

Kansas

Annual Report of Accomplishments and Results

FY2000

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Introduction

K-State Research and Extension is committed to collaborating with industry, government, and other institutions to preclude duplication of efforts and to ensure maximum benefits from research and educational efforts of interdisciplinary teams of scientists and educational experts. Ours is not to do the work of others but to add our considerable abilities to theirs, thereby enhancing the expertise and skills needed to solve the complex problems we face today and will face tomorrow in Kansas, across the nation, and around the world.

This Annual Report describes K-State Research and Extension program impacts and accomplishments for Fiscal Year 2000, as required by the Agricultural Research, Extension, and Education Reform Act of 1998. In this report, you can see the numerous projects K-State Research and Extension is involved in and how we are building working relationships with many other agencies, businesses, universities, and foundations to support and advance research, education, and international programs for the betterment of people everywhere and especially in Kansas. We believe that those who support K-State's Research and Extension land-grant mission are chief beneficiaries of its knowledge, programs, and improvements. Our achievements have been and will be keys to progress.

Examples of our cooperative efforts abound. Extension agents in Kansas counties and districts work together to plan and implement programs across county lines. All agents, researchers, extension specialists, and administrators participate in regional and national meetings of professional societies and joint research projects, staying connected with colleagues and learning about different research and outreach methods that effectively address issues. K-State Research and Extension faculty participate in some 44 multistate research projects, nearly 40 coordinating and information exchange committees, and 14 administrative committees focusing on setting goals and priorities.

Scientific peer and merit reviews are done to determine the quality and relevance of all projects funded by the state and the federal government. Project evaluations include overall appropriateness of each project to the five National goals/four K-State Research and Extension core mission themes and the 16 issues that have been identified as critical to the welfare of Kansas.

In fiscal year 2000, total funding in support of the programs described in the plan totals \$78,431,964 (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)

Intended outcomes in the **cropping systems** plan include such statements as adopting new cropping systems, adopting best management practices, conserving water resources through improved irrigation management, improving crop rotations and intensifying cropping systems, and reducing the losses to plant pests.

Some evidence of progress toward those outcomes might best be described in the work being done (outputs) that will lead to those longer-term outcomes. As farmers intensify dryland cropping systems to include more summer annual crops and less fallow, results are known to improve profitability, reduce soil erosion from wind and water, and improve water use efficiency. As a result of educational programs, including county, regional, and statewide meetings, field days, on-farm research, demonstrations, numerous publications, media releases, and Web sites devoted to cropping systems designs, the acres of no-tillage corn, soybeans, sunflowers, and grain sorghum have increased to nearly 20% according to data collected by the CTIC. Substantial one-on-one educational consultations have occurred with Kansas farmers to offer solutions to the problems, issues, and questions of farmers interested in making a switch from a wheat-fallow system to more intensive crop production. Cotton has been introduced into parts of Kansas as a new crop that fits well in rotation systems and offers improved profitability over existing crop choices. Research has made improvements on canola winter survival, so that it has become a more viable alternative crop in Kansas. A new Center for Sustainable Agriculture and Alternative Crops has been established in Kansas to create a greater focus on the research and dissemination of new knowledge. Examples of outputs that have likely supported these developments include such evidence as: 520 farmers and advisors directly contacted concerning economic viability of dryland cropping systems in Northwest Kansas; a Kansas/Oklahoma cotton field day was organized to present current research findings and show plot work for 60 farmers in South Central Kansas; management issues for crop rotation systems were discussed at 31 plot tours attended by over 1000 farmers, agri-business advisors, and the public in Northeast Kansas; and public meetings and one-on-one delivery of educational information on grain storage, energy costs, and no-till cropping systems reached over 900 clientele.

Kansas' number-one agricultural enterprise is **livestock production**, with beef cattle systems leading the way. The beef, dairy, and swine industries identify profitability, production efficiency, record keeping, employee management, and environmental concerns as key issues for research and extension. A first-ever multistate conference on employee management for animal agriculture was attended by 130 farmers and advisors from 13 states interested in improving their fundamental understanding of employee management. While longer-term outcomes cannot be identified, early evidence of the involvement of the attendees in discussions and planning indicates knowledge and understanding of important principles

were gained by the audience. Integrated dairy, swine, and beef teams have shown the value of educational programming directed at individual farm -level problems and issues to be an effective way to design and deliver research and extension education. Some examples include: beef stocker nutrition education that reaches 975 beef producers representing 750,000 stockers and 35,000 beef cows; “Cowboy Colleges” are popular educational vehicles in the feedlot industry with approximately 100 individuals in the feedlot business (representing 30 feedyards, and approximately 1.5 million head capacity) trained through the beef quality assurance curriculum; the Kansas bull test program involves 75 herds from 5 states providing yearling bulls to create research data on the genetics, improvements, and overall performance that result in continued improvements in the genetic soundness of beef cattle herds across the region; and cooperation between the Kansas Livestock Association and K-State results in over 400 farmers and ranchers touring a ranch and gaining knowledge on current issues such as animal health, estrous synchronization, lease hunting, grazing land management, fence laws, and replacement heifer development.

Researchers have advanced **development of new, appealing food products** for Kansas agriculture. Examples of the advances include working on 925 inquiries from mid -sized and small processing plants on ingredients, packaging, product development, analyses, and design. Meat processors have a K-State Web site for which they can find information on latest developments. Milk products and yogurt are being studied to improve shelf life and flavor.

With wheat being a major crop commodity in Kansas, research to **enhance value of agricultural goods** has focused on potential uses of wheat straw and other by-products of the wheat production and milling processes. Wheat straw has been incorporated into a biodegradable, edible packaging for potential use in delivering feed to livestock. The barrels of wheat straw have been tested in the lab scale version and are currently being studied for commercialization. Adhesives made from protein -based technologies also offer promise for value -added commercialization. These products offer a safer, more environmentally friendly product for consumers.

Agricultural risk management educational programming has taken the approach of developing risk management clubs at the county level that support local interests and needs around the broad topics of risk management. These risk management clubs began in 1998 and have continued through 2000. Common educational topics have included grain marketing, record keeping, costs of production, financial statements, lease arrangements, cooperatives and other vertical coordination strategies, machinery economics, land economics, environmental economics and policy, labor management, and personnel management. A Risk and Profit Conference held annually drew approximately 250 farmers and farm advisors. This conference focuses on contemporary issues facing Kansas agriculture, and delivers information and education from the research -base of KSU and surrounding Universities. This premier event is supported with an additional series of agricultural profitability conferences held for Kansas farmers, with over 300 attending. Agricultural economists report high levels of engagement with the Kansas farmers on critical issues facing the future of agriculture and profitability.

Agricultural technologies are advancing through our research and education on such topics as biotechnology, precision agriculture, and utilizing Web-based technology to improve diagnostic services for agriculture. The new K-State Biotechnology Web site was recognized for its comprehensive educational value to readers of all interest and ages. Our faculty have been instrumental in providing research-based options to ensure a longer life of the Bt technology for corn production in the United States. Precision agriculture research findings are brought to the agriculture community through a premier conference attended by 130 individuals from 5 states. Digital images are now loaded on the Web for plant disease, insect, or other pest diagnostics techniques, resulting in improved speed of diagnosis and recommendation and an invaluable archive of photos showing various unusual and rare plant problems found across the state.

e. Total expenditures by funding source and FTEs

FY2000	Projected: \$53,486,415; Actual: \$53,267,442	275.17 FTEs
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Key Theme – Adding Value to New and Old Agricultural Products

Finding Ways to Improve Wheat Straw By-Products

- a. Utilizing wheat straw can add value to wheat crops. The straw can be ground and molded to make products like structural panels, desktops, stereo components, doors, and more. K-State Research and Extension is looking at ways to make wheat straw products more attractive and add further value to this important Kansas crop. Because wheat straw has been utilized only with its natural color, it has been used mainly as underlay material. K-State textile researchers have been applying bleaches and dyes to the ground wheat straw fibers. This increases the possibilities for using the wheat straw in new ways as an overlay. K-State has facilities for making, bleaching, dyeing, and testing boards of wheat straw.
- b. The scientists have tested the internal bond strength of these boards, and it falls in between particle board and fiber board. Bleaching the wheat straw, it was found, creates an even stronger bond. Wheat straw products are expected to be more insect resistant than wood products, and the K-Staters have been investigating the resistance to insects and other harmful conditions.
- c. Source of Funding – Hatch
- d. Scope of Impact – State Specific

Milling Trial Gives Millers and Bakers Preview of White Wheat Characteristics

- c. To help Kansas producers capture part of the growing international market for hard white wheat, K-State grain scientists completed a milling trial on Betty and Heyne, two KSU white wheat varieties. The trial compared performances of Betty and Heyne with a control sample of hard red winter wheat. Flour characteristics such as thousand kernel weight, hardness index, moisture, and flour yield were recorded, as were such wheat characteristics as test weight, moisture, ash, and protein. The results give millers a preview of what white wheat can mean to their operations.
- d. About 500,000 bushels of white wheat should enter commercial channels in Kansas after the

2000 harvest, and over 10 million bushels are projected to be produced from the 2001 harvest.

- c. Source of Funding – State Matching
- d. Scope of Impact – Multistate Research

Extra Value Means Extra Income

- a. Advances in food processing and marketing come from adding value to existing commodities and products. Research is necessary to determine which value-added products or processes are economically possible in Kansas, and educational programs are essential to teach Kansans how to take advantage of value-added opportunities.

In the area of wheat, for example, there have been projects on pasta production from wheat, starch and gluten from wheat, uses of wheat in shellfish diets, nonfood and nonfeed uses of wheat, new food productions from wheat, utilizing wheat milling by-products, and use of wheat for oriental noodles.

- b. A number of projects also have focused on improving quality and marketability of agricultural products, including improving the grain marketing system, expanding export markets, evaluating food marketing, and processing sorghum for improved marketability.
- c. Source of Funding – Hatch and State Matching
- d. Scope of Impact – State Specific

Key Theme – Animal Production Efficiency

Reducing Production Losses in Dairy Cattle

- a. Ectoparasites such as stable flies and lice cause problems for dairy cows that result in lost income for Kansas producers. Total milk production on Kansas dairies in 1997 was 1,285,000,000 pounds valued at \$164,480,000.
- b. A K-State Research and Extension entomologist estimates that a 3% production loss from ectoparasites means 39,742,300 fewer pounds of milk worth \$5,087,000. If that loss can be reduced by just 5%, there would be a return from the program of \$254,350. Ectoparasitism also causes reduced metabolic efficiency in dairy cattle. A two percent increase in feed per cow for the 79,000 cows in Kansas comes to \$1,896,000. It is estimated that at least 5% of that loss in efficiency can be prevented, saving \$94,800. The estimated minimum total benefit of both programs would be \$349,150 annually.
- c. Source of Funding – Hatch, Smith-Lever, State Matching
- d. Scope of Impact – Multistate Integrated Research and Extension
 - With AL, AZ, CA, FL, GA, IL, IN, IA, MI, MN, MO, NE, NH, NM, OH, PA

Using Infrared Thermal Imaging to Help Manage Livestock in Feedlots

- a. Researchers in the Food Animal Health and Management Center at K-State are providing

evidence that infrared thermal energy units can help feedlots monitor the health and well-being of cattle. Used like a video camera, the unit measures the rates of radiant energy loss in cattle. If energy levels fall because of appetite suppression, the camera will show a cooler thermal profile.

- b. This is important economically because research has shown that sick animals have reduced average daily gains by 25% to 50%. The unit also can be used in quality assurance programs for feedlot owners. Conditions such as injection-site reactions, abscessed implants, and lameness that alters blood flow to an area are potentially detectable.
- c. Source of Funding – State Matching
- d. Scope of Impact – Multistate Integrated Research and Extension

Forage Information Now Available on the Internet

- a. K-State Research and Extension has developed a Web site on common forages used for livestock feed, a step that centralizes the state's best information and research on forage. The site was built around information that producers said they wanted most, including:
 - Developing efficient, coordinated livestock production systems.
 - Developing efficient, integrated crop production systems.
 - Ensuring quality and conservation of surface water and groundwater.
 - Developing systems for improved soil and air quality.

The site also includes the Kansas Forage Publications Database, Forage Facts Notebook, current research in Kansas, links to other sites, and a calendar of meetings and events. The Web address is <http://www.oznet.ksu.edu/forage>.

- b. **Producers can use information from the Web site to improve their efficiency and their economic competitiveness.**
- c. **Source of Funding – Hatch and State Matching**
- d. **Scope of Impact – Multistate Integrated Research and Extension**
 - With IA, MO, NE

Key Theme – Biotechnology

Using Biotechnology to Improve Kansas Crops

- a. Biotechnology is helping scientists improve many of the world's most popular foods. K-State Research and Extension scientists are especially interested in improving the state's major crops: wheat, corn, sorghum, soybeans, and alfalfa. They also are working on developing canola as an alternative crop in Kansas.

Working with the U.S. Department of Agriculture, K-State has developed and released an insect-resistant alfalfa germplasm with glandular hairs that has resulted in new alfalfa varieties and a leaf rust-resistant wheat germplasm that spawned the commercial variety, AgriPro Thunderbolt. The work in this important area of science is being done through the Plant Biotechnology Center that was established at K-State in 1997.

Many more disease-resistant crops and value-added uses for wheat and other crops are being developed. For example, researchers believe they can develop harvest-ready, colored cotton, which eliminates the need for environmentally damaging dyeing.

Over the next five to 10 years, agricultural researchers will develop richer grains that contain higher levels of amino acids, which will make them better feed for animals, and exotic starches in cereal crops, which will make them more adapted to certain baking practices.

The same biotechnology that produced Monsanto's Roundup Ready soybeans will spawn similar Roundup-resistant developments for wheat and corn. Work at K-State also will help the world's researchers eventually map the wheat genome. A K-State plant pathologist—one of 10 principal investigators in that project—coordinates the actual mapping of the wheat genome. The project is now 11 years old.

- b. K-State Research and Extension is advancing the frontier of knowledge in biotechnology and is positioning itself as a leader in agricultural biotechnology that will benefit Kansans and Kansas .
- c. Source of Funding – Hatch and State Matching
- d. Scope of Impact – Multistate Integrated Research and Extension

Great Plains Cereal Grains Biotechnology Consortium

- a. A newly created multistate initiative, the Great Plains Cereal Grains Biotechnology Consortium involves improving production and profits of producing wheat, corn, and sorghum by focusing on plant disease resistance and by utilizing an emerging array of important genetic tools for such work.

