grant universities.

Water Conservation and Management: Prolonging the Life of the Ogallala Aquifer

In-canopy and near canopy center pivot sprinkler irrigation is widely practiced in the U.S. Great Plains Region. These systems, which include LEPA (Low Energy Precision Application), LESA (Low elevation spray application and MESA (mid-elevation spray application), can potentially result in water savings through elimination of aerial and plant canopy water evaporative losses and a possible reduction in soil water evaporative losses for those systems that do not wet every crop furrow. However, these in-canopy and near canopy sprinkler irrigation systems are not always appropriate because of the increased potential for irrigation runoff. Research at Kansas State University has shown that irrigation nonuniformity with these systems when poorly designed and managed can result in row-to-row corn yield differences as great as 20 bu/acre. This can translate into differences in economic returns of as much as \$80/acre. A cooperative effort with researchers from Texas is underway to more fully describe the concepts of in-canopy and near canopy center pivot sprinkler irrigation. The outcome will be producers knowing which system is appropriate for their operation and also how to manage the systems to avoid excessive runoff.

Subsurface drip irrigation (SDI) is another advanced irrigation technology that can reduce or eliminate non-beneficial water losses (e.g., runoff, soil evaporation, deep percolation). SDI systems are expensive investments that must have a long life to approach economic competitiveness with alternative irrigation systems. A research SDI system at K-State has been operated for 19 years with little degradation, demonstrating that these systems can have a long life when using the high quality water from the Ogallala aquifer. A free computer software tool has been developed at K-State to allow producers to easily compare the economics of SDI with center pivot sprinklers. Analysis with this software tool indicates that SDI systems can easily compete with center pivot sprinklers on small and irregular shaped fields and in situations where corn yield and price are higher.

Research at K-State and Texas indicates that SDI will generally result in more stability in crop production under deficit irrigation than center pivot sprinkler irrigation. As the ability to fully irrigate a land parcel decreases in the future due to aquifer declines, SDI will probably play an increasing role in stabilizing farm income.

In many areas of the Ogallala, irrigation well capacities are dwindling and water allocations are becoming more restrictive; as a result irrigators are considering different crop combinations. To address this need, a software tool has been completed for computerized decision making. The Crop Water Allocator (CWA), which irrigators and water policy makers can use to allocate limited water to an optimized selection of crops, was released on the World Wide Web during December 2004 at www.oznet.ksu.edu/mil. It is available for download to an individual user's computer and has attracted over 1000 visitors to the site with 1/3 of those visitors downloading the program. Optimum economic net returns are calculated from all possible combinations of crops, irrigation allocations, and land rotation patterns proposed by a user's input scenarios. Multiple runs of the model give the user indications of the sensitivities of net economic returns to water allocation, commodity prices, maximum yields, irrigation costs, and crop production costs. This tool guides irrigators and water professionals to cropping strategies that return the best value from the limited water used in irrigation from individual fields to a regional analysis. Users of CWA have included irrigators, crop consultants, extension advisors and specialists, educators, and researchers. Inquiries for use of this program for policy guidance have come from the Kansas Water Office and the Kansas agricultural crop insurance industry.

The fate of the western Kansas economy is inextricably linked to the fate of the Ogallala aquifer. Irrigated crops, livestock production, and meat processing are vertically linked industries along the food supply chain in this region and are the primary drivers of development and job growth. All these industries are water-intensive and together account for almost all water consumption in western Kansas; irrigation alone accounts for 87% of regional water use. In sum, the part of the state most dependent on water is exactly where water supplies are dwindling at the fastest rate. K-State Research and Extension economists are studying the economic forces impacting water use and are evaluating the likely consequences of policies aimed at reducing the decline rate of the aquifer. For example, one policy alternative receiving increased attention by both state and federal policy makers is a water-right buyout program, and a recently completed study estimated the cost of buying out water rights from irrigators in the Rattlesnake Creek sub-basin. Ongoing research will provide similar cost estimates for other parts of the state and will also compare the costs to those from other policy alternatives. Results such as these will give policy makers and their constituents science-based information to assess different policy proposals.

Soil Quality: Carbon Sequestration

K-State Research and Extension scientists are studying carbon sequestration, a process that could reduce global warming while also improving soil quality, and reducing soil erosion and water runoff. Carbon sequestration increases soil organic matter and reduces carbon dioxide in the air. It is good for the environment and good for crop production. K-State is leading the Consortium for Agricultural Soils Mitigation of Greenhouse Gases (CASMGs), a consortium of research institutions that is working to provide the tools and information needed to successfully implement soil carbon sequestration programs. K-State has been one of the nation's leaders in research on agricultural soil carbon sequestration and greenhouse gas emission.

The CASMGs research team at Kansas State University has made significant contributions to: (a) improving knowledge about carbon sequestration and greenhouse gas mitigation, (b) quantifying agricultural greenhouse gas emissions and reductions at the state and national level, (c) developing practical tools for assessing the effectiveness of carbon sequestration strategies, and (d) providing outreach and educational material about agricultural greenhouse gas mitigation.