The consortium pools the strengths and resources of K-State, University of Nebraska, and Oklahoma State University. The consortium also partners with the private Noble Foundation of Ardmore, Oklahoma, and has formal links to the International Corn and Wheat Center in New Mexico and the International Rice Research Center in the Philippines. All of these institutions have strengths in plant pathology and disease-resistance research.

The first approach will be to investigate ways to enhance resistance to the plant diseases by incorporating some novel resistance genes from barley and other cereals that are specific against certain compounds produced by fungi that infect the cereal grains and cause disease. The group also is exploring ways to move resistance genes from corn into wheat through genetic engineering to explore the possibility of using resistance genes from one species in another.

- b. The formation of the consortium played an instrumental role in helping K-State receive funding to purchase a DNA sequencer, a tool to help researchers manipulate the traits of crop plants. The sequencer will allow those researchers to make more rapid progress in improving cereals, which in turn will mean better varieties in the fields of Kansas farmers.
- c. Source of Funding – Hatch and State Matching

- d. Scope of Impact – Multistate Integrated Research and Extension
 • With NE, OK, NM, International

A New Biotechnology Web Site

- b. K-State Research and Extension scientists want to make sure the public can access factual information on biotechnology, so they developed a Web site that can be found at <http://www.oznet.ksu.edu/biotech/>.
- c. The Web site is a way to keep people aware of issues surrounding biotechnology. Users of the site will find answers to commonly asked questions about biotechnology, a glossary of terms, information about biotechnology research at K-State, and links to other biotechnology-related information. An up-to-date listing of news releases about biotech-related issues can also be accessed, including the recall of Starlink corn products and Iowa State University's most recent research on Bt corn and monarch butterflies. A glossary of biotech terms and the KSU Ag Biotech Newsletter also are accessible via the Web site.
- d. Source of Funding – State Matching
- e. Scope of Impact – State Specific

Key Theme – Plant Production Efficiency

Distance Diagnosis

- a. If the local K-State Research and Extension staff members can't identify a plant problem and find a solution, they can quickly tap into a secure site on the World Wide Web to consult with experts. They can send along their own analyses and digital color photos taken on the spot, enabling Kansans to get help on problems ranging from sick ferns at home to insect-infested corn in the field. This kind of distance diagnosis is possible because K-State Research and Extension is linked electronically with all Kansas counties and research and extension centers statewide.
- b. K-State is one of the first universities in the nation to offer such a service. The diagnostic labs on the K-State campus in entomology, horticulture, plant pathology, and the herbarium are providing the expertise for the program. They also are linked with experts across the nation and globe for their opinions on problems particularly puzzling. When a quick response is needed, the distance diagnosis system can provide it quicker than ever, which often can mean the difference between saving a plant or a crop or losing it.
- c. Source of Funding – State Matching
- d. Scope of Impact – State Specific

Crop Production in Southeast Kansas

- a. In southeastern Kansas, nearly 1,650,000 acres are devoted to crop production. For the 15 county area, soybean occupy 49% of the total acreage, wheat 27%, grain sorghum 15%, and corn 8%. Because of the diversity of crops grown, this research seeks to investigate long-term effects of crop rotation, tillage, soil fertility, and herbicide use on crop production for the shallow,

claypan soils of this region.

- b. Results indicate that soybean and grain sorghum yields can be increased 10 to 15% with crop rotation. In addition, the use of conservation tillage practices (such as planting double-cropped soybean no-till into wheat stubble and planting wheat no-till into existing soybean, corn, or grain sorghum residues) can have a significant impact on soil quality as well as reducing soil erosion while maintaining grain yields comparable with a conventional tillage system.
- c. Source of Funding – Hatch and State Matching
- d. Scope of Impact – Multistate Integrated Research and Extension
 - With OK, MO, AR

Key Theme – Risk Management

Profiting while Protecting the Environment

- a. The statewide Crop Management and Marketing program of K-State Research and Extension helps Kansas agricultural producers learn to manage their risks better. Several core areas form this program: (1) economics of precision agriculture, (2) machinery economics, (3) land economics, (4) environmental economics and policy, and (5) risk management. The goal is to keep Kansas farms strong and profitable.
- b. In the long run, the environmental focus of this program will help producers and policy makers better understand the tradeoffs between profitability and environmental soundness. Through the educational process, the negative environmental impacts of farm-level decisions often can be diminished without substantially reducing farm profitability. Reduction of negative environmental impacts, enhanced producer profitability, and increased ability to deal with economic risk will lead to retaining as much social capital (viable farm families) as possible in the rural areas of Kansas.
- c. Source of Funding – State Matching
- d. Scope of Impact – Multistate Integrated Research and Extension
 - With TX, OK

Helping Producers Make Informed Decisions About Crop Insurance

- a. K-State Research and Extension provides unbiased, research-based information so Kansans can make important decisions affecting their lives and businesses. Crop insurance decisions can be complicated, but the K-State Department of Agricultural Economics makes them easier by providing up-to-date facts on crop insurance. A K-State Research and Extension ag economist has worked with the private sector to develop the first crop insurance contract that combines bushel replacement coverage with revenue insurance.
- b. This new tool allows growers to price bushels preharvest and maintain a hedge position even if their crops fail. This new kind of insurance has been a hit with growers, and the availability of this option is changing the entire crop insurance industry.
- c. Source of Funding – State Matching
- d. Scope of Impact – State Specific

Assisting Decatur County Producers to Manage Their Risks

- a. The federal government has been phasing out agricultural support programs, which means that acquiring knowledge about various risk-management strategies is becoming essential for successful farming. K-State Research and Extension provides that knowledge and disseminates it freely throughout Kansas. An example is the K-State program in Decatur County. The basis of Decatur County's economy is ag production, which totaled \$65.4 million in 1998. The average income for Decatur County is about \$24,763 with an average farm income of \$35,000. Producers and the economy of the county depend on agriculture. Many producers look to K-State Research and Extension for research-based information from various communications and

- presentations.
- b. Decatur County's K-State Research and Extension Office activities have included developing a Risk Management Club; participating in a risk seminar; coordinating a farm management enterprise analysis meeting; providing white wheat and other wheat variety information to producers; producing six ag newsletters with timely articles featuring agronomic, livestock, value-added, and horticultural information; and planting and harvesting an annual wheat plot and publishing the results.
 - c. Source of Funding – Smith-Lever
 - d. Scope of Impact – State Specific

Key Theme – Managing Change in Agriculture

Employee Management for Animal Agriculture

- a. The typical farmer in Kansas is changing. Average farm size continues to increase. Many of the farmers of the past are finding themselves transformed into feedlot managers, dairy managers, swine managers, and larger crop farm managers. With this change comes a whole new area of expertise in managing that first non-family employee. When polled on issues facing individuals in managerial roles within those agricultural enterprises, the clear lead issue was always some aspect of employee management. Within employee management the issues run all the way from learning how to communicate with someone of a different culture, to dealing with conflict, to being certain the appropriate personnel files are kept.
- b. A first-ever multistate conference on employee management for animal agriculture was attended by 130 farmers and advisors from 13 states interested in improving their fundamental understanding of employee management. Additionally, this topic has had great popularity for risk management clubs and other local programs across the state. While longer-term outcomes cannot be identified, early evidence of the involvement of the attendees in discussions and planning would indicate knowledge and understanding of important principles were gained by the audience.
- c. Source of funding – State Matching
- d. Source of Impact – State Specific

Key Theme – Plant Genomics

Plant Transformation and Biotechnology

- a. The overall goal of this research pertains to the improvement of plants through the use of biotechnology. The program is primarily focused on plant tissue culture and genetic transformation and molecular biology of wheat, soybean, and corn.

For genetic transformation in wheat, the primary pathogen group to be targeted for control is

rusts. Rusts are one of the most economically damaging pathogens of cereals worldwide. Crop loss due to wheat leaf rust in Kansas has been as high as 11.3% in epidemic years. A second approach is to use transgenic defense proteins for disease and insect management.

Our primary goal in soybean biotechnology will be to combat charcoal rot and soybean cyst nematodes. Charcoal rot, caused by a soil fungus (*Macrophomina phaseolina*), is the major fungal disease of soybean in the state of Kansas. In 2000, yield loss due to charcoal rot was estimated to be around 12%.

In corn, rootworms are the most serious insect pest in the Midwest. It is estimated that U.S. yield loss resulting from rootworm damage and pesticide applications to control rootworms exceeds one billion dollars annually. Our approach to control rootworms is by producing transgenic corn plants expressing high levels of insect chitinase to inhibit the normal development of rootworms.

- b. The research summarized above will increase fungal disease resistance, result in yield stabilization in pathogen infected areas, and facilitate breeding programs by introducing new traits to elite cultivar lines. Additionally our laboratory provides transformation services to several independent laboratories on campus.
- c. Source of Funding – Hatch and State Matching
- d. Scope of Impact – Multistate Integrated Research and Extension

Key Theme – Rangeland Management

Rangeland Management

- a. The main charge of this research program is to provide information on the conversion of rangeland and seeded forage resources to final animal product. Research in the program focuses on complementary forages and complementary forage grazing systems in conjunction with the utilization of native rangeland. Of major interest for this program is the identification of perennial cool-season grasses and winter small grain cereal cultivars that provide fast, abundant vegetative growth for grazing purposes from September through April, when native warm-season forages are typically dormant. Other topics of interest to this research involve introduced rangeland weed species.
- b. The effects of this research program on the public has potential to be very important. Kansas has approximately 1.5 million mature cows and first calf heifers annually. Nearly one-tenth, or 150,000 of these breeding animals, occupy the nine county area surrounding the Agricultural Research Center-Hays. At current prices for fair quality alfalfa hay or good quality forage sorghum hay (approximately \$50-\$55/ton), producers could feed \$2.9-\$3.1 million of forage in one month to the mature cow population in this nine county area. Statewide, \$30 million could be spent in one month's time. Complementary grazing systems that utilize perennial cool-season grasses or winter small grain cereals for forage for one month have the potential to save producers statewide millions of dollars on stored feed. Implementation of a usable complementary system could have a direct and multimillion dollar impact on the clientele within

the local economy. Nearby states such as eastern Colorado, eastern Wyoming, Nebraska, and the Dakotas, where precipitation characteristics are similar, may find that complementary systems in Kansas are compatible to their region. Systems which are able to utilize more than one month of grazing on complementary forage rather than utilizing stored feed have even greater economic saving potential.

Another impact of implementing complementary grazing systems is that animal numbers are likely to be increased. More early spring and late fall grazing pressure will fall on complementary forages, which in many cases have a greater carrying capacity than rangeland of equal area. Nearly two-thirds of Kansas farms are mid- to small-sized farms and ranches of fewer than 500 acres that have tracts of both rangeland and cropland lying adjacent to each other, which is ideal for complementary grazing. About three-fourths of Kansas farms produce fewer than \$50,000 of commodities annually. An increase in volume of cattle sales may be beneficial for many of these small producers that struggle because of low profit margins. Complementary systems could be one tool to try to help save small farms and rural communities from extinction.

Most research in this program concerned with invasive introduced weed species on native range will involve cultural practices for weed control. The use of herbicides is economically expensive on a land area basis, especially on native range where profit margins are relatively small. Cultural practices for control are much less expensive and more environmentally friendly.

- c. Source of Funding – Hatch and State Matching
- d. Scope of Impact – Multistate Integrated Research and Extension
 - With NE, OK

Key Theme – Precision Agriculture

Precision Ag Technologies

- a. The Precision Ag Technologies team at Kansas State University is comprised of faculty members from four different departments with responsibilities in research, teaching, and extension. The research component of this team is based on field evaluations as well as the development of techniques to analyze and evaluate the resulting data. The Precision Ag Technologies team continues to be one of the leaders in economic evaluation of site specific management. Extension activities conducted by the Precision Ag Technologies team focus on allowing interested individuals to see how the technology works and is being used and on getting groups of interested individuals together so that they can develop personal networks to facilitate future learning. These goals are typically reached through workshops, Web site activities (www.oznet.ksu.edu/precisionag), field days, conferences, and winter meetings.
- b. Yield monitor data offer the potential to improve management decisions through increased knowledge of production variability within a field and to determine spatial crop production. Three

to six years of yield monitor data were analyzed for four sprinkler -irrigated cornfields in central and western Kansas. Yield monitor data were block -averaged to 180 ft square cells and normalized based on the mean yield. These data were used to develop spatial yield goals for subsequent years. A transitional yield goal which used yield monitor data from the previous year combined with a uniform yield goal improved prediction when compared to uniform yield goals for a given field and year. The transitional yield goal approach was also more effective at predicting actual yield than a yield goal developed with only yield monitor data.

- c. Source of Funding – State Matching
- d. Scope of Impact – Multistate Integrated Research and Extension
 - With MO

A Cooperative Venture in Precision Agriculture

- a. Locating the literature of Precision Agriculture is problematic, due to the great diversity in technologies, procedures, crops, natural resources, measured factors, and disciplines involved. While the goals of Precision Agriculture are well articulated (i.e., the assessment and management of variability for agricultural profitability and sustainability), the corresponding published knowledge about this subject has not been as easy to encompass or organize.
- b. These issues are being addressed by a joint initiative made by the China Agricultural University East Campus Library and Kansas State University Libraries at the outset of a two-year cooperative project, begun in 2000. The project is combining resources available in China with those found in the United States in a distributed bibliographic database which will cite, link, or publish original research in Precision Agriculture over two internet servers.
- c. Source of Funding – State Matching
- d. Scope of Impact – International

Key Theme – Agricultural Profitability

Policy, Profitability, and Production Decisions for Kansas Crop Producers

- a. Crop production systems across Kansas have been undergoing significant changes in recent years as a result of agronomic, economic, and policy influences. This integrated program combined basic research activities on Kansas crop production trends and systems together with educational efforts aimed at providing farm audiences valuable information and analysis to make crop production decisions.
- b. Information on crop production systems in Kansas was delivered through several channels, including presentations, publications, and media contact. Seven presentations reached more than 300 individuals directly with information on crop production economics and comparisons of profitability between different crops and crop rotations. A spreadsheet analysis demonstrated during the presentations indicated as much as a \$10 per acre advantage for changing cropping

systems away from traditional systems.

This research and extension activity also led to a press release and media interviews, culminating in at least seven popular press articles and two radio segments. Through these channels, including the two major agricultural newspapers in Kansas and the leading Kansas agricultural magazine, additional Kansas producers were reached with valuable information on crop production economics.

Related to this work was the revision and release of 12 crop production budgets for North Central and Northeast Kansas. Many producers and agricultural professionals use these budgets as planning standards and guidelines in making crop production decisions for the coming year.

- c. Source of Funding – Smith-Lever, State Matching
- d. Scope of Impact – State Specific

Soil Fertility and Water Management

- a. Research focuses on soil and crop production technologies for dryland and irrigated agriculture in western Kansas with emphasis on soil fertility and dryland cropping systems. The objectives are to: (1) Develop management practices to optimize utilization of inorganic and organic nutrient sources for crop production without adversely affecting the environment and (2) Determine the feasibility of alternative dryland cropping systems with regard to profitability, grain production, and soil and water quality.
- b. The use of fallow (objective 2) is a common practice in semiarid regions to store water for subsequent crops. However, the efficiency of precipitation storage during fallow is often only about 25% in conventional wheat-fallow systems.

Reduced and no-tillage systems increase fallow efficiency (and reduce erosion), but with the long fallow period in wheat-fallow, storage efficiency is still only about 40%. Another means of increasing efficiency is to reduce the length of the fallow period (increase cropping intensity) by including a summer crop in the rotation. Wheat-summer crop-fallow systems (using reduced or no-till practices) have been shown to increase profitability. Net returns (10-yr average) for sorghum in a wheat-sorghum-fallow rotation were \$30/acre greater with no-till than conventional tillage. Further intensification of the system by adding a second wheat or sorghum crop (3 crops in 4 years) is appealing, but average returns for the past 4-years show no increase in profitability compared to the 3-year rotation. Producers in western Kansas are changing their cropping practices as indicated by the increase in dryland corn and grain sorghum acreage. For example, the number of acres of dryland corn increased from 108,000 acres in 1995 to 481,000 acres in 1999 while sorghum increased from 557,000 acres in 1995 to 999,000 acres in 1999 (total of three western Kansas crop reporting districts as published by Kansas Agricultural Statistics).

Another advantage of producing corn and sorghum is that they can be utilized locally as a feedgrain in the animal feeding industry while wheat must be exported from the region. This improves the sustainability of the producers, local communities, and the region.

- c. Source of Funding – Hatch and State Matching
- d. Scope of Impact – Multistate Integrated Research and Extension
 - With North Central Region

Key Theme – Plant Production Efficiency

Biological Control of Weeds and Arthropod Pests

- a. Current research projects on biological pest control are in two broad areas: weeds (musk thistle and field bindweed) and arthropods (spider mites and thrips on ivy geraniums). The long-term goals of the weed project are to: (1) evaluate the level of musk thistle biological control that is already occurring as a means of understanding what the future needs are for managing this weed; and (2) establish new natural enemies (for field bindweed) and determine their impact.
- b. The weed biological control research has potential economic and environmental impacts. For example, we now have a gall mite permanently established on field bindweed. Although it is too soon to assess the long-term impact that this natural enemy may have on field bindweed, distribution of this mite throughout Kansas should accelerate infestation. If we can demonstrate reduced weed populations, this would save growers money and potentially lower herbicides in the environment.

For the ivy geranium program, the predicted impact of our interdisciplinary research is threefold. First, by studying how horticultural practices affect the plant, its key pests (spider mites and thrips), and their natural enemies (predatory mites), we expect to be able to develop a program for greenhouse growers that maximizes efficiency because we can select procedures that have the greatest net benefit with respect to crop production and protection. Second, understanding how production and protection practices affect pests and predators will allow us to optimize the use of biological control in a realistic, practical, manner. By providing commercial growers with an alternative, we hope to reduce the use of pesticides, thus providing an environmental benefit. Third, by testing and developing our crop production/protection methods in consultation with two agricultural economists, we will ensure that any changes in greenhouse crop operations can be validated in economic terms. The social acceptance of pest management alternatives also will be addressed by surveys that will be developed and administered to a focus group of actual commercial growers in Kansas.

- c. Source of Funding – NRI and State Matching
- d. Scope of Impact – Multistate Integrated Research and Extension
 - With AZ, CA, GU, HI, ID, MT, NM, NY, OR, UT, WA, WY, USDA/ARS, USDA/APHIS, USDA/RS, USDA/DFA

GOAL 2 – A SAFE AND SECURE FOOD AND FIBER SYSTEM

Overview

The goal of food safety programs is to prevent foodborne illnesses. Between 6.5 million and 81 million cases of foodborne illnesses, including 9,000 deaths, occur each year in the United States. The level of illness reported in Kansas is low, but the reporting system is not an active one, and it is a well-known fact that foodborne illnesses are greatly underreported. Experts believe the risk of foodborne illness is increasing due to multiple factors. In Kansas in 1996, 7.1 million head of cattle were slaughtered and processed, and 5.1 million cattle were finished (23% of the U.S. total). Kansas had 1.5 million beef cows for reproduction, and 4.4 million calves and feeder cattle were imported into the state. Kansas, in 1996, ranked second nationally with 255 million bushels of wheat production. Kansas ranked first in wheat flour milling capacity and flour milled, with over 36 million hundred weights milled. Kansas also is a major producer of grain sorghum, corn, and soybeans, with over 750 million bushels of collective production among those grain crops. Fresh vegetable and fruit production through local markets is expanding in Kansas. In addition, Kansas has some 20,000 licensed foodservice operations and about 500 meat and non-meat food-processing facilities.

- a. The year 2000 was the third year of a major statewide coordination effort for ServSafe in Kansas. Nearly 500 persons participated in the two-day training workshops. Because of the importance of food safety issues and the need to reach a rapidly increasing Latino population in southwest Kansas, a program was developed to deliver safe-food-handling, mass-media messages to Latino consumers in the Garden City, Kansas, area during the end of 1999 to January 2000 using radio, television, posters, and news articles in Spanish. Extension agents can use materials developed in Food Safety Consumer Education and Mass Media for Latino Audiences, program for statewide teaching of safe food handling to targeted Latinos in their counties, especially through the FNP program. A Food*A*Syst program is being developed to assess food safety practices on the farm and in the home with regard to water, wastewater, solid waste, beef production, poultry production, fruit/vegetable production, packaging/transporting, open-air markets, food purchasing, and home food preparation. The Master Food Volunteer program is being developed to provide base knowledge to volunteers in the areas of food safety, food science, food preparation, and food preservation. A set of publications provides information on minimizing microbial hazards on fruits and vegetables at Farmers' Markets. An awareness program on new food irradiation and food biotechnologies was developed, and agents and FCE members were trained. A set of train-the-trainer HACCP educational materials is being developed for use in child nutrition programs. HACCP and food safety training has been provided to individual food processors experiencing problems. A Beef Quality Assurance program was presented to producers and 100 feedlot managers and employees. Research has been directed to the improvement of the microbiological safety of meat and poultry products, especially on development of slaughter interventions and interventions that may be applied on -

- farm and during fabrication of sub-primals, irradiation and chemical treatments, and post-process pasteurization. A Web site that includes HACCP information was developed, and nearly 140 products from small- and medium-sized food companies were analyzed for safety and compliance with low-acid canned food regulations. KSU's research on slaughter interventions has been widely implemented by the meat industry.
- b. Many who have participated in ServSafe have commented that they will change certain practices as a result. As a result of the Latino mass media food safety program, there was an improvement in knowledge about doneness of burgers and the importance of cleaning after raw meat is in contact with surfaces. Attitudes about the importance food safety also improved. Participants in focus groups provided feedback on the Food*A*Syst program that was used to modify materials for the program. One of the most important food safety issues—the problem of *Listeria monocytogenes* in cooked, ready-to-eat processed meat product also is being addressed. KSU research is being conducted to evaluate post-process pasteurization of these products using steam and/or chemical anti-microbial treatments combined with aseptic handling and packaging systems. The percentage of Kansas meat processing plants that used university or extension tools as information sources increased from 38.9% to 64.6% from 1997 to 2000, while those that used other information sources only increased from 2.8% to 8.9% during the same period. KSU's research on slaughter interventions has been widely implemented by the meat industry. As a result, carcasses are visually and microbiologically cleaner than at any time in our history. The extension of anti-microbial treatments to include pre-harvest and post-slaughter applications will further reduce the risks of microbial hazards in meat and poultry products.
- c. ServSafe trained people are sought after in food service for managerial positions. A Shawnee County HeadStart parent landed a \$30,000 management job—at least in part due to her completion of ServSafe training and certification. Agents who plan and conduct ServSafe workshops gain visibility in their communities for knowledge and expertise in food safety among the foodservice commercial and noncommercial sectors, thus expanding their traditional audience. Food safety and HACCP assistance programs are enabling meat and food processors to comply with regulations and improve their products. Based on the types of assistance provided to plants, the USDA announced the successful implementation of HACCP in all federal- and state-inspected very small plants. The direct impact of the Biosecurity program is an increase in the value of Kansas products. By incorporating biosecurity principles, the indirect impact may be to decrease the potential foodborne pathogens that leave the farm.
- d. It is believed that substantial progress has been made in Kansas toward the reduction of foodborne illness, improved food production and management practices, and compliance with HACCP guidelines. The faculty of K-State Research and Extension have contributed greatly to this progress. They are recognized both in the state and nationally for their contributions.
- e. Total expenditures by funding source and FTEs
- | | | | |
|--------|-------------------------|---------------------|-----------|
| FY2000 | Projected: \$2,356,422; | Actual: \$2,346,775 | 19.7 FTEs |
|--------|-------------------------|---------------------|-----------|

Key Theme – Food Safety

Farmers' Markets and Food Safety

- a. The purpose of Farmers' Markets and Food Safety is to develop and distribute educational materials for food safety programming for small fruit and vegetable growers.
- b. A set of publications based on the FDA's Guidelines for minimizing microbial hazards on fruits and vegetables has been completed and available for distribution. They provide growers with "reader-friendly" information for them to minimize food safety risks for their operations and support the Food A*Syst program. new farmers' markets were included in the 2000 directory and information on food safety, publicity, and resources has been added to the farmers' market Website.
- c. Source of Funding – State Matching
- d. Scope of Impact – State Specific

Serving Safe Food

- a. Serving Safe Food incorporates the Manager Certification Course, SERVSAFE, and is conducted as a 2 day workshop targeting commercial and noncommercial foodservice managers across the state. In 2000, 16 locations planned and conducted 22 workshops.
- b. Nearly 500 participants attended the workshops representing a variety of foodservices including restaurants, schools, hospitals, "quick-typw shops with gas stations, private catering, and others.

The program benefits participants directly by providing certification in food safety and sanitation. It provides the knowledge base in food safety required by the 1999 KS Food Code so many are motivated to participate because of the new regulations. Some gain employment as a result of participation. SERVSAFE - trained people are sought after in food service of managerial positions.

- c. Source of Funding – State Matching and Smith-Lever
- d. Scope of Impact – State Specific

Key Theme – HACCP

Hazard Analysis and Critical Control Points (HACCP)

- a. K-State's growing reputation in the food safety area comes from its efforts in Hazard Analysis and Critical Control Points (HACCP), a food safety system that can be applied across the food system.
- b. In research, successful work has been done in such areas as steam pasteurization of slaughterhouse carcasses, processed meat validation studies, detecting the prevalence of the pathogen *E. coli* in beef cattle herds from farm to feedlot, creating new safety standards for

ground beef, and microbiological and chemical testing for early detection of microorganisms. In extension, efforts have involved food safety training, providing a toll free telephone number, putting food safety advice on the World Wide Web, and providing information on shelf -life studies of food products.

- c. Source of Funding – State Matching
- d. Scope of Impact – Multistate Integrated Research and Extension
 - With NE

Key Theme – Foodborne Pathogen Protection

Tracking Down a Pathogen

- a. The foodborne pathogen *Escherchia coli* O157:H7 originates in cattle. A long -term study by K-State veterinary scientists has been determining the prevalence of the organism in Kansas cow -calf herds, where it occurs, and what factors affect it.
- b. A high-tech genetic test is helping the researchers to detect *E. coli* in cattle and environmental samples. The goal of this comprehensive study is to build a management plan for farmers and ranchers that is economically sound, protects their health and public health, and produces a safer product.
- c. Source of Funding – State Matching
- d. Scope of Impact – Multistate Integrated Research and Extension
 - With NE, MO, SD

Steam Process Brings Food Safety Closer to Consumer

- a. Scientists with K-State Research and Extension are testing a new, steam-based pasteurization system that moves food safety another step closer to the American consumer. They're pasteurizing the surface of hot dogs, ham, pepperoni, and other ready -to-eat meats after final packaging. The product is not handled again by human hands until it reaches the consumer's kitchen or a retail outlet. The scientists are interested in finding a system to decontaminate ready -to-eat meats because some emerging technologies such as irradiation are not approved by the USDA or FDA for these products. Some ready-to-eat meats have been contaminated during post-cooking processes with *Listeria monocytogenes*, which can be an equal threat to consumers as the more publicized *E. coli* O157:H7.
- b. The scientists are finding that pasteurization kills any disease -causing bacteria present on wrapped food surfaces.
- c. Source of Funding – State Matching
- d. Scope of Impact – Integrated Research and Extension

K-State Gets State-of-the-Art Meat Safety Testing Equipment

- a. An Ohio company, STERIS Corporation, has constructed a K-State “clean room,” where slicing and packaging is done under highly controlled, aseptic conditions similar to surgical rooms. Clean rooms are being built at meat processing facilities to ensure that sliced products do not become contaminated with *Listeria monocytogenes*. What makes a clean room is the controlled access. Rules for going in or out are very strict to prevent bringing in organisms or bacteria on clothes or by other means.

Stork RMS-Protecon Inc. of Gainesville, Ga., has provided K-State Research and Extension with a steam pasteurization unit that can pasteurize already -packaged meats. The post-process pasteurization test model is the only one in the United States. It allows food scientists to test time and temperature combinations to determine best conditions for decontaminating ready-to-eat meats.