Key results include:

1. Grain sorghum hybrids have been tested to determine if certain hybrids will be better at adding carbon to the soil. Preliminary tests have shown that there are differences among hybrids indicating that some hybrids will provide a more stable source of carbon than others. This research has also shown that nitrogen rates used on grain sorghum have an impact on soil carbon sequestration, with higher N rates resulting in higher soil carbon levels.
2. Work is underway to determine the role of mycorrhizal fungi in stabilizing macroaggregates and thus carbon in soil. This information can be used to design crop and soil management systems to stimulate fungal development.
3. Using recommended grazing rates, as opposed to the common practice of overgrazing, has been found to increase forage productivity and belowground root production. Soil carbon levels are slightly higher where moderate stocking rates are used, compared to heavier stocking rates.
4. The effect of tillage, crop rotations, manure, and fertilization on soil carbon levels, energy use, and economics have been evaluated. No-till and manure applications resulted in the highest levels of total soil carbon. Rotations that include wheat resulted in the greatest amount of total soil carbon. Grain sorghum and corn also add considerable amounts of carbon to the soil. Where a fallow period is included in the rotation, it is very difficult to increase soil carbon levels, even using no-till production. Economics of the various management practices varies by region. Where no-till is more profitable than conventional tillage,

it will be easier to encourage producers to switch to no-till and increase carbon sequestration rates within the state.

5. An electronic newsletter focuses on state, national, and international activities in carbon sequestration and global warming. This newsletter goes primarily to about 350 producer groups, policymakers, educators, and researchers within Kansas. CASMGS has a national Website <http://www.casmgs.colostate.edu>. K-State has a carbon portal web site that is a central location for information on soil carbon. The portal address is www.soilcarboncenter.k-state.edu.

Impacts

Kansas: There are currently about 3.4 million acres of no-till in Kansas. This means that on no-till acreage alone, Kansas agricultural soils are sequestering about 2.8 million tons of CO₂ per year. We hope to increase the future acreage of no-till in Kansas. Current payments for carbon credits on no-till are between \$0.50 and \$2.00 per acre per year. K-State CASMGS researchers are members of the Kansas Coalition for Carbon Management (KCCM). KCCM is an organization of producer groups and NRCS Resource Conservation and Development Region associations. KCCM relies on information and data provided by the K-State CASMGS team for its educational materials. KCCM and K-State are actively working to establish links between carbon credit buyers and producer groups to sell (or lease) carbon credits. This led to a recent offering through the Iowa Farm Bureau and the Chicago Climate Exchange to provide to producers the opportunity to sell C credits for a 4-yr lease period. Over 70 contracts representing 72,000 acres were signed in Kansas. A new sign-up period for the most recent phase of this project began in February 2006.

National: Agricultural soil carbon sequestration is the most cost-effective method of carbon sequestration available to industry, and could help industry in the US meet initial CO₂ reduction targets economically. The cost of a ton of CO₂ credits from agricultural soil sequestration is about \$1, compared to an estimated cost of \$100 per ton from geological carbon sequestration pilot projects currently underway in this country. Power companies looking to buy carbon credits are finding that agricultural soil carbon sequestration is by far the most affordable type of credits at this time. The multi-state effort of CASMGS scientists is regularly called upon to provide briefings to industry and policy makers.

In general, we are finding that no-till, more intensive crop rotations, grass plantings, and manure applications result in some of the highest rates of carbon sequestration and the best overall global warming whole-farm potentials. Where these practices are not profitable, either government programs or private-sector carbon credit payment systems would be needed. The Chicago Climate Exchange, Environmental Defense, and others involved in voluntary carbon credit payments in the U.S. have come to CASMGS researchers to determine the most realistic carbon sequestration rates to use for agricultural soils.

International: CASMGS has been collaborating with organizations in other countries (Australia, Brazil, Canada, and New Zealand) on research and outreach efforts. For Kansas State University, an Australian scientist is working with a graduate student at K-State on chemical changes in crop varieties as they relate to changes in soil carbon cycling. Recently a university in Brazil signed an agreement to facilitate scientific and student exchanges with K-State.

Air Quality: Particulate Matter and Ammonia Emissions at Beef Cattle Feedlots

Texas and Kansas are the nation's largest cattle feeding states (42% of US total). Growth of beef cattle feeding boosts the regional economy, but presents air quality challenges. Dust-related complaints rise dramatically during drought periods, while odor concerns and ammonia emissions increase during wet periods. In collaboration with Texas A&M University, KSRE scientists have been monitoring particulate matter and ammonia concentrations and emissions from open-lot feeding facilities in northwest Texas and

southwest Kansas. Laboratory experiments using weight-drop test chambers have been conducted to develop relationships between kinetic energy of hoof action and feedlot dust emission at a variety of moisture contents and manure depths. Chamber studies show water sprinkling or surface amendments of sawdust or wheat straw to be effective in reducing dust emission for short periods of time. Particulate matter concentrations are being monitored upwind and downwind of a large cattle feedlot to determine the effects of weather conditions and corral surface characteristics on emissions. Ammonia emissions are also being measured at large feedlots on a continuous time basis in order to relate ammonia emissions with meteorological conditions.