- b. The impact of using post-process pasteurization could be large. Millions of pounds of ready-to-eat meats are processed every year.
- c. Source of Funding – State Matching
- d. Scope of Impact – Integrated Research and Extension

Key Theme – Food Security

Biosecurity

- a. Health of animals and the public health is an area that must be at the forefront of our total commitment to quality. The biosecurity program is guided by three principles to: (1) prevent of the introduction of infected animals; (2) raise the overall level of resistance and specific resistance to infectious disease; and (3) minimize herd exposure to infectious disease. We are currently gathering information on the prevalence of bovine leukosis virus, Johne’s disease, and bovine virus diarrhea to determine appropriate management procedures.
- b. Impact of Biosecurity program is directly economic by increasing the value of Kansas products. By incorporating biosecurity principles, the indirect impact may be to decrease the potential foodborne pathogens that leave the farm.
- c. Source of Funding – Hatch and State Matching
- d. Scope of Impact – Multistate Integrated Research and Extension

GOAL 3 – A HEALTHY, WELL-NOURISHED POPULATION

Overview

Kansans are concerned about their personal health and safety as well as that of their families and communities. Statewide surveys, forums, and other data have revealed that citizens have a keen interest in programs delivered by local and state organizations. Public health planning documents, such as Healthy Kansans 2000, 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 – 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 of 10 women and 1 in 3 men by age 75. Tobacco use increases risk for many diseases, including lung cancer and emphysema. Currently, 22% of Kansans smoke, and more youths are using tobacco products. Alcohol and drug abuse are common, especially inappropriate use of medications and over-the-counter drugs by the elderly and binge drinking by youths and young adults. Fourteen percent of adult Kansans engage in binge and heavy drinking. Exposure to environmental hazards (e.g., lead, radon) in their homes can also be a cause of illness and death for Kansans. Other environmental hazards can result in health problems for people with asthma and allergies or in death from carbon monoxide. 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.

- a. The Office of Community Health offers distance learning, networks, help with training, evaluation systems, process surveys, and basic and applied research expertise and support to help communities change unhealthy environments into places that allow children, youths, and adults to make healthy choices when given the option. In 2000, the Family Nutrition Program (FNP) provided nutrition education to more than 114,000 food-stamp eligible citizens in 73 counties and included education to improve skills in food resource management, obtaining safe and nutritious foods, and balancing physical activity with food eaten. 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, that uses social marketing techniques to mobilize Kansans with limited incomes to use available nutrition education and food resources to improve their health. The Expanded Food and Nutrition Education Program (EFNEP) is available in four counties for youths and homemakers with limited resources. EFNEP reached 1,570 Kansas families and nearly 18,000 youths in 2000. Healthy Eating for Life (HELP) promotes healthy eating and well-being among senior citizens in more than 40 Kansas counties. The Creating a Home for a Lifetime program is used with older audiences (or with people who are concerned about older family members) to improve home accessibility. Take It Outside, an indoor air quality program, reached 2,131 FCE members in 2000, who then provided information to over 50,000 Kansans. An intergenerational health education program, Personal Actions to Health, is being conducted in 12 Kansas

- communities, with mini-grants available to support activities for youths and seniors to do activities together that range from building birdhouses to making homemade ice cream to tutoring about computers. Health-related research programs are examining the influence of different dyes on the UV protection value of cotton fabric; developing a protein compound that may alleviate the complications of cystic fibrosis; determining the effect of dietary polyphenols in green tea on the absorption of fats and fat-soluble vitamins after menopause; examining the effect of zinc deficiency on the absorption of vitamins A and E; identifying the food-related concerns of people with macular degeneration; and examining the connection between cigarette smoke, vitamin A, and emphysema.
- b. The FNP program resulted in significant intention to change behavior, including 52% intending to move closer to the recommended number of servings of the Food Guide Pyramid; 63% intending to move closer to the Dietary Guidelines recommending that Americans include a greater variety of foods in their diets; and 30% intending to increase their level of physical activity. The initial social marketing campaign of KNN increased from none to 71 the number of shares of Heartland SHARE (a cooperative food-purchasing program that emphasizes fresh fruits and vegetables) that were purchased by Latinos in Wichita. More than 90% of the EFNEP participants showed improvements in dietary intake after completing the series of EFNEP lessons. Approximately 45% of elderly HELP graduates increased, or intended to increase, their servings of fruits and vegetables. Participants in the Creating a Home for a Lifetime program intended to use the information in their homes and will recommend the program to people they know. Research programs have shown that red, green, blue, and brown dyes provide better UV protection than black or white and light-colored clothes; using computer models, peptide synthesis and laboratory tests, researchers are finding that a specific peptide can restore lost function caused by defective cystic fibrosis cells; research has shown that green tea profoundly lowers the absorption of fat and cholesterol, without compromising the body status of fat-soluble vitamins A and E; zinc deficiency has been shown to markedly reduce the absorption of vitamins A and E; and a connection was found between low vitamin A levels in smokers and the development of emphysema.
- c. Dietary behavior improvements that resulted from the nutrition education programs could affect the risk for a variety of chronic diseases over the next decades. The PATH program has been successful in dispelling common prejudices between youths and seniors. As a result of the Take it Outside Program, one FCE group was successful in changing city council laws to prohibit smoking within the Community Building and outside on sidewalks surrounding the building. The results of the research projects will likely lead to improved health of the targeted populations.
- d. K-State Research and Extension programs are contributing to improvements in health and nutrition behaviors, especially with low income individuals who are at particular risk. Whether these behaviors lead to improvement in health status remains to be seen. The faculty are seen as experts in the state and are looked to for guidance in helping citizens of Kansas and beyond become more healthy and live in safer environments.

e. Total expenditures by funding source and FTEs

FY2000	Projected: \$3,776,582;	Actual: \$3,761,120	43.2 FTEs
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Key Theme – Human Health**New Approaches to Community Health**

- a. Changes in K-State Research and Extension’s Office of Community Health will impact the health of all Kansans. The most dramatic changes included an increase of new personnel and a sharp rise in federal and state grants that the program receives. New staff members have been added in Wichita at the KU Medical School Department of Preventative Medicine and for the Rural Stroke Project in Hays. Faculty from the K-State Department of Kinesiology, 4-H Youth Development, and Haskell Indian Nations University also are working with the Office of Community Health.

Additions to the Office of Community Health include the formation of three teams that are integrating research and extension programs with a target audience in community issues. The teams focus on (1) child and adolescent health, (2) adult and older adult health, and (3) preventative medicine and rehabilitation.

The office also is sponsoring the Connect Kansas program and is forming state planning teams on important community health topics. Connect Kansas was developed to measure the outcomes of community health efforts and to train community leaders to look at health factors and create conditions of health.

- b. Research has shown that health doesn’t reside in doctors’ offices but in the community. Instead of experts explaining the way to eliminate teenage pregnancy, drug abuse, and other problems, the emphasis is changing to solutions. The Office of Community Health is creating the capacity for communities in Kansas to solve health problems in those communities where people live, learn, work, and play.
- c. Source of Funding – State Matching and Other Foundation
- d. Scope of Impact – State Specific

Community Health Focuses on Healthy Places

- a. To develop healthy places, people and communities need a way to connect, promote healthy behavior, and prevent unhealthy behaviors from occurring in the first place. That is the objective of the Healthy Places program of the Office of Community Health.

Healthy Places development helps communities to work together to change unhealthy

environments into places that allow children, youth, and adults to make healthy choices when given the option.

Lifestyles and community environments are tied to such health problems as arthritis, cardiovascular disease, cancer, diabetes, obesity, and pulmonary disease. Lifestyles and community environments are also tied to such youth problems as dropping out of school; early and irresponsible sexual behavior; delinquency, violence; and substance abuse.

Often, problems in health are considered in isolation. In one community, a hospital will offer diet and exercise programs to obese children, while the nearby school offers a program for substance abuse prevention. Yet the same children may attend an after-school program on conflict management. These programs are often costly, have limited research, and are confusing because they approach problem-behaviors and unhealthy lifestyles in different ways.

- b. The solution is to coordinate community resources to develop a healthy place, or community, that reaches all the people needing it and to give them the capacity to make healthy choices and learn from their successes and failures.

As part of its responsibilities, the Office of Community Health offers such aids as distance learning, networks, help with training, a healthy youth evaluation system, a healthy places developmental process survey, and basic and applied research expertise and support.

- c. Source of Funding – State Matching and Other Foundation
- d. Scope of Impact – State Specific

Influence of Dyes on Ultraviolet Protection by Fabrics

- a. Skin cancer is the most common form of cancer in the United States. It probably is caused by both acute and cumulative exposures to ultraviolet UV radiation from the sun. K -State researchers studied the influence of different dyes on the UV protection value of a cotton fabric.
- b. They found that red, green, blue, and brown dyes may provide better UV protection than black dye. White and light-colored clothes traditionally worn in summer are cooler because they reflect light but may not screen out the harmful UV rays.
- c. Source of Funding – State Matching
- d. Scope of Impact – Multistate Integrated Research and Extension
 - With AL, AR, GA, IN, KY, LA, MS, NE, NC, TN, WI, ARX, LAX, FL STATE U

Uncovering a Potential Cystic Fibrosis Treatment

- a. Cystic fibrosis is caused by a defective gene inherited by offspring from each parent. One in 29 Americans—more than 10 million people—is an unknowing carrier of the defective gene. Cystic fibrosis is the most common fatal genetic disease in the country. Typically diagnosed in children by the age of three, the life expectancy for someone with the disease is 31 years. Treating the disease costs an average of about \$50,000 per patient (1997 figure). At that rate, treatment

costs in Kansas are more than \$11 million a year. In addition to helping find a cure for the disease, this kind of research may help decrease the cost of treating the disease.

- b. Researchers with K-State Research and Extension have developed a protein compound that may alleviate the complications of cystic fibrosis, a deadly disease that costs Americans more than \$1 billion in annual treatment costs. The compound—a peptide or mini-protein—may restore normal function to the cells most affected in cystic fibrosis patients. Use of that peptide would be a completely new approach to treating cystic fibrosis. The team of scientists on the project is stringing together amino acids to form this potential therapy. Using computer models, peptide synthesis, and laboratory tests, they are finding that the peptide can restore lost function caused by the defective cystic fibrosis cells.
- c. Source of Funding – Hatch and State Matching
- d. Scope of Impact – Multistate Integrated Research and Extension

Take It Outside: Healthy Indoor Air for Kansas Homes

- a. Secondhand smoke causes health problems in children and adults who are exposed to it. A K-State Research and Extension program uses the information in the Healthy Indoor Air for America's Homes program materials, and it was redesigned to be used with parents and grandparents of children. The objectives are to increase participants' awareness of the health risks associated with exposure to secondhand smoke; to help them to identify situations in which they and members of their family are exposed to secondhand smoke; and to identify strategies they can use to reduce exposure to secondhand smoke. Participants are encouraged to use an accompanying checklist to assess their children's and their own exposure to secondhand smoke and to sign a contract to reduce exposure.

In the past year this program was used by the Family and Community Education (FCE) organization in Kansas. They report that 2,131 members were reached, and 426 members sent in exposure assessment checklists. Local FCE groups made booths for county fairs, farm shows, and other community events; they made window displays and posters for events and placed them in libraries. Newspaper articles were written. One FCE group was successful in changing City Council laws to prohibit smoking within the Community Building and outside on sidewalks surrounding the building. It is estimated that over 50,000 people were reached through displays, booths, and media articles, and 1,984 community members benefitted from the changed law.

- b. The expected benefit is that health risks from secondhand smoke would be reduced.
- c. Source of Funding – State Matching
- d. Scope of Impact – State Specific

Personal Actions to Health

- a. The Personal Actions to Health (PATH) intergenerational project is entering its second year of positive influence on Kansas seniors and youths. The project is funded by Kansas Health

Foundation. Each site is awarded a mini-grant that requires the sites to interact in five or more intergenerational activities, ranging from building birdhouses to making homemade ice cream to tutoring about computers. The activities are the foundation blocks in building strong, lasting relationships. To harness the results of the relationships, simple questionnaires are administered after each activity.

- b. The project is designed to foster healthy relationships with today's youth and seniors in Kansas communities and to dispel common prejudices between the two groups. The project has been extremely successful in the 12 principal sites.
- c. Source of Funding – State Matching
- d. Scope of Impact – State Specific

Finding a Connection Between Cigarette Smoke, Vitamin A, and Emphysema

- a. Previously, researchers in K-State Research and Extension found that vitamin A prevented inflammation in rats that were exposed to an inflammatory toxin. A follow-up study revealed that vitamin A deficiency not only increased inflammation in the lungs of rats but also induced emphysema. Because cigarette smokers are at a greater risk for developing emphysema, a study was designed to determine if there was a connection between cigarette smoke, vitamin A status, and development of emphysema. The researchers found that rats that were exposed to five packs of cigarettes per week for six weeks developed emphysema. These rats also had low levels of vitamin A in their lungs, plasma, and liver.
- b. This connection between cigarette smoke, vitamin A deficiency, and emphysema creates an intriguing area for study and should help us understand why cigarette smokers develop emphysema. These findings also may provide practical treatment applications for cigarette smokers and for nonsmokers who suffer from emphysema.
- c. Source of Funding – State Matching and Hatch
- d. Scope of Impact – Multistate Integrated Research and Extension

Key Theme – Human Nutrition

The Family Nutrition Program Works with Low-Income Citizens in Kansas

- a. K-State Research and Extension, through the Family Nutrition Program (FNP), provides nutrition education in 73 counties to food-stamp eligible citizens. FNP, sponsored by the Kansas Department of Social and Rehabilitation Services with funds from the USDA Food Stamp Program, provides programming that fosters the development of skills in food-resource management, obtaining safe and nutritious foods, and balancing the food participants eat with physical activity. In the past year, FNP reached more than 114,000 food-stamp eligible people. FNP's collaboration with community agencies and organizations such as local health departments and public schools makes it possible for FNP to serve a large number of limited-resource individuals and families in Kansas.

- b. Analysis of evaluation data showed a statistically significant intention to change behavior of participants in the following areas: 52% intended to move closer to the recommended number of servings of the Food Guide Pyramid; 63% intended to move closer to the Dietary Guidelines recommending that Americans include a greater variety of foods in their diets; and 30% intended to increase their level of physical activity. Of those participating in food safety education: 38% intended less often to let food set out more than two hours and 42% intended to wash hands more often before touching food.
- c. Source of funding – USDA Food Stamp Program
- d. Scope of impact – State Specific

Kansas Nutrition Network

- a. The Kansas Nutrition Network (KNN) is a partnership of state-level public and privately funded nutrition education and food assistance programs led by K-State Research and Extension. The mission of KNN is to use social marketing techniques to mobilize Kansans with limited incomes to use available nutrition education and food resources to improve their health. The first promotional campaign targeted three elementary schools in one neighborhood in Wichita. Because the majority of people in these schools are Spanish-speaking, the tag lines were developed in both Spanish and English. The campaign highlighted Heartland SHARE, a cooperative food-purchasing program that emphasizes fresh fruits and vegetables.
- b. The goal was 30 new Heartland SHARES purchased following the campaign. Seventy-one SHARES were purchased, far exceeding the goal. The second campaign was to promote National School Breakfast Week in the same three elementary schools. All students in those three schools were offered a free breakfast during the week. This campaign also was a success. The school district submitted a grant application to USDA to participate in the Universal Free Breakfast study, a significant community change event.
- c. Source of Funding – State Grant
- d. Scope of Impact – State Specific

Expanded Food and Nutrition Education Program

- a. EFNEP, the Expanded Food and Nutrition Education Program, is a federally funded nutrition education program successfully conducted through the Cooperative Extension Service in every state and U.S. territory since 1969. EFNEP programs serve Kansans in Sedgwick, Shawnee and Crawford counties, and EFNEP programming begins in Wyandotte County in FY 01. The goal is to assist limited resource families and youths in making simple changes in eating behaviors so that over time, healthy choices become healthy habits.
- b. During FY 2000, 1,570 Kansas families benefitted from EFNEP. In addition, EFNEP youth programs enriched the lives of 17,935 Kansas youth last year. EFNEP participants who completed the 8-10 lesson series improved nutrition, food behavior, and food safety practices. As a result of their participation in EFNEP: 64% almost always compared prices; 85% seldom or never ran out before the end of the month; 62% read labels to select nutritious foods most or

all of the time; 50% planned meals in advance most or all of the time; and 88% showed positive food safety practices

- c. Source of Funding – USDA Federal Grant
- d. Scope of Impact – State Specific

Healthy Eating For Life

- a. Older Kansans, the fastest-growing segment of the population, are challenged by many diet-related chronic diseases. The Healthy Eating for Life (HELP) nutrition education program of K - State Research and Extension promotes health and well - being among senior citizens in the more than 40 Kansas counties where it is taught. HELP increases knowledge about eating healthful foods and encourages behaviors that lead to improved nutritional status and to decreases in chronic disease and medical costs.
- b. Approximately 45% of elderly HELP graduates had made, or intended to make at the time of the survey, beneficial changes in their regular nutrition practices that included eating more servings of fruits and vegetables.
- c. Source of Funding – State Grant
- d. Scope of Impact – State Specific

Green Tea May Lower Cholesterol Levels in Menopausal Women

- a. After menopause, women are substantially more susceptible to coronary heart disease and other degenerative diseases associated with antioxidant nutrient deficiencies. The objective of this project in K-State Research and Extension was to determine the effect of dietary polyphenols on the absorption of lipids and lipid-soluble vitamins in rats as a model that mimics certain physiologic changes associated with estrogen loss.
- b. The findings obtained with this rat model provide evidence that green tea and green tea polyphenols profoundly lower the intestinal absorption of fat and cholesterol, without compromising the body status of lipid-soluble vitamins A and E. The findings are of practical importance in that the active ingredients (catechins) in green tea can be used as a safe dietary means of lowering cholesterol absorption. Further studies on the mechanism whereby dietary polyphenols affect cholesterol absorption and metabolism will help devise new approaches toward preventing or treating hypercholesterolemia and coronary heart disease in women.
- c. Source of Funding – State Matching
- d. Scope of Impact – Multistate Integrated Research and Extension

Zinc Deficiency Lowers Absorption of Vitamins A and E

- a. In zinc-deficient children and elderly people, the external signs of deficiencies of vitamins A and E, such as impaired vision, poor vision in darkened conditions, and dermatitis, also are apparent.
- b. Researchers for K-State Research and Extension have provided convincing evidence, for the first time, that zinc deficiency, even at a marginal stage, markedly reduces the intestinal absorption of these vitamins. The findings will lead to the development of effective strategies to

correct the clinical symptoms of deficiencies of the vitamins in malnourished children and the elderly.

- c. Source of Funding – State Matching
- d. Scope of Impact – Multistate Integrated Research and Extension

Older Adults with Eye Disease Face Diet Problems

- a. Age-related macular degeneration is the primary cause of low-vision and irreversible blindness among adults age 65 and older in the United States and in Kansas. No effective treatment exists for the most common form. Treatments for the less common but more serious form usually offer limited long-term benefits. Older adults with vision loss experience greater limitations in activities of daily living, including shopping, food preparation, and maintenance of lifelong food-related practices.
- b. Interviews and focus groups were conducted by researchers in K-State Research and Extension to identify significant food-related concerns of people with macular degeneration. These concerns form the basis of a research questionnaire for future studies. To reduce disability in food preparation, potential dietary inadequacy, and reduction in quality of life, information from these studies will be incorporated into training and practical suggestions for adaptation.
- c. Source of Funding – State Matching
- d. Scope of Impact – Multistate Integrated Research and Extension

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; generate systems for improved soil and air quality; and maintain plant diversity.

Topics in this area have been making headlines recently due to new research and changing regulations. The Kansas Center for Agricultural Resources and the Environment (KCARE) has led a number of environmental efforts which have helped K-State Research and Extension's progress towards its 5-year plan of work goals.

The programs in the plan address three primary issues: ensure quality and conservation of surface water and groundwater; develop systems for improved soil and air quality; and promote community and residential environmental management.

The following summaries outline some of the impacts and current results and direction of K-State Research and Extension:

Fecal coliform bacteria are often present in Kansas surface waters. Research is underway to identify potential sources of fecal coliform contamination. Best management practices to reduce fecal coliform bacteria are being tested. Vegetative filter strips were shown to reduce concentrations of the bacteria at four K-State research sites near feedlots.

K-State Research and Extension is working to develop and evaluate such integrated agricultural management systems as reduced tillage, fertilizer placement, and vegetative filter strips that reduce runoff of major contaminants such as pesticides, nitrogen, and suspended solids while maintaining or improving production and profitability.

Efficient use of water and energy resources is the focus of K-State Research and Extension irrigation management programs. The programs have resulted in new irrigation system designs, more effective water usage, and increased economic returns from irrigated agriculture. The programs include field studies of subsurface drip irrigation and multiyear, on-farm demonstration projects. Participants in the irrigation scheduling program were able to reduce pumping of water by three inches, resulting in a saving of pumping cost by \$1,500 per center pivot.

Groundwater quality is a key consideration near animal waste lagoons. A K-State Research and Extension study of seepage losses from 15 lagoons across the state revealed an average loss of 1/20th inch/day. Constructing soil liners with bentonite and other materials that adsorb potential contaminants could reduce the risk of groundwater pollution from nitrogen, phosphorus, salts, and other nutrients. Computer modeling is being developed to optimize lagoon design using site-specific criteria.

Chemical and biological components in liquid animal waste may have a significant impact on the kinetics of ammonium adsorption and desorption by soil. A study is being conducted to investigate the sorption and desorption behaviors of NH_4^+ (ammonium cation) on soils under lagoon liners.

In response to increasing concern about problems associated with livestock wastewater from confined animal feeding operations, K-State Research and Extension initiated a project to address odor, seepage into groundwater, and runoff into surface water supplies. Subsurface drip irrigation (SDI) is a potential tool that can alleviate these problems and also use livestock wastewater for crop production. Current research focuses on identifying appropriate amounts of swine wastewater for corn production using SDI. Approximately 9,500 acres in Kansas are under subsurface drip irrigation, up from 7,000 acres in 1999.

Phosphorus represents a significant threat to surface water quality. A majority of phosphorus comes from surface runoff with a large portion attributable to agricultural lands. A K-State study is examining the influence of the addition of varying amounts of cattle manure on phosphorus levels in soils and runoff.

Several projects are underway at dairies across the state to demonstrate the effectiveness of various waste management system designs. At Nichols Dairy in Anderson County, nutrients from both milk parlor effluent and the barnyard are processed through three wetland cells and three vegetative filter strips. A holding pond is used to control the release of runoff into the wetland cells. Twenty dairies in northeast Kansas are participating in the Dairy Environmental Cooperative, established in collaboration with K-State Research and Extension and USDA/NRCS. The project has exceeded its original goal to bring 1,000 dairy cows into compliance and currently manages 2,500 cows.

Filter strips and riparian buffers serve as natural biological methods of reducing sediments and other materials that are carried by runoff into streams or rivers during rains. A new educational program aims to improve water quality in the Blue River Basin through increased implementation of riparian buffer strips. The basin, in north central Kansas and south central Nebraska, is the focus of a cooperative project between Kansas State University and the University of Nebraska-Lincoln. The project's goals are to: conduct surveys, set up demonstration sites and field tours, train natural resource professionals, and develop publications to educate the general public.

e. Total expenditures by funding source and FTEs

FY 2000	Projected: \$8,766,825;	Actual: \$8,730,934	66.0 FTEs
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Key Theme – Agricultural Waste Management

Providing Science-Based Information for the Public

- a. K-State Research and Extension provides objective, science-based information on controversial issues of high public concern. An example is the evaluation of animal waste lagoons and their potential for contaminating groundwater.
- b. Research on lagoons and groundwater contamination has determined the potential for groundwater contamination depends on the condition of the lagoon site and the type of waste used. The results of these efforts have led to the conclusion that lagoon design should be done on a site-specific basis considering aquifer, soil, and other characteristics at the proposed site. Research on the land-application of wastes shows that the risk of leaching and runoff is minimal when the waste is applied at proper rates and times. KDHE plans to utilize this information in drafting new site-specific requirements for lagoons that will protect groundwater while not overregulating sites that have low risk for groundwater contamination.
- c. Source of Funding– State Matching and Hatch
- d. Scope of Impact– State Specific

A New System to Control Dairy Waste

- a. An ecological pollution control demonstration project utilizing wetland cells and vegetative filters was constructed for a 200-cow dairy in Anderson County. The nutrients removed by the plants will be harvested as forages for feed.
- b. By providing an understanding of livestock pollution control practices, the project can help producers learn about waste control practices that do not require investments in irrigation equipment for periodic pumping of lagoons.
- c. Source of Funding– State Matching
- d. Scope of Impact– State Specific

Key Theme – Soil Quality

Testing Soil Samples for Kansans

- a. The Soil Testing Laboratory of K-State Research and Extension analyzes some 12,000 soil samples each year for Kansas farmers and horticulturists. Each soil sample represents 20 acres, and the lab in one year tested 8,000 samples from producers. In addition to those soil samples for the public, the laboratory also analyzes a similar number of soil samples for various research projects in K-State Research and Extension. Those projects range from environmental issues to development of new soil-testing methodologies.
- b. The results have implications for 160,000 acres at \$5/acre from either higher yields or lower fertilizer usage and cost. The indirect cost is about \$800,000. In addition the impact on the

horticulture industry is conservatively estimated at \$200,000. Overall indirect contribution by the soil testing lab is \$1 million.

- c. Source of Funding– State Matching, Fees, Smith-Lever
- d. Scope of Impact– State Specific

Key Themes – Soil Quality and Air Quality

Carbon Sequestration

- a. The major concern in the soil quality area is carbon sequestration which means increasing organic matter of the soil to reduce carbon dioxide in the air. This work could have a huge impact on global climate change.

Plants release carbon dioxide into the environment when they die. By reserving more organic material through cropping methods, the carbon can be maintained in the soil instead of the air, helping the climate.

- b. Carbon sequestration is a win-win situation—good for the environment and good for production. Carbon sequestration can be decreased by implementing cropland management techniques (i.e., no-till or minimum till), restoring riparian areas, and conservative rangeland grazing.
- c. Source of Funding – USDA Special Grant
- d. Scope of Impact – State Specific

Key Theme – Sustainable Agriculture

New Center Supports Sustainable Agriculture

- a. Expanded research, education, and outreach on sustainable agriculture will be the result of the new Kansas Center For Sustainable Agriculture and Alternative Crops recently created by the Kansas Legislature and housed at K-State. It will especially benefit producers on small farms.
- b. The Center will assist farmers with identification and development of markets for products by collecting and analyzing basic information and providing opportunities for existing or new crop production and direct marketing. For example, Rhonda Janke, an alternative crops specialist for K-State Research and Extension, is studying more than 20 plants for their medicinal crop and profit potential, including echinacea, a herbal supplement used worldwide and derived from the purple coneflower that grows wild in Kansas. K-State helped the Legislature develop the model for the Center that is largely based on project's like Janke's.

K-State Research and Extension also hopes to provide farmers with new research and information on organic products; energy savings technology; investments that are less capital - intensive; and agricultural practices that reduce soil erosion and restore soil health. Alternative crops that represent new marketing opportunities for Kansas farmers include canola, safflower, dry beans, and cotton.