Sustainable Agriculture

Role of the Kansas Center for Sustainable Agriculture and Alternative Crops (KCSAAC)

- Serve as a resource center for producers and professionals searching for information to develop a more diversified, sustainable agriculture.
- Provide and facilitate a communications network among sustainable agriculture professionals and producers for increased collaboration and multidisciplinary projects and activities directed towards research and outreach needs expressed by Kansas producer stakeholders. Current priority areas include:
 - Grazing/livestock systems
 - Community based food systems
 - Organic production systems

Impacts of Community Based Food System Efforts

- Twenty-five Kansas producers have expanded or begun small scale value-added processing and 12 new Kansas products for sale by small-scale processors.
- Approximately 40 Kansas producers made an informed decision not to add small scale processing to their operation.
- Seven new producers in the Kansas City Metro area mentored through the Growing Growers project.
- One new restaurant in Lawrence that uses locally raised foods.
- Kansas was the only applicant to receive a grant from the USDA to develop a State Food Policy Council.

Impacts of Organic Production System Efforts

- Two meetings on transitioning to organic production hosted by the Kansas Organic Producers.
- Organics 101 – a workshop hosted by the Douglas County Extension Office.

KCSAAC Website. The number of visits to the site averages approximately 2,700 per month, up from 2,000 in 2004. The most commonly visited pages are the Publications, Calendar of Events and Grant Opportunity pages. The URL is <http://www.kansassustainableag.org>

Participated in organizing and hosting conferences, workshops and tours.

- 2006 Organic Agriculture Conference (approximately 200 people attended)
- Farmers Market Manager and Vendor (73 people attended)
- Find Direction for Your Marketing Workshop (approximately 30 attended)
- Three Value-Added Processors Bus Tours (approximately 100 people participated)
- Four Fall Grazing Tours – highlighted water development (approximately 80 attended)
- Improving Your Financial Skills Workshop (approximately 20 attended)
- Two Farmer/Rancher Grant Writing Workshops (approximately 25 attended)

e. Total expenditures by funding source and FTEs

FY 2006	Projected: \$9,085,603	Actual: \$10,213,972	FTEs: 64.55
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Key Themes – Soil Quality and Air Quality

A Leader in Studying the Benefits of Carbon Sequestration

- a. K-State Research and Extension scientists are studying carbon sequestration, a process that could reduce global warming while also reducing soil erosion and water runoff. Carbon sequestration increases soil organic matter and reduces carbon dioxide in the air. It is good for the environment and good for crop production. K-State is leading the Consortium for Agricultural Soils Mitigation of Greenhouse Gases, an organization that is working to provide the tools and information needed to successfully implement soil carbon sequestration programs. K-State has been one of the nation's leaders in research on controlling soil carbon sequestration and greenhouse gas emission.
- b. It has been estimated that 20% or more of targeted emission reductions could be met by agricultural soil carbon sequestration. Other benefits of this technology are increased soil fertility, reductions in erosion, and increases in soil quality.
- c. Scope of Impact – Multistate Integrated Research and Extension

Key Theme – Sustainable Agriculture

Earth Awareness Researchers for Tomorrow's Habitat (E.A.R.T.H.)

- a. In 1998, a focus group was formed to address a lack of adequate middle school environmental education material in Sedgwick County. Based on the group's recommendations, Earth Awareness Researchers for Tomorrow's Habitat (E.A.R.T.H.) was created to respond to the shortfall. The hands-on program provides curriculum, supplies, a student workshop, and teacher training focused on empowering students with skills and knowledge to take appropriate action in areas of environmental protection.
- b. Short-term Outcomes:
More than 4,200 students participate in E.A.R.T.H. statewide, including 2,300 in Sedgwick County.
 - (a) Students report that they have learned skills in the classroom that they can apply to real-life situations in their community and that they now feel more qualified to be wise stewards of their environment.
 - (b) Teachers report that students' experimental environmental learning has allowed the students to develop the critical thinking skills needed to succeed in life.
 - (c) Students involved in E.A.R.T.H. report that they enjoy learning more and remember what they have learned longer when they use E.A.R.T.H.'s hands-on lessons.
 - (d) Teacher evaluations indicate that students who participate in the program have a stronger commitment to school and greater academic success than those who do not.
- c. Scope of Impact – State Specific

Key Theme – Water Quality

Citizens Take Hold of Kanopolis Lake Pollution Problems

- a. Kanopolis Lake, part of the Middle Smoky Hill River watershed, faces such pollution problems as streambank erosion, fertilizer runoff, livestock fecal coliform bacteria, pollutants from urban areas, oil well site-management, and illegal dumping of sewage or trash. As in many waterways, these issues affect all local residents in different ways.
- b. Intermediate Outcome:

The number of cost-share and Environmental Quality and Incentives Program (EQIP) contracts through NRCS has increased over last year's sign-up date. Ellis County's cost-share numbers have doubled since the first sign up.

Short-term Outcome:

Those attending the town meetings and driving tours reported increased awareness and knowledge of why the watershed is being assessed and protected.

- c. Scope of Impact – State Specific

A Partnership with Nebraska to Monitor Water Quality

- a. The Blue River Compact—The Kansas- Nebraska partnership, of which K-State Research and Extension is a part, effectively monitors water quality and promotes practices to prevent runoff of pesticides into the Big Blue River. The work is being conducted under the auspices of the two states' Big Blue River Compact. Water samples regularly are collected at 22 locations through the basin and analyzed for pesticide, nutrient, and bacterial levels. New sites are being added in Nebraska and Kansas in the upper tributaries (Upper Horseshoe Creek, Lower Horseshoe Creek, Big Indian Creek, and Turkey Creek). The monitoring will help narrow the search for the highest levels of loading.
- b. Landowners in Nebraska and Kansas (i.e., row crop and livestock producers) have put in place numerous Best Management Practices including many streamside vegetative buffers. Kansas and Nebraska Corn Growers and Grain Sorghum Producers associations and the Kansas and Nebraska Farm Bureau organizations have been active partners in the planning, development, and implementation of this effort.
- c. Scope of Impact -- Multistate Integrated Research and Extension

Key Theme – Natural Resources Management

Limited Irrigation Program Helps Farmers

- a. Many farmers rely on the Ogallala Aquifer to irrigate their crops, though it is well-documented that this vast resource in parts of five Midwest states is diminishing. Kansas State University researchers are helping farmers predict which crops to irrigate by experimenting with different amounts of limited water and allocating water to limited water areas, and by selecting different crops. Researchers have developed a computerized decision aid for irrigators, water professionals and water policymakers. The model allocates water by partitioning it among one to several crops, and spreading it over all or only part of the land under irrigation.
- b. According to two years' results of a crop residue management field study:
 - (1) Irrigators will save 3-4 inches of soil water evaporation by using the limited irrigation program during the growing season.
 - (2) The potential annual savings in pumping costs is \$1,000 to \$3,000 per center pivot.
 - (3) For 99,200 acres and 182,000 acres of sprinkler-irrigated soybeans in western and central Kansas, respectively, 3-4 inches of water savings is \$2.5 to \$2.6 million in annual pumping costs.
 - (4) For the individual irrigator, 3-4 inches of water will generate 1,500 to 2,000 bushels of soybean, and 5,000 to 6,000 bushels of corn—or estimated revenue of \$7,000 to \$15,000 per center pivot.
 - (5) Extending those gains in revenue over western and central Kansas shows that soybean annual impacts would be \$16 to \$21.6 million, and corn annual impacts would be \$98 to \$131 million.
- c. Scope of Impact – State Specific

Establishing and Maintaining Turfgrass Systems with Reduced Water and Pesticides

- a. Maintenance of home and commercial lawns would be made easier and less expensive during dry Kansas weather if minimum water requirements were known. KSU researchers are evaluating

minimum requirements of turfgrasses in the state, and best methods for converting cool-season turf to water-conserving, seeded warm-season grasses.

- b. Using drought-resistant turfgrass species can result in a water saving of up to 40% compared to less resistant types. The researchers have developed a novel minimal disturbance seeder to establish warm-season grasses. This affords a seed saving of up to \$1,600 per acre compared to traditional establishment methods, and would allow a golf course to remain open during the process of conversion.
- c. Scope of Impact – State Specific

GOAL 5 – ENHANCED ECONOMIC OPPORTUNITY AND QUALITY OF LIFE FOR AMERICANS

Overview (includes sections a, b, c, and d)

An educated and knowledgeable citizenry is the foundation of Kansas' economic productivity; democratic character and social system; and quality of life. The focus of Youth, Family, and Community Development has been on building strong, healthy communities; improving parenting skills and family relationships; preparing youth to be responsible citizens; balancing demands of work, family, community, and time for self; and developing consumer and financial management skills. Today's complex issues and problems require new perspectives and skills. K-State Research and Extension (KSRE) helps communities better themselves through economic development, leadership training, improved housing, quality child care, a skilled workforce, and welfare reform. The work involves delivering educational programs and technical information that improves skills in communication, group dynamics, conflict resolution, issue analysis, strategic planning, effective parenting, developing life skills, and helping youth to grow in healthy, productive ways.

The Kansas Saves Campaign has been launched in 39 Extension sites. The goal "Save and Build Wealth" encourages people to save more and reduce credit card debt. The Kansas Saves campaign, sponsored by K-State Research and Extension and local community partners, is part of a nationwide effort to boost savings. Participating communities feature information and local activities on how to build savings and how to reduce or manage debt wisely.

Extension agents have made hundreds of presentations and answered thousands of phone calls to help people understand the new Medicare Prescription Drug Program. Agents and volunteers also manned the Senior Health Insurance Counselor for Kansas (SHICK) hotline. Of the people helped, agents estimated that the average savings per person was conservatively \$1,000 or more per year on medications and premiums.