- c. Source of Funding – State Matching
- d. Scope of Impact – State Specific

Whole Farm Planning—Good for the Environment, Farm Families, Finances

- a. K-State Research and Extension is reaching out to Kansas farmers by providing information on Whole Farm Planning, a process that takes into consideration the economic, social, and conservation factors involved in farming. According to some estimates, only about 30% of farmers have a clear idea of their break-even costs for their major market commodities, and only 5% have done a recent calculation. A barrier to Whole Farm Planning is absentee ownership of farms. More than 50% of Kansas farmland now is rented. As Whole Farm Planning reaches more people, it can create awareness that the land is more than just an investment to hedge against inflation but also a living, breathing resource needed to sustain the future productivity of the heartland.
- b. Short-term profits will increase as farmers utilize Whole Farm Planning to determine how to decrease input expenses and increase returns through alternative and value-added marketing options. Long-term financial benefits will accrue to farmers who utilize the knowledge and techniques available to preserve water quality and improve soil quality .
In addition, social benefits can be realized by those who engage in Whole Farm Planning.
 - Spouses begin to communicate about farm goals, life goals, and other shared values.
 - Children and parents also are brought into the planning process.
- c. Source of Funding – State Matching
- d. Scope of Impact – State Specific

EARTH

- a. In Sedgwick County, 800 middle and elementary school students are involved in a community collaboration program called EARTH, which stands for Earth Awareness Researchers for Tomorrow's Habitat. The curriculum created by the Steering Committee contains 23 lessons on soil, air, water, and living resources. The program completed its pilot year with a workshop for about 600 participating teachers and students.
- b. The program is designed to give students information that they can use to make sound environmental decisions.
- c. Source of Funding – State Matching and Smith-Lever
- d. Scope of Impact – State Specific

Kansas Environmental Leadership Program

- b. The Kansas Environmental Leadership Program (KELP) is for individuals who want to better understand water issues and improve their leadership skills. The program is designed to assist participants in enhancing their knowledge of water resources and water quality issues, regulations, and use. This knowledge is partnered with the practice of skills that will assist individuals in becoming more effective leaders.
- c. Forty participants (18 in 1999 - Pilot Class, 22 in 2000 - Class 1) completed the training program. Evaluations reflect an increase in knowledge of Kansas water resources and an increase in active participation in water resource issues. A follow-up survey indicated that graduates were involved in development of a county comprehensive plan for awareness of wellhead protection; development of a stream-team monitoring class; Kansas Water Authority development of plans to conserve the Ogallala aquifer; work with the Arkansas River Water Symposium; Governor's Water Quality Forum; and development of a leadership profile for environmental issues for use by secondary education teachers.
- d. Source of Funding – State Grant
- e. Scope of Impact – State Specific

Key Theme – Water Quality

Water Quality Initiative: A Statewide Effort

- b. In 1996, Kansas Gov. Bill Graves enlisted the help of K-State Research and Extension and several groups from agriculture, industry, city governments, federal and state agencies, and the private sector to study and improve the water in Kansas. Since then, K-State expertise has contributed to plugging abandoned water wells, cleaning illegal dump sites, building livestock waste systems, building terraces, and repairing wastewater systems.
- c. Best Management Practices (BMPs) implemented through the Governor's Water Quality Initiative are paying off with decreasing atrazine levels in the Kansas Lower Republican River Basin. Three watersheds in this basin have improved. In the Mission Lake watershed, for example, 90% of landowners adopted BMPs with subsequent atrazine reductions. Work by K-State has included water quality monitoring, evaluation of BMPs, educational programs, and one-on-one work with county agents and producers. The work also has yielded improvements in water quality on cropland, rangeland, confined animal feeding operations, home sites, and other rural, suburban, and urban land sites.

This a success story because we have both the research to show these practices work and effective extension programs to increase the implementation, coupled with the cost share programs through the State. Those are the three elements necessary to change people's behaviors: good options, education, and a cost share incentive.

- d. Source of Funding – State Matching
- e. Scope of Impact – Integrated Research and Extension

Irrigation and Water Management for Profitable Crop Production in Western Kansas

- a. Irrigation in Western Kansas is mostly dependent on groundwater pumped from Ogallala aquifer. The major economic concern for the area is the rapid decline of water level. Conservation of water resources is essential for prolonging the life of the aquifer. Rapid expansion of confined animal feeding operation of livestock industries has created a concern about groundwater pollution from application of livestock manure, both liquid effluent and solids to cropland.
- b. Year 2000 was very dry and hot. Yet, the participants of irrigation scheduling program reduced pumping of water by three inches. This resulted in a saving of pumping cost by \$1,500 per center pivot. The total for the project amounted to a savings of approximately \$16,500 and about 112 million gallons of water. Three technical sessions along with product and service expositions on SDI were attended by 130 participants. Establishment of SDI system has gone up by another 2,500 acres in the year 2000, totaling approximately 9,500 acres in Kansas.

The innovative research results on the use of SDI for lagoon wastewater has prompted the livestock feedlot owner to establish 40 acres of subsurface drip system for wastewater use. The research on variable application amount of swine effluent to develop BMPs got started.

- c. Source of Funding – State Matching
 - d. Scope of Impact – Integrated Research and Extension
- a. In 1997, water engineers said that the Horton’s water supply from Mission Lake was contaminated with atrazine. At levels above 3 parts per billion in drinking water—the state’s “acceptable” standard— atrazine is considered a health threat. Because their water’s atrazine levels were well above 3 ppb, Horton’s 1,885 residents took action. Working through the Governor’s Water Quality Initiative and K-State Research and Extension, they implemented Best Management Practices (BMPs) to successfully save their water supply.
 - b. Today, the water in Mission Lake meets water-quality standards for atrazine.
 - c. Source of Funding – State Matching
 - d. Scope of Impact – Integrated Research and Extension

New Watershed Specialists Help Clean Up Kansas Waters

- a. K-State aims to meet water-quality challenges and total maximum daily load goals with the help of five newly created watershed specialist positions. The specialists will work within high -priority watersheds. These include the Blue River, Upper Delaware, Lower Kansas, and Upper and Lower Arkansas basins. Each specialist will be headquartered in a K-State Research and Extension facility within the multicounty area of assigned work. The specialist will work on a one-on-one basis to promote adoption and implementation of Best Management Practices (BMPs) associated with livestock management, waste management, nutrient management, pesticide management, soil erosion control, reduced tillage, and other conservation practices, and riparian/vegetative buffers.

- b. This represents a major effort to do something on a voluntary basis to clean water and avoid regulation.
- c. Source of Funding – State Grant
- d. Scope of Impact – Integrated Research and Extension

The Leader in Subsurface Drip Irrigation

- a. Providing water to row crops in dry areas of the Great Plains has always been a challenge, but scientists with K-State Research and Extension have found a way to get the job done at a water savings of 25% or more while protecting groundwater quality. They have advanced subsurface drip irrigation (SDI) technology to the point it's now a viable option for corn producers, and K-State is recognized nationally and internationally as the place to go for information about subsurface drip irrigation (SDI) on corn.

SDI is a method of irrigation to deliver water to crop roots below the soil surface at small emission points from a series of plastic lines spaced between crop rows. It is an emerging technology that also allows producers to use wastewater in their irrigation system without the odor or risk of human contact or drift, since it is applied under the soil.

- b. The value of annual water savings associated with widespread adoption of SDI on currently furrow-irrigated areas in western Kansas has been estimated to range between \$175 million to \$350 million. The associated investment costs might approach \$400 million to \$500 million but could be amortized over the estimated 10 to 20 years of SDI system life.

In a widely distributed AP newspaper story, one southwest Kansas irrigator is quoted as saying he “wished SDI had been available 30 years ago, so that further water savings could have been made.”

- c. Source of Funding – USDA Special Grant
- d. Scope of Impact – Multistate Integrated Research and Extension

Irrigation Scheduling

- a. Improving irrigation equipment and utilizing irrigation scheduling are the goals of a 4 -year research project in south central Kansas. Irrigation scheduling calculates the water demanded by the crop based on weather, soil moisture, and crop development. This allows producers to apply just enough water to meet the needs of the crops.
- b. As a result of success experienced with a small group, the project is now focusing on reaching a larger group of farmers, with the possibility for a mobile learning center to visit and demonstrate irrigation scheduling and reach water conservation principles to producers.
- c. Source of Funding – State Matching and State Fee Grant
- d. Scope of Impact – Integrated Research and Extension

Water Purification in Space

- a. Clean, safe water is a concern here on the planet but also in space. A recent K-State Research and Extension water purification experiment flew aboard the space shuttle launched from Kennedy Space Center in Florida. The experiment utilized a K-State developed iodinated resin, and the goal was to investigate its potency for killing bacteria in space.
- b. The work has potential benefits for developing new procedures for NASA and for drinking water on Earth.
- c. Source of Funding – State Matching
- d. Scope of Impact – Multistate Integrated Research and Extension

Key Theme – Air Quality and Agricultural Waste Management

Environmental Air Quality Issues Associated with Agricultural Operations

- a. Research in this area addresses air quality issues associated with confined livestock feeding operations. Researchers have been studying methane, ammonia, and hydrogen sulfide release from animal waste lagoons, as well as testing state-regulated separator distances for animal production facilities. Separator distance is the distance required between lagoons and some public buildings and are tested by measuring the gases as they leave the lagoon. We are developing technologies and strategies to help ensure adequate air quality for workers, animals, and nearby residents.
- b. The potential benefits are better health and safety conditions for workers and reduced odor and dust in the neighboring environment.
- c. Source of Funding – Departmental
- d. Scope of Impact – Multistate Research
 - With AR, CA, IL, IN, IA, MI, MN, MD, NE, NC, OH, OK, OR, PA, SD, TX, UT, WA

Key Theme – Integrated Pest Management

Training Clientele in Plant Disease Management

- a. Commercial producers and pesticide applicators require detailed information on disease identification and control, yet they often lack adequate training in these areas. With increased public scrutiny of pesticide usage, these producers require training in integrated management practices to control major plant diseases.
- b. Approximately 2500 participants, including greenhouse and nursery personnel, vegetable growers, fruit growers, turf managers, pesticide applicators, master gardeners, and extension agents attended the meetings. Participants developed a better understanding of the major plant diseases affecting horticultural crops and integrated pest management practices to reduce or suppress plant disease problems.

- c. Source of Funding – State Matching
- d. Scope of Impact – Integrated Research and Extension

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

Overview

An educated and knowledgeable citizenry is the foundation of our state's economic productivity, democratic character and social system, and quality of life. K-State Research and Extension programs inform and help people through research and education, including 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.

- a. K-State Research and Extension is increasingly valued by state agencies, regional health providers, the Legislature, and the state's largest private foundation as the most engaged entity in local communities. As a result, the organization 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. 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. K-State Research and Extension offers CoupleTalk: Enhancing Your Relationships for couples along with programs such as Choose Life Balance, Basic Living Skills, and Life in the State of Poverty to promote personal and family resource management. In the Greater Kansas City metropolitan statistical area, K-State has joined with the Missouri Cooperative Extension System in launching Extension InfoLine for 24 - hour access to helpful facts or where to go for services. Parents and early childcare providers receive training to improve the quality of childcare, whether in home or in a site-based program. The WonderWise Parent Web page links parents, stepparents, caregivers, teachers, and parent educators to numerous resources, including a noncredit, free course on Responsive Discipline. Extension 4-H youth development programs reach out to more than 100,000 children, youths, and teens in high quality, hands-on, life-skills building opportunities. K-State partners with Haskell Indian Nations University Extension in developing and implementing the American Indian Youth Leadership Program on the state's four reservations and five urban American Indian centers. For teens, community leaders, and elected officials, K-State provides ongoing leadership training through comprehensive leadership development programs such as Leadership Excellence and Dynamic Solutions (LEADS), the Kansas Agricultural and Rural Leadership program (KARL), and the Kansas River Youth Leadership program (KRYL). The K-State Office of Local Government created, maintains, and supports a Kansas County Government Fiscal Database that has been shared with 99 of 105 counties.
- b. Kansas State University Research and Extension is a key partner in ConnectKansas, an initiative of the Kansas Legislature and Governor's office, to coordinate activities, provide common long -

term impacts, standardize funding applications, and provide a common language to all public and private agencies that support youths, families, and communities in the state. K-State Research and Extension is more integrated into the day-to-day thinking of other state agencies such as Social and Rehabilitative Services, the Juvenile Justice Authority, and Department of Health and Environment. The partnerships are realizing additional funding for Kansas communities. Extension programs provide the educational components and thus benefit from the local grantsmanship efforts.

Parenting, family resource management, and childcare education were provided to more than 46,000 counties during 2000. 4-H youth development programs provide safe, caring places where young persons are mastering new knowledge and skills and receiving recognition for these accomplishments. With more than 1000 healthy places in Kansas communities, 4-H youth development participants have fewer problems, are more prepared, and are engaged to be productive citizens today and for the future.

Comprehensive leadership education from K-State Research and Extension is increasing the capacities of local communities to sustain quality of life and economic vitality. Technical assistance to county governments, especially those in less populated parts of the state, is helping local Commissions make more informed decisions by identifying trends and their sources.

c.

- K-State Research and Extension is recognized as the agency of choice by state government to engage communities in solving local issues.
- Leadership programs are changing the abilities of individual participants and strengthening community service in the political arena through not-for-profits, volunteer efforts, and in bringing the voice of older youths to discussions about the future.
- Childcare provider training and parent education strengthens individuals and families. Children are more prepared for learning at school and able to cope with the normal ups and downs of life.
- 4-H youth development continues to be the largest out-of-school program in Kansas. Fifteen thousand youth development volunteers improve their care-giving skills as they mentor school-aged youths in acquiring both life skills and subject-matter knowledge.
- Kansas County Government Fiscal Database is the only such resource for rural and isolated counties.

d.