Extension Agents collaborated with the IRS sponsored Volunteer Income Tax Assistance (VITA) sites to help low to moderate income, disabled and homebound taxpayer families, who are often also the unbanked to receive free income tax preparation and filing services; learn about tax credits for which they qualify; receive tax refunds to supplement take home pay, pay bills and provide for themselves; keep more of their funds by avoiding high cost check cashing or tax refund loan fees; receive financial education to learn to make maximum use of the refunds. For example, in 2005 in Shawnee County, 5,000 eligible individuals, with average incomes of \$23,098, received refunds totaling \$4.49 million and paid \$500,000 in tax liabilities and 862 individuals in Salina, with average incomes of \$12,000, received \$570,000 in refunds.

Programs on Protecting Your Nest Egg were presented in six counties in Kansas in 2005. Eight programs were presented to 66 people who discovered how the state securities regulator works to protect and inform investors; learn why you should verify the credentials of any financial professional with whom you are considering working; recognize common tactics used to deceive and defraud investors; and learned where and how to report problems or questions.

Extension activity with family communication was generated at both state and national levels. At the state level, activity included a writing a peer-reviewed lesson (Building Bridges within Our Communities), individual consultations with Extension agents on moving from county to district agent positions with more specialization in marital and family relationship education, local and state presentations, agent training, monthly Connections newsletters, twice-a-year CoupleTALK internet course, multiple news

releases with additional media inquiries, and other miscellaneous obligations. At the national level, work has revolved around the National Extension Relationship and Marriage Education Network (NERMEN) in which a select group of state specialists (including one from Kansas) are striving to expand the nationwide Extension outreach of research-based resources in the area of relationship and marriage education. One major endeavor will culminate this spring with the 2006 National Annual Family Life Electronic Seminar Series hosted by Ohio State Extension with Kansas agents invited to participate. A Kansas Extension Specialist is an invited presenter. Additionally, on a national level, Mississippi State Extension has adopted Stepping Stones for Stepfamilies for statewide distribution.

In cooperation with Utah State University, “The Strong Latino Marriage Project” has brought together Family Studies and Human Service graduate students and a Developing Scholar (all Spanish speaking students) in a qualitative study in which ten Latino couples were interviewed on what makes their marriage strong.

“Women Managing the Farm”, a workshop focusing on farm business management and family dynamics involving 11 partnering organizations was delivered at four sites in Kansas. Participants numbered 201 and 52% noted a change in behavior within 3 months because of workshop information.

- e. Total expenditures by funding source and FTEs
 FY2006 Projected: \$12,889,774 Actual: \$12,503,756 FTEs: 132.95

Key Theme – Youth Development/4-H

Junior Master Gardener Program

- a. The Junior Master Gardener Program is an innovative youth gardening program that supports individual, family, or community horticulture learning opportunities. Through involvement in this hands-on project, youths learn about horticulture as well as health, nutrition, food safety, and decision-making. Junior Master Gardeners are encouraged to give back to their communities through service learning projects, which enhances the involvement of master gardener volunteers within communities.

Classroom teachers, Head Start teachers, volunteers, and extension staff participate in a series of in-service training sessions across the state utilizing the FNP approved youth nutrition curriculum while focusing on the experiential learning model.

- b. Intermediate Outcomes:
 More than 3,500 Kansas 4-Hers in 36 local Extension Units donated 3,539 volunteer hours for local food programs, collected 10,679 cans of food, 2,118 pounds of fresh produce and \$3,513 in cash for the Kansas Centennial Community Service Project. From the JMG in-service training, 20 teachers indicated their intent to use Junior Master Gardener curriculum in their classrooms. A total of 348 children participated in gardening programs, with 241 of those children being involved in six or more lessons.
- c. Scope of Impact – State Specific

4-H Military Programs

- a. The Kansas 4-H Military Program efforts are designed to address the needs of Army, Air Force, National Guard and Army Reserve children and their families. Working in collaboration with the U.S. Army Child and Youth Services, CSREES, and National 4-H Headquarters, the program received a second year \$30,000 grant which provides funding for staff development, organizational structure, and programmatic needs for the Military 4-H Clubs at Ft. Riley, Ft. Leavenworth and McConnell Air

Force Base. A \$100,000 grant provides funding for Operation Military Kids (OMK), a two-year effort which was launched in the fall of 2005 to reach National Guard and Army Reserve children and their families who have suddenly become "military kids" when their parent is deployed on active service.