K-State Research and Extension is the only extension participant in 18 states that is engaged in comprehensive, seamless, statewide community capacity building efforts. Because the state is tracking the long-term impacts of the ConnectKansas effort, we believe that as an organization we are on the right track. The ability to identify and be valued by others regarding our market niche for communities is powerful for the organization. We are a stronger organization connected and visible than we are in isolation.

e. Total expenditures by funding source and FTEs

FY2000	Projected: \$10,368,140;	Actual: \$10,325,693	148.35 FTEs
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Key Theme – Child Care/Dependent Care**Offering Education and Training to Child Care Providers**

- a. K-State Research and Extension helps to increase the quality of childcare for the young children of Kansas by providing education and training for child care providers. Research tells us that the quality of care for children improves when their providers receive education and training. Access to training is often an issue for rural Kansans. K-State addresses this need by providing state-approved training in rural areas. Sessions on infant-toddler care and education have been presented in addition to taped satellite broadcasts on a variety of child-care and early education topics. Training is tailored to the needs of the child-care providers in the county.
- b. Programs that improve the quality of childcare through the education and training of providers help Kansas children enter school ready to learn and succeed.
- c. Source of Funding – State Matching and USDA Special Grant
- d. Scope of Impact – Multistate Integrated Research and Extension

Key Theme – Communication Skills**CoupleTalk: Enhancing Your Relationship**

- a. The divorce rate in Kansas has generally been higher than the national average since 1951 as reported in the Annual Summary of Kansas Vital Statistics. The exact cost of divorce to Kansas families is hard to measure both economically and psychologically, but it is no secret that the losses are enormous for most families. The K-State Research and Extension program, CoupleTalk: Enhancing Your Relationship, was created to help couples build skills to make their relationships stronger and more satisfying. It went online this year, offered as a noncredit, Internet-based distance education course. More than 100 persons from all over Kansas enrolled in the course's initial offering in the spring of 2000. The Web-based course is being offered twice each year—once in the spring and once in the fall.
- b. Some of the evaluation comments at the conclusion of the program were: "It was a good tool to try and re-focus on our relationship." "Excellent program, and I'm glad that it was offered to people over the Internet." "We will listen to each other and use the tools we learned to have calm conversations about difficult issues." "I believe this has been a wake-up call that shoving our marriage aside in order to be parents is not a good idea. We are talking more and have some new tools to use when we have discussions."
- c. Source of Funding – State Matching
- d. Scope of Impact – State Specific

Key Theme – Family Resource Management

Choose Life Balance

- a. Changes in employment roles, composition of the labor force, family structures, and values and traditions have prompted a growing awareness of the interdependence of work and family life. For many people, feelings of stress and conflict indicate the need to find ways to balance their lives. Choose Life Balance is an informal educational program combining a social marketing campaign with a family resource-management curriculum presented through group meetings or in a self-study format. The purpose is to raise awareness of the benefits of balance and to help “busy people” learn how to better manage time for work, family, community, and self in today’s complex world.
- b. The lesson series has been used in group meetings for diverse audiences such as hospital wellness groups, golf course superintendents, accounting firm employees, Parents As Teachers, Head Start staff, K-State Research and Extension planning committees, and youth clubs, as well as through self-study.
- c. Source of Funding – State Matching
- d. Scope of Impact – State Specific

Extension InfoLine

- a. Want to know about activities for youths, making meat safer, or making your home more energy efficient? In an example of bi-state cooperation, K-State Research and Extension is working with University of Missouri/Lincoln Outreach and Extension to provide an audio text system called Extension InfoLine to the residents of the Kansas City metropolitan area. Topics include gardening and horticulture; family and parenting issues; food preparation and preservation; youth activities; agriculture; community development; and many others. Faxed copies of the messages also are available. The service provides pre-recorded information to the public through telephone access. It is formatted in one- to two-minute messages on a variety of topics available 24 hours a day and free of charge. The counties participating in this collaborative effort are Clay, Jackson, and Platte in Missouri and Johnson, Leavenworth, and Wyandotte in Kansas.
- b. Residents have access to current research-based information.
- c. Source of Funding – Smith-Lever and State Matching
- d. Scope of Impact – Multistate Extension
 - With MO

Life in the State of Poverty

- a. Families do not share equally in economic growth, and the gap in income between this nation’s poorest and richest citizens has been growing. According to census data, some 10.9% of the people of Kansas lived in poverty during 1998-1999. The “Life in the State of Poverty” simulation is an experience that is being offered in various locations across the state. It was developed by ROWEL (Reform Organization for Welfare in St. Louis, Missouri) and adapted

for use in Kansas. Designed to help sensitize participants to the realities of life faced by low-income families, it motivates people to get involved in reducing poverty and providing important services and support for these families.

In the simulation, participants assume the roles of different families facing poverty. During 1999-2000, the poverty simulation has been used with a variety of community groups in at least nine counties, including social service agency personnel, leadership groups, educators, social workers, health care workers, clergy, youth groups, and others.

- b. A common response by participants is that the experience is difficult and frustrating but a powerful learning experience nonetheless. Evaluations from 99 adult participants in four counties indicated that over three-fourths of participants had an improved understanding of the financial pressures faced by low-income families in meeting basic needs; of the difficult choices low-income families face each month when trying to stretch limited resources; and of the emotional stresses and frustrations faced by low-income families in meeting basic needs.
- c. Source of Funding – State Matching
- d. Scope of Impact – State Specific

Key Theme – Leadership Training and Development

A Program to Develop Leaders: An Example in Republic County

- a. K-State Research and Extension works with Kansas counties to help them build programs to strengthen their communities. Republic County is a good example. The Extension Council there was approached by concerned citizens who expressed the need to develop informed leaders who would provide guidance and ideas for governing of Republic County.
- b. As a result, K-State Research and Extension implemented the first leadership program class in the county, including bringing in speakers, obtaining donations for meals, promoting the event, and planning the graduation. The six initial class participants gave the program excellent reviews. Seventy-five persons attended the graduation ceremony where the guest speaker was the Lt. Governor. The energy of the first participants and the success of the class generated nine members for the second class. Forty volunteers were involved in the first class, and they donated some 100 hours to the program.
- c. Source of Funding – Smith-Lever
- d. Source of Impact – State Specific

Leadership, A Shared Process

- a. Leadership Excellence and Dynamic Solutions (LEADS) is a comprehensive leadership development program of K-State Research and Extension based on the philosophy that leadership is a shared process of people working together to achieve mutual goals. The program provides a series of sequential educational activities and learning experiences.

- b. Recognized and emerging leaders, both adult and youth, in local communities across Kansas have participated and learned to facilitate meetings, resolve conflicts, and form collaborations and coalitions with other groups to address local issues. The program has been used to integrate a leadership capacity component into community economic development frameworks and to meet specific needs and interests of particular clientele groups.
- c. Source of Funding – State Matching
- d. Scope of Impact – State Specific

Leadership Program Focuses on Global Agricultural Issues

- a. Agricultural leaders and community leaders in Kansas face many challenges as well as opportunities as a result of emerging global trade agreements. Since 1990, KARL has helped 150 Kansans study the agriculture of other countries. The program involves class room training and a two-week study tour in another country.
- b. The Kansas Agricultural and Rural Leadership program (KARL) has been helping agricultural leaders and community leaders understand and work with international issues affecting Kansas agriculture and consumers. Participants compare agricultural practices and learn about different customs and cultures that affect Kansas agriculture in the global marketplace.
- c. Source of Funding – State Grant and State Matching
- d. Scope of Impact – State Specific

Key Themes – Parenting

The WonderWise Parent Web Page

- a. This distance education program on the World Wide Web is designed for parents, grandparents, foster parents, stepparents, caregivers, teachers, and parent educators. Since it opened in 1996, the main page of The WonderWise Parent has received 45,287 visitors. The actual number of visits to the total site is at least twice that number. The site includes information about parenting programs that visitors can implement in their community. A noncredit and free course on Responsive Discipline is entirely online. There also are recommendations for children's books, a sample of the author's radio commentaries, and a large section of humor that relates to parents and children.
- b. One parent recently wrote the author to say, "I love the responsive discipline course. I'm reading through it a second time, first time I started when my oldest was two years, now she is three and her little brother is two years old, and it's more helpful at every new stage of development." The Web can be a powerful tool for reaching out to and supporting busy parents. Web site URL is <http://www.ksu.edu/wwparent/>.
- c. Source of Funding – State Matching
- d. Scope of Impact – State Specific

Helping People of All Walks of Life Learn Basic Living Skills

- a. Many people of all ages and socioeconomic status lack knowledge and training necessary for acquiring basic life skills. Changes in life situations —such as living on one’s own for the first time, divorce, or death of a spouse—can create circumstances for specific skills not previously needed. K-State Research and Extension provides education based on the premise that knowledge, skills, and motivation are needed to meet everyday physical, social, emotional, and cognitive needs of individuals and families.
- b. The Basic Living Skills materials help individuals develop skills related to parenting, home maintenance, food and nutrition, and job-readiness. County K-State Research and Extension agents work with such local collaborators as SRS (Kansas Department of Social and Rehabilitation Services), health departments, Head Start, and others to deliver these new educational programs.
- c. Source of Funding – State Matching
- d. Scope of Impact – State Specific

Key Theme – Youth Development/4-H

Developing 4-H Volunteers

- a. A healthy and vibrant 4-H program utilizes adult volunteers to plan, manage, and implement educational learning experiences for youths in their communities. To assure that these adults will be successful in accomplishing their goals, the 4-H program focuses on providing opportunities for them to strengthen their skills and expand their knowledge base in a variety of topics. This approach to volunteer development includes written job descriptions; matching of the volunteer’s skills and interests with the jobs that need to be done; an orientation to the 4-H program philosophy of youth development; training in specialized subject matter areas as well as on general topics; the opportunity to put their knowledge to work; recognition for their achievements; and the opportunity to evaluate their experience.
- b. As a result of the volunteer development process, K-State Research and Extension 4-H volunteers are prepared to make a positive difference in the lives of young people across the state.
- c. Source of Funding – State Matching
- d. Scope of Impact – State Specific

4-H Generating New Ideas to Help Kids

- a. The goals of 4-H programs—teaching life skills, providing the opportunity to master them, and encouraging responsible citizenship—remain the same, but some program delivery is changing. Because the social climate in which kids are growing up is changing, 4-H, with input from K-State Research and Extension program planners, is strengthening programs that emphasize life skills and developing new program concepts to offer the best possible educational opportunities

for young Kansans.

- b. An important part of citizenship is learning to work well with others, so 4-H organized a program to help students get acquainted with their neighbors.

A new program in northeast Kansas is a good example. 4-H agents there have developed the Kansas River Youth Leadership (KRYL) program, which introduces youths to responsible citizenship and leadership with support from the Kansas 4-H foundation and the Ewing Marion Kauffman Foundation.

- c. The trial venture introduced 36 students (average age of 16) to local and state governments and included a legislative day in Topeka. Students learned more about their neighbor's diversity by attending a graduation pow wow at Haskell Indian Nations University in Lawrence and by visiting the Fort and prison in Leavenworth.
- c. Source of Funding – State Matching
- d. Scope of Impact – State Specific

4-H Essential Principles: Character Education

- a. Over the past 20 years, Project ESSENTIAL has been developed, piloted, and evaluated with more than 10,000 students and teachers in the greater Kansas City area. The program is designed to develop self-esteem, moral reasoning skills, character, and integrity in children. In 1990, the Kauffman Foundation engaged in a 5-year research initiative to determine the effectiveness, and in 1995, the Teel Institute was established to continue the work and expansion of Project ESSENTIAL involving 4-H clubs and after-school groups in informal settings.
- b. Kansas 4-H sees this program as a promising approach that will address five of the nine Developmental Outcomes of healthy communities identified by the Governor's Substance Abuse Prevention Council, and is closely linked to the eight critical elements of youth development identified by the National 4-H Impact Study.
- c. Source of Funding – State Matching
- d. Scope of Impact – State Specific

4-H Reaches Out to All Youths

- a. People sometime think that 4-H targets rural audiences. It is true that the program was originally planned to provide educational opportunities in rural America, but the majority of students who now benefit from today's 4-H programs live in urban and suburban areas. About 29,000 students in the state are 4-H club members; another 60,000 students benefit from school enrichment programs each year, like the Old Sedgwick County Fair Education Day. The re-creation of a circa 1870 county fair for students K-8 provides learn-by-doing activities to help children develop a better understanding of the role of agriculture in their daily lives and local history. The educational event is a cooperative effort with the Old Cowtown Museum and dozens of volunteers.
- b. Also in Sedgwick County, K-State Research and Extension agents collaborated with other health, education, business, and youth organizations to develop an environmental education series

for 1,000 middle school students. The learning sessions concluded with an environmental awareness conference at the end of the school year. The collaborative class earned a national educational award, a Pollution Prevention Award from the Kansas Department of Health and Environment, and raised the level of environmental consciousness in young people.

- c. Source of Funding – State Matching and Smith-Lever
- d. Scope of Impact – State Specific

Helping Stop Drug Use in Shawnee County

- a. Federal funding is helping K-State Research and Extension work with other state agencies on the Shawnee County Methamphetamine Awareness Project. Goals of the project are to 1. Reduce the supply of methamphetamine in the county by reducing the availability of precursor products used in the manufacture of methamphetamine and 2. Reduce the demand for methamphetamine in the county by providing opportunities for youth education and community awareness about the dangers of this drug.
- b. K-State is responsible for targeting rural areas in Shawnee County through educational presentations to reduce the theft of anhydrous ammonia and increase awareness about its use as a methamphetamine precursor product. Target audiences will include farmers, farm supply stores and co-ops. K-State also is providing education about alcohol and other drugs including methamphetamine to youth through county 4-H and FFA programs.
- c. Source of Funding – Smith-Lever and State Matching
- d. Scope of Impact – State Specific

4-H Builds Community in Classrooms

- a. The Sedgwick County K-State Research & Extension 4-H Youth Classroom 4-H clubs at Horace Mann Elementary School began a three-year pilot program in 1997 with two participating classrooms and 50 to 55 students. In subsequent years, the program grew to include six classrooms, including three bilingual classrooms and about 150 students.
- b. The participating school and 4-H staff have observed positive changes in behavior and attitudes of the students involved in the Classroom 4-H program. According to school staff, the children have increased teamwork skills while working to achieve their self-set goals, and attendance has increased on 4-H meeting days. Now, the students are moving up to middle school, and their teachers want 4-H at that level.
- c. Source of Funding – Smith-Lever and State Matching
- d. Scope of Impact – State Specific

Cheyenne County Prepares Youths to be Responsible Citizens

- a. K-State Research and Extension is working in all Kansas counties to foster development of youth. One example is in Cheyenne County where there are some 800 youths ages 18 and under who face the same pressures as youths everywhere, including problems with alcohol, drugs, smoking, and peers. That is why helping youths acquire valuable life skills such as responsibility,

leadership, and genuinely earned self-esteem is so important.

- b. Through four 4-H clubs in the county, K-State Research and Extension has been helping youths with numerous projects and activities that help them learn how to succeed and grow into productive citizens. The 4-H members are learning leadership in their 4-H projects by serving as officers and committee chairs. They are learning self-esteem and confidence through sharing project knowledge and skill with others, speaking in front of groups, and serving others in their communities. They are expanding their knowledge and skill base through their projects. They also are learning responsibility for their actions within their clubs by completing projects and records and working with adult leaders in Cheyenne County. They receive support from those leaders, parents, and concerned adults in the community as well as from K-State Research and Extension staff.
- c. Source of Funding – Smith-Lever
- d. Scope of Impact – State Specific

OPEN-K Helps Native American Youths

- a. Through the OPEN-K project, K-State Research and Extension is a partner with Haskell Indian Nations University in Lawrence on the American Indian Extension Youth Leadership program. It focuses on activities and education that can empower American Indian youths to grow and develop self-respect, dignity, self-sufficiency, and self-determination. OPEN-K stands for Opportunities for Prevention Education and Networking in Kansas.
- b. The program will serve as a hub to connect nine targeted American Indian communities on tribal land and in Kansas cities so they can benefit from each other's youth development experience and knowledge. Efforts are being made to identify people in the Native American communities to interact with American Indian youth and mentor them so they can achieve their potential in tomorrow's economy and society while honoring their cultures and traditions.
- c. Source of Funding – USDA Grant
- d. Scope of Impact – State Specific

Key Theme – Other - County Government

Kansas County Government Fiscal Database

- a. The K-State Office of Local Government has developed a database that tracks 34 categories of county expenditures and 20 categories of revenues since 1989. The availability of this information makes possible a whole new range of educational resources, technical assistance services, and applied research opportunities dealing with Kansas county government. The objectives of this project are to help local officials manage county government finances more effectively and save Kansas citizens tax dollars. Educational programs were delivered to 71 counties in 2000. Combined with 1999 outreach, programs were delivered to 99 of Kansas' 105 counties.