- b. Intermediate Outcomes
Eighteen 4-H Clubs are organized and active on the three military installations in the state --- Ft. Riley, Ft. Leavenworth, and McConnell Air Force Base -- involving 678 youths and youth services staff members in monthly meetings, activities and special events. Staff development training efforts have positioned the 4-H clubs and program to be sustained after the grant ends. The State 4-H OMK team includes partners from Army Reserve, Army National Guard, Air Guard, Boys and Girls Club and American Legion. Over 75 Hero Packs were distributed to youth in targeted regions of the state that have experienced a high impact of Guard and Reserve deployment.
- c. Scope of Impact --- State Specific

Key Theme – Community Development

Assisting Local Communities

- a. KSRE is increasingly valued by state agencies, regional health providers, the Legislature, and private organizations as the most engaged entity in local communities. As a result, KSRE receives an increasing number of requests to convene, facilitate, or broker comprehensive planning efforts that assist local residents in sorting out and prioritizing the programs and technical assistance needed for healthy individuals, families, and communities.
- b. Mobilized with a continuum of knowledge for their lives, Kansans can tap deep sources of knowledge and skills beginning with prenatal care and extending to making decisions regarding the long-term needs of seniors.
- c. Scope of Impact – State Specific

Key Theme – Family Resource Management

Health Insurance Education—Medicare Part D

- a. Numerous local K-State Research and Extension offices partnered with SHICK (Senior Health Insurance Counseling of Kansas) to reach more than 400,000 people through extensive public education presentations and individual consultations. As educators, agents framed complex and confusing information into a step-by-step package so people could understand Medicare Part D options and make wise choices.
- c. Agents reported, "People came to the program confused and overwhelmed. They left with a clear understanding of what to do and when." Agents conservatively estimated an average yearly savings per person assisted was at least \$1000 on medications and/or premiums.
- c. Scope of Impact – State Specific

B. STAKEHOLDER INPUT PROCESS (includes sections a, b, and c)

Stakeholder input is a continuous process across the breadth of educational programs in an effective grass-roots organization like K-State Research and Extension. Stakeholder input happens through local, regional, state, multi-state, and national input processes. The stakeholder input process is a comprehensive effort to seek focus on critical issues and problems needing research and answers that fit well within our defined mission priorities. This input continues throughout planning, project implementation, and program delivery.

At the local level, the Kansas Cooperative Extension Service law dictates election of local advisories and an executive board in each of our 105 counties. This amounts to publicly electing 2,520 individuals across the state to provide program development input to local Extension staff for each program area of agriculture, family and consumer sciences, economic development, and 4-H youth. Of those 2,520 individuals, 945 are further elected to executive boards and are required by law to oversee the program, staff, and budget of our local Extension units across Kansas. These executive boards meet monthly to provide such oversight in cooperation with administrative leadership within K-State Research and Extension. Such ongoing stakeholder input into the decentralized decision-making processes of this organization play heavily into the priority programs and direction to K-State Research and Extension programming, especially for Cooperative Extension.

In 2005, a strategic planning process for the Cooperative Extension mission of K-State Research and Extension was completed. The 34-member task force that worked to complete this process was carefully constructed to involve a balance of key leadership among our broad stakeholders and personnel within our faculty and agent ranks. The purpose of the strategic planning was to identify key principles that must be given attention to assure the future to a relevant, sustainable, quality Extension Service in Kansas. The process included three facilitated daylong meetings and interim reports posted on our Website to solicit further external input. Focus was given to organizational structure and staffing, resource development, systems of education and information dissemination, and constituent development and marketing. The task force identified a series of recommendations. In 2006, the strategic planning recommendations were distributed widely within and outside the organization, and planning and implementation processes developed to address key issues. Some of those issues include strengthening professional development, increasing program depth and focus of our local extension programs, moving forward on multi-county models of program delivery, multi-state programming initiatives, and enhanced training for stakeholders in the advocacy process.

On a regional level, our research and extension centers make use of advisory committees composed of stakeholder leadership and clientele from the local area. For instance, interested producers, agribusiness concerns, and interested members of the public are brought together to help prioritize some of the projects being considered for deployment at off-campus research locations. New Extension program suggestions often develop from these deliberations. During the year we also meet informally with a large number of diverse organizations to discuss collaborative efforts, consider sharing of resources, review prioritization process, assess progress reports and realized outcomes, and to design complementary educational efforts. Feedback examples include commodity commissions (e.g., deliberations that help prioritize the awarding of producer-funded extramural grants involving check-off dollars) and helping citizens to understand options associated with regulatory decisions made by the EPA, Kansas Department of Health and Environment, Kansas Department of Agriculture, and other groups. Successful programs involve co-sponsorship of watershed specialist positions to improve water quality within drainage districts, creation of third-party educational vendor partnerships with NRCS, facilitation of multidisciplinary certified crop

advisor training programs, a wide range of projects involving community organizations, school programs (i.e., school enrichment), and social services (e.g., Area Agencies on Aging and SRS).

At a state level, stakeholder engagement includes external advisory groups for each academic department who meet with department leadership, Dean's advisory, research center advisories, campus-based institute and center advisories, state 4-H program advisory, and state Extension advisory. Each of these advisories provides strategic input to the associated program or departmental unit once or twice each year.

A comprehensive survey instrument is sent out each year through the family and consumer sciences program network. At the local level, agents target the various underserved audiences through this survey process to ensure input into critical issues and needs of these audiences as program focus is defined each year. This survey is instrumental in shaping the educational curriculum developed and implemented for the future.