- b. The program reached an estimated 93% of the target clientele.
- c. Source of Funding – State Matching
- d. Scope of Impact – State Specific.

<http://www.oznet.ksu.edu/forage>

B. STAKEHOLDER INPUT PROCESS

The stakeholder input process is a comprehensive effort to seek input throughout the planning process. Ongoing oversight and review by stakeholders involve three key points: (1) each county uses the Program Development Committee to determine current priorities; (2) an integrated Research and Extension Advisory network regularly identifies issues and priorities for area Extension faculty and off-campus Research faculty; (3) the State Extension Advisory Council meets biannually to review Research and Extension priorities for a multicounty area.

The usefulness of the process is apparent through the identified priorities and the commitment of the stakeholders to the process.

C. PROGRAM REVIEW PROCESS

There have been no significant changes in the program review process since the 5 - Year Plan of Work was submitted.

D. EVALUATION OF SUCCESS OF MULTI AND JOINT ACTIVITIES

1. K-State Research and Extension has formed numerous teams to develop research and outreach plans around the 16 issues that were identified in the initial plan. Working in teams that include both research and extension faculty is a new experience for many faculty members. Some teams function well, while others have a plan on paper and some implementation but lack the energy and synergism that comes from optimal team interaction. We anticipate that, over time, faculty will prefer to work in a team environment; the issues we hope to solve are systems problems that require multidisciplinary expertise. Competitive funding opportunities frequently require multidisciplinary, multiuniversity, and research and extension participation in the project; this arrangement will also stimulate teamwork.

- d. Livestock waste issues as part of a comprehensive production system

Emotion sometimes has a louder voice than science when it comes to waste management issues. Do lagoons leak? Can large dairy operations be environmentally safe? Questions such as these are complex to answer and require good research along with an effective extension mechanism to get the information to decisionmakers and producers. One team has taken on this problem. An outline (See Appendix C) shows the work being done and some of the new opportunities that are evolving as the 5-year plan progresses.

- b. The Forages Program is multistate (IA, KS, MO, & NE), multi-institutional, and

multidisciplinary (agronomy, animal science, economics, entomology, and plant pathology) with joint research and extension activities that address issues identified in the 5 - Year Plan. Work underway is being conducted as part of NC-225 (Improved Grazing Systems for Beef Cattle Production). An initial version of a user -friendly, Windows-based software program (KansasGrazer) has been completed which will allow individuals to estimate and compare annual forage production and livestock demand. The KansasGrazer software helps livestock producers identify potential imbalances in their existing grazing system and also isolates potential changes in order to make more informed management decisions. Preliminary results from the grazing systems study have shown animals from the more densely stocked intensive -early system had similar early and late gains but produced more beef on a land area basis than continuously stocked pastures.

Livestock producers in southeast Kansas need high quality forages to complement grazing of tall fescue, especially during the summer months when fescue forage production declines and animal performance is reduced by the fescue endophyte. Crabgrass requires a high level of nitrogen fertilizer. Adding the legume lespedeza reduced the nitrogen fertilizer requirement and extended grazing of high quality forage in late summer. Available forage dry matter, grazing steer performance, subsequent finishing performance in the feedlot, and overall gains were similar between pastures of crabgrass fertilized with nitrogen fertilizer and those interseeded with lespedeza.

These issues were identified as being critical by ranchers and the associated agribusinesses based on input through advisory councils, other direct input through county agents, and others. The expected outcome of the Forage Program is to provide ranchers with improved grazing systems with greater profits from livestock - forage systems. The computer software provides ranchers with an economic analysis framework for evaluating different grazing systems based on Kansas data. Ranchers are using the software to evaluate alternative grazing strategies, and they have already identified factors that influence grazing land costs and profitability.

2. Small-scale producers have been underserved because they have not been segmented as a separate, distinct audience. The science that supports the small -scale producers is the same science that supports large-scale producers. With some new funding from the Kansas Legislature, a Center for Sustainable Agriculture and Alternative Crops was established; this will help K-State Research and Extension focus on unique needs and scale of production issues faced by small-scale and part-time producers.

Through a very good working relationship with Haskell Indian Nations University, K-State Research and Extension faculty are working on several agriculturally related issues on reservations. One project is a water quality oriented effort with buffer strips and stream bank

plantings to reduce erosion and prevent nonpoint materials from reaching the water. Another project is the development of an orchard where organic production practices are used. The most extensive efforts on the reservations are youth development programs conducted jointly between Haskell and K-State Research and Extension faculty.

3. Multistate activity as discussed in the initial plan continues. Because we are more conscious of the need to work with other universities to be more competitive in receiving grant funding, the level of this effort has increased in the last few years. Budget constraints have also forced land-grant universities to work together more closely in order to develop the depth and breadth of science needed for many projects.
4. We have learned quite a lot through the process of developing and implementing this 5-year plan. We talk about stakeholder input, and we devise methods for gaining stakeholder perspectives on issues and priorities. This is important from the perspective of perception – people we serve feel that they are heard and have input. At a given point in time, issues don't vary much from county to county, state to state, or even nationally; this is verified by comparing the issues that states have identified in their plans. What does change is the priority that people in communities and in states place on different issues.

We have learned that the Logic model is an excellent project management framework that works for joint research/extension projects. We have made some minor language changes to the model which makes it more user friendly to researchers. When we develop our next 5-year plan, we will put the greatest emphasis on the short- and medium-term outcomes and the long-term impacts that we anticipate will occur from our work. Crisp, specific outcome statements provide a benchmark that makes the evaluation process much easier.

We have determined that different levels of evaluation should be used for different issues. For some, examples of how K-State Research and Extension has solved the problem and how stakeholders have used the science-based information in their business/life meet the accountability requirements. For others, more extensive evaluation is needed to convey the social, environmental, or economic impact that has been achieved; decisions need to be made during the planning phase as to what level of evaluation/documentation will be utilized with a given project.

K-State Research and Extension has conducted two statewide marketing surveys to determine the support/approval rating that taxpayers in Kansas have for K-State Research and Extension. Here is a quote from Mr. Ron Arp from Fleishman-Hillard, Inc., an international communications and marketing organization, following the second survey: "Your program remains off the charts with regard to the number of Kansans that feel it [K-State Research and Extension] is important (94%) and those who approve of spending

public funds (89%) for it. The consistency shows that people are very supportive of the concept [Land-Grant] behind your program.”

Survey information generated through a scientific process by an independent, credible source is very powerful. We have found that these data, along with several examples of project impact, are very effective ways of communication with decision - makers at all levels of government.

E. MULTISTATE EXTENSION ACTIVITIES

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

Institution Kansas State University
 State Kansas

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

	Actual Expenditures				
<u>Title of Planned Program/Activity</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003</u>	<u>FY 2004</u>
Collaboration at National and Regional committees, meetings, and projects.	58,614				
Total	58,614				

SUPPLEMENT TO THE 5-YEAR PLAN OF WORK
MULTISTATE EXTENSION ACTIVITIES

ACTUAL EXPENDITURES FOR FY 2000

The multistate interactions at Kansas State University, as listed in the approved 5-Year Plan of Work, represent participation at national and regional professional meetings by extension specialists, county agents, and faculty. The amount reported on Form CSREES-REPT represents actual expenditures from federal funds.

F. INTEGRATED RESEARCH AND EXTENSION ACTIVITIES

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

Institution Kansas State University
 State Kansas

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

Actual Expenditures

<u>Title of Planned Program/Activity</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003</u>	<u>FY 2004</u>
NC 205	5,608				
Pecan Fields	25,478				
Institutional engagement	672				
Total	31,758				

Form CSREES-REPT (2/00)

SUPPLEMENT TO THE 5-YEAR PLAN OF WORK
INTEGRATED ACTIVITIES - HATCH ACT FUNDS

ACTUAL EXPENDITURES FOR FY 2000

NC-205: Ecology and Management of European Corn Borer and Other Stalk-Boring Lepidoptera.

The amount reported represents actual federal expenditures for FY 2000.

Pecan Field Study: Joint research and extension activity to study pecan hybrids as alternative agriculture.

The amount reported represents actual federal expenditures for FY 2000.

Institutional Engagement: Attendance at regional research and extension meetings.

The amount reported represents actual federal expenditures for FY 2000.

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

Institution Kansas State University
 State Kansas

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

<u>Title of Planned Program/Activity</u>	<u>Actual Expenditures</u>				
	<u>FY 2000</u>	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003</u>	<u>FY 2004</u>
NC 205	0				
Pecan Fields	0				
Environmental management of livestock systems	11,309				
Grazing, land and forage issues	37,226				
Plant Biotechnology	20,325				

Total

68,860

Form CSREES-REPT (2/00)

SUPPLEMENT TO THE 5-YEAR PLAN OF WORK
INTEGRATED ACTIVITIES - SMITH LEVER FUNDS

ACTUAL EXPENDITURE FOR FY 2000

NC-205: This program was completed in FY 2000 but expenditures were made solely from state funds.

Pecan Fields Study: This program was completed in FY 2000 but expenditures were made solely from state funds.

Environmental Management of Livestock Systems - Action Plan number NREM 1.3

The amount reported represents actual federal expenditures for FY 2000.

Grazing Land and Forage Issues - Action Plan number AIC 2.5

The amount reported represents actual federal expenditures for FY 2000.

Plant Biotechnology - Action Plan number AIC 5.3

The amount reported represents actual federal expenditures for FY 2000.

Appendix A

KANSAS STATE UNIVERSITY FISCAL YEAR 2001 ESTIMATED SOURCE OF FUNDS FISCAL YEAR 2000 ESTIMATED & ACTUAL SOURCE OF FUNDS			
February 23, 2001	FY 2000	FY 2000	FY 2001
	Estimate	Actual	Estimate
RESEARCH			
Base Programs	\$3,350,790	3,586,870	3,535,222
Special Research Grants	3,061,260	2,386,511	2,600,000
Competitive & Other Grants	5,433,014	7,050,110	6,500,000
Total Federal Distribution	11,845,064	13,023,491	12,635,222
State Appropriation and Match	28,177,159	27,372,759	29,119,088
Total Research Funding	<u>\$40,022,223</u>	<u>40,396,250</u>	<u>41,754,310</u>
EXTENSION			
Base Funding (Including CSRS Ret.)	\$5,051,894	5,748,445	5,043,159
National Priorities	926,334	863,904	850,000
Other Extension Programs			
RREA	42,112	42,112	42,000
FERS Ret.	200,469	191,742	190,000
Total Federal Distribution	6,220,809	6,846,203	6,125,159
State Appropriation and Match	17,161,352	16,622,794	17,737,964
County Contribution	15,350,000	14,566,717	15,891,855
Total Extension Funding	<u>\$38,732,161</u>	<u>38,035,714</u>	<u>39,754,978</u>
Kansas State University Research & Extension			
Research and Extension: Federal	\$18,065,873	19,869,694	18,760,381
Research and Extension: State	45,338,511	43,995,553	46,857,052
Research and Extension: County	15,350,000	14,566,717	15,891,855
Total Appropriation	<u>\$78,754,384</u>	<u>78,431,964</u>	<u>81,509,288</u>

Appendix B

KANSAS STATE UNIVERSITY			
FISCAL YEAR 2001 ESTIMATED SOURCE OF FUNDS			
FISCAL YEAR 2000 ESTIMATED & ACTUAL SOURCE OF FUNDS			
	<u>FY 2000 Estimate</u>	<u>FY 2000 Actual</u>	<u>FY2001 Estimate</u>
Research Base - Federal		3,350,790	3,756,006
State Fed Shift		236,080	-220,784
		<u>3,586,870</u>	<u>3,535,222</u>
Research Base - State			
Base		28,177,159	28,898,304
Fed Offset		-236,080	220,784
Reductions		-568,320	0
		<u>27,372,759</u>	<u>29,119,088</u>
Extension - Federal			
Base		5,185,804	4,703,061
Fed State Shift		151,194	-103,931
CSRS		411,447	444,029
		<u>5,748,445</u>	<u>5,043,159</u>
Extension - State			
Base		17,161,352	17,634,033
Fed Offset		-151,194	103,931
Reductions		-387,264	0
		<u>16,622,894</u>	<u>17,737,964</u>
County Expense: see Bob's report			
National Priority			
Integrated Pest Mgmt		180,200	180,000
EFNEP		669,934	670,000
Farm Safety		13,770	0
		<u>863,904</u>	<u>850,000</u>

Appendix C

TEAMREPORT

Develop Efficient, Coordinated Livestock Production Systems: Environment

Pat Murphy

RESEARCH

Lagoons, liner aspects - Jay Ham

nutrient verification for HB2950- Joel Derouchey/Robert Goodband

Bacteria, Chuck Rice, George Marchin - DNA tracking

Nutrition, animal science

Field application- Alan Schlegel, Mahbub Alam/Freddie Lamm, -drip irrigation

EXTENSION

Dairy, Harner/Strahm - KDHE dairy housing/waste demonstrations in counties

Beef, Murphy/Harner - 1000 head or less feedlot demonstrations

Swine, Murphy - 2950 KDHE certification meetings,

- Kansas Department of Agriculture regulations

(Whitney, Pierzynski, Dhuyvetter)

All species - EPA National Curriculum Manure Stewardship Project/Power Point/Website - 30 lessons

Clean Water Foundation – On Farm Environmental Assessments

NEW ISSUES

KSU North Farm Manure Research/Demonstration

KDHE Permits - Murphy/Harner

KCARE

Center Pivot Application - Gary Clark/Dan Rogers

Compost - Harner, Murphy

Wetland - Mankin, Hutchinson

On-site Treatment, Dallemand, Powell

Watershed specialists - county agents - NRCS

New EPA/KDHE regulations -

Consultants/Environmental Assessments -

Facility/lagoon runoff control systems

Site odor measurement