Our five-year plan steering committee engaged in internal and external discussions with stakeholders to select new core mission themes, long-term intended outcomes, and strategies that will result in their implementation. We received comments via e-mail, a Website, and targeted stakeholder discussions. Plans are underway for changes to the input process as we implement the new 5 year revolving plan whereby we continuously adjust and add only the 5th year to the plan on an annual basis.

Subsets of participants in these endeavors were given the opportunity to comment on the effectiveness of individual and interdisciplinary outreach efforts. College leadership, unit leadership, and state extension leaders collectively used this feedback to reallocate resources and determine programming efforts so greater effectiveness and more comprehensive outcomes are attained.

Strategic planning process for 4-H youth development programs involved a series of facilitated meetings with a balance among youth and adult users/stakeholders and extension agents, University faculty, and administrators. The input provided through this facilitated process was distributed widely and is currently being used to set the direction for program enhancement, staff development, resource development, and program delivery in 4-H Youth Development.

While these techniques and processes for stakeholder input do not appear to have a single focus, we believe such processes by the various segments and audiences across our broad areas of work do in fact give us more focused and comprehensive feedback on the value of our work, its impacts, and where our future focus needs to be in a comprehensive way. Experience in conducting a statewide, comprehensive, single process has been frustrating in the huge volume of information that comes in across the work of the system and a lack of ownership or clarity to that body of information. Focused input with key stakeholder groups creates ownership, understanding, and effective implementation planning for the relevant, critical issues which coincide with the needs of the state and the mission of K-State Research and Extension.

C. PROGRAM REVIEW PROCESS

Most aspects of the program review process described in the current Five-Year Plan remain unchanged. In response to budget pressures and a mandate from the Kansas Board of Regents and KSU administration, we have undertaken a comprehensive effort to review and prioritize all K-State Research and Extension programs. The program prioritization process began in 2002 and concluded during 2003. The process was designed to ensure active participation by all levels of the organization, and stakeholder input is being solicited in public meetings. The goal has been to group research and extension programs in several

priority clusters so that lower priority programs will be the first to be eliminated as state budget cuts come to bear. We anticipate that this process will help us avoid the organization-wide shift towards mediocrity that would result from across-the-board cuts. Our strategic intention is to ensure continued delivery of the most essential programs during a difficult financial period, and to leave the organization poised to grow in new and important directions when better times return. As an initial step in this process, unit administrators were asked to prioritize vacant faculty positions with highest areas of research, teaching, and extension program needs. Through that process, 58 positions were identified across K-State Research and Extension.

D. EVALUATION OF SUCCESS OF MULTI AND JOINT ACTIVITIES

In 2006, K-State Research and Extension built in important new ways on its tradition of providing leadership for delivery of interdisciplinary, integrated research-extension and multistate programs. KSRE's senior leaders have functioned for years as an integrated team, meeting on a formal basis about twice a month, and informally on a daily basis. Dr. Fred A. Cholick holds three key job titles: Dean of the College of Agriculture, Director of the Kansas Agricultural Experiment Station, and Director of the Kansas Cooperative Extension Service. In addition to an Associate Dean and Associate Directors for academics, research, and extension, the senior leadership team includes a Special Assistant with responsibilities for stakeholder communications and a Senior Business Officer. Frequent meetings of this team ensure that decisions about personnel, programs, and budget are made in a way that takes the needs of all three administrative areas into account. Open communications across mission boundaries ensure a high level of awareness and appreciation for challenges, opportunities and achievements, regardless of whether they are mission-specific or cross-cutting. Meetings of the integrated senior leadership team are generally followed by meetings of a larger integrated team of department heads, center directors and unit leaders, which includes campus leaders as well as area extension directors and heads of regional research centers from across the state. Meetings of these teams were firmly established in 2006, with regard to timing, participation, and expected outcomes. Meetings often include opportunities for highlighting particular activities, opportunities, or priorities within particular departments or programs.

K-State Research and Extension provided leadership and support during 2006 for the development and implementation of a new University-wide "Center for Engagement and Community Development (CECD)." This initiative was sparked by K-State's new Provost, Dr. Duane Nellis, who was in turn inspired by core documents such as Boyer's famous 1990 study, "Scholarship Reconsidered," the Kellogg Commission's "Engaged Institution," NASULGC's "Extension System: Vision for the Future," and even the National Science Foundation's criterion on broader societal impact as a standard for evaluating proposals.

Provost Nellis included Dean and Director Cholick from the very beginning of his effort to create the CECD. Numerous KSRE faculty and administrators contributed to development of CECD as a place where university faculty and community leaders can come together to address community challenges, meet community needs, and realize community dreams through effective scholarship-based engagement. A KSRE faculty member serves as liaison to the CECD and takes an active role in its leadership. CECD has several advisory boards, including on-campus and off-campus faculty, as well as community leaders and other non-university stakeholders. KSRE faculty are well-represented on these advisory boards. KSRE has even helped fund some of CECD's activities and initiatives, which have included competition for seed grants to stimulate community development-related engagement projects. A key focus of CECD's efforts has been to elevate community engagement as a scholarly objective for all of the University's faculty and staff, not just faculty who serve on KAES or KCES appointments. K-State Research and Extension is proud to have been included in planning and implementing the CECD. Across the country, a number of

Land Grant Universities have launched similar-sounding programs aimed at promoting University-wide engagement. However, K-State's CECD may be unique, or nearly so, in the way that it builds on and synergizes with the long-standing efforts of the AES/CES research and extension organization

In 2006, KSRE joined other land grant universities across the North Central region and beyond by correcting a remarkable shortcoming in the multistate project portfolio. NC506, a new "rapid response" project, was formed as the first multistate effort to address issues related to the rapid emergence of ethanol production as a factor in shaping rural communities and economies at the local and national level. NC506 focuses on corn-based ethanol with a primary goal of understanding community impacts of the quickly-emerging "bio-economy." The need for such an effort was clear, based on steadily increasing energy costs for consumers, farmers, and all sectors of the economy, as well as the President's challenge to greatly increase the availability of non-petroleum based fuels. The number of grain-based ethanol plants is increasing dramatically in Kansas and all across the region. As states like Iowa and Nebraska shift from being corn exporters to corn importers, the price of grain is rising rapidly, with unpredictable effects at the local level. High grain prices may benefit corn producers but place new stresses on livestock feeders at the same time. The rapid commitment of large capital and human resources to ethanol plants that depend heavily on government policy simultaneously creates jobs, income, and risk in rural communities. NC506 will address these issues by creating a forum for exchange of ideas between a wide-ranging community of researchers and extension specialists. K-State is represented on the team by a rural sociologist and a cereal chemist. Thus, NC506 is becoming a mechanism for planning an integrated, cross-cutting multistate response to a major challenge of our time.

Teamwork is essential to meaningful progress in multi and joint activities, and it is highly valued in our system. Teams of all types are common across K-State Research and Extension. Many teams have been formed within administrative units, while others cut across disciplines and organizational boundaries. Some teams are informal, while others are more structured. All are aligned with one or more of the twelve long-term intended outcomes that address critical issues and provide the focus for our efforts. Teams provide an important means of organizing faculty and other resources in a way that help us address larger-scale objectives and enhance overall productivity. KSRE has emphasized 'centers without walls,' such as the Food Science Institute and the Kansas Center for Agricultural Resources and the Environment, which function to promote the development of multidisciplinary teams that conduct integrated research and extension programs. Under the leadership of KCARE, funding for environmental programs addressing water and air quality have more than tripled, and they involve faculty from all five colleges with faculty serving on AES appointments.

K-State Research & Extension recently pioneered a new model for multistate cooperation, joining with Oklahoma State University to create a joint program for improvement and utilization of winter canola as an alternative crop for the southern Great Plains. Canola has great promise as a rotational crop for winter wheat. It has frequently been argued that canola will pay for itself just by increasing the value of the wheat crops that are grown in rotation. However, the winter canola production system in the southern plains has inherently greater yield potential than traditional spring production systems in the northern plains, and the crop has great value in its own right as a source of health-promoting edible oils and feedstocks for biofuels. The two-state relationship between Kansas and Oklahoma was formalized by the negotiation and signing of a binding two-party agreement that spells out the objectives, activities, rights to intellectual property and commercialization, and measures for assessing progress and accountability. Both states are contributing financial resources to support a canola breeder who is working in both states. Researchers and extension specialists from each state participate in the planning and delivery of programs that straddle the state boundary. The result is to meet a need for investment in a new program at much lower cost to each state than would be the case if each state tried to run its own. The program is guided by a joint

administrative team that meets annually, as well as a cross-cutting advisory team that includes faculty, producers and representatives from the private sector. In 2006, the program released its first proprietary germplasm, and it is on track to release valuable new cultivars within the near future.

The K-State Research and Extension project portfolio includes more than 320 projects entered in the CRIS database. Most of these have more than one participating faculty researcher and many include extension specialists. All spending of Hatch appropriations is tracked and reported as investments in these projects, along with the requisite matching State funds. Extension funds are also invested in those projects that include extension faculty. The project portfolio includes a number of multistate projects, and the KSRE multistate research fund, amounting to more than 25% of the total Hatch appropriation, is invested in 67 different projects. Unlike some of our sister institutions, K-State makes directed investments in specific multistate projects on an annual basis. Individual investigators receive support for travel to multistate project meetings, as well as operating funds to help cover the expense of meeting specific objectives. The range of multistate projects is remarkable, including faculty in five different colleges, focused on the natural and social sciences. Multistate projects have succeeded in leveraging MRF support by obtaining additional funding from granting agencies or Congress. Committees are encouraged to form advisory committees that include diverse stakeholder representatives, and these committees provide clear feedback regarding progress towards meeting objectives. Contributions are also assessed by the Multistate Research Committee of the North Central Region, which provides approval for continuation or renewal as appropriate. Committees are also required to write impact statements that are accessible online and updated on annual basis.