



Kansas State University Agricultural Experiment Station and Cooperative Extension Service

K-State Research and Extension *2001 Annual Report*



K N O W L E D G E f o r L I F E



Dean's Introduction

Our Programs Are Accountable

The consolidation of agriculture and the influence of outside funding on K-State Research and Extension have been topics of discussion during state tours that faculty members have taken at the request of the Legislature.

Change has been the hallmark of Kansas agriculture. Farms and rural communities have gone from simple, self-sufficient places to complex business and industrial partners tied to national and world economies. Cities and towns have experienced wrenching changes, too, and are in need of the kind of educational programs and unbiased scientific information that we provide.

To make sure we are on the right track, we are building in new methods to measure the impact and success of what we do. We also are undertaking various means to keep our clientele informed about our programs and their impacts.

It becomes statewide news when we receive large sums of money from corporations, but the entire commercial sector funds just 5 percent of all research conducted by K-State Research and Extension.

Sometimes, by its very nature, research is controversial, but it must be done, and the information it provides must be published. All of the research conducted at the university is subject to a great deal of state and federal oversight. We respect and welcome that oversight as a part of discovering new information.

According to the 1998 publication *Value Added: The Economic Impact of Teaching and Research at Kansas State University*, K-State returns nearly \$17 for every \$1 of state funding it receives. We can take pride in knowing we've taught Kansans so many ways to improve the quality of their lives, develop strong communities, improve economic well being, be safer and healthier, and—quite literally—play a major role in feeding the world.

In addition to the 5 percent of research funded by industry.

- 52 percent is funded by state government;
- 7 percent is funded by the federal government through formula funds;
- 15 percent is funded by sales of crop or livestock products grown during the research;
- 15 percent is funded by competitive federal grants; and
- 6 percent is funded by nonfederal grants.

K-State Research and Extension has many checks and balances, including:

1. Public advisory committees;
2. Local, state, and federal reporting, as well as budgeting;
3. Periodic program audits;
4. Peer reviews; and
5. Annual evaluations with input from publicly elected officials and peers outside of K-State Research and Extension.



K-State's Mission as a Land-Grant University

The Role of K-State Research and Extension

As the nation's first and oldest land-grant university, K-State is distinguished from other Regents' universities by its College of Agriculture, College of Veterinary Medicine, College of Human Ecology, College of Engineering, and the Kansas State University Agricultural Experiment Station and Cooperative Extension Service. K-State educates professionals in the sciences, engineering, and in business. That education is applied to the vast agricultural and food industries, including production agriculture; agricultural input supply and finance; agricultural processing for food and materials; agricultural policy and communication; and other fields related to products originating from plants, animals, and natural resources.

K-State works directly with many kinds of agricultural producers who have a broad philosophy about how best to steward natural resources. K-State applies chemistry, engineering, and business in search of practical ways to add value to Kansas crop and livestock commodities, resulting in higher prices for farm products and jobs in Kansas communities. K-State utilizes science and care to improve animal health. K-State applies microbiology, toxicology, and engineering to discover cost-effective ways to keep food safe from farm to table. K-State applies soil science, engineering, and economics to generate cost-effective tools for farms, households, and communities to complete their tasks with environmental responsibility. K-State uses molecular biology and biochemistry to improve crop and livestock genetics to keep Kansas agriculture competitive worldwide and to keep the world's burgeoning population alive in the future. K-State applies all of its disciplines to educate young people to be effective citizens and creative in the workforce.

K-State applies all of its knowledge to build youth, communities, families, and agricultural businesses across income levels, sizes, cultures, and philosophies. Kansas State University remains true to the original mission of the land-grant university system: to generate knowledge and disseminate it to students and every citizen who wants it.

The Role of K-State Research and Extension.

As the only statewide university network, K-State Research and Extension conducts research and provides practical information, education, and training on issues that Kansans consider important and helpful in improving their lives, farms, organizations, businesses, families, or communities.

What kind of information and training?

Our work affects every aspect of life—from ensuring a plentiful, nutritious, safe, and acceptable food supply, to promoting a desirable quality of life, to preserving natural resources. Through science-based programs, we address complex and critical problems and deliver our findings in person or by public presentations, demonstrations, publications, computer networks, CD-ROMs, satellite and video technology, newspapers, radio, and television.

Why address current issues and statewide concerns?

K-State Research and Extension is a short name for the Kansas State University Agricultural Experiment Station and Cooperative Extension Service, a partner in the nationwide land-grant system of universities that was created in the 1860s to educate people from all walks of life and to generate and distribute useful public knowledge. K-State scientists and extension faculty can draw on the expertise and accumulated studies and discoveries of the land-grant system, other universities, state and federal agencies, and industry. Headquartered on campus in Manhattan, K-State Research and Extension includes statewide county extension offices, research centers, and experiment fields supported by county, state, federal, and private funds.



Playing a Major Role in K-State's Ranking as a Major Research University

For the first time in its history, K-State's research base grand total exceeds \$100 million, which is one reason the Carnegie Foundation has ranked K-State as one of the nation's major research universities in the doctoral/research classification.

In 1998, a study was done on the impact of K-State on the Kansas economy. For every dollar received from the state, the university returned \$17 to the state's economy. According to data from the U.S. Commerce Department, more than 40 jobs are created in Kansas for every million dollars of research awards to the university, so the sizable increase in K-State's research funding in recent years is helping fuel the Kansas economy.

New Patents

Nine new patents were issued last fiscal year, including a new therapy for cystic fibrosis. This work was supported by K-State Research and Extension and led to the founding of Nacelle Therapeutics, a company that uses synthetic peptides to replace defective ion channels characteristic of such genetically based diseases as cystic fibrosis. The company's competitive position is based on intellectual property and the specialized know-how developed by J.M. Tomich and colleagues. Tomich is a biochemist with K-State Research and Extension.

New Businesses

AgriEnergetics is the second recent start-up business that utilizes research and development from K-State Research and Extension. It is based on a new livestock monitoring technology called infrared thermal imaging. When used to manage feedlot cattle, it has the potential to bring about significant reductions in carcass quality losses that amount to about \$3.5 billion annually.

The AgriEnergetics technology derives from intellectual property developed by Mark Spire and colleagues. Spire is a professor of thermography in K-State Research and Extension and with the Food Animal Health and Management Center in the K-State College of Veterinary Medicine.

The Beneficiaries.

Extramural funding directly supports research assistantships for hundreds of graduate students in K-State's 107 graduate programs, and K-State undergraduates have opportunities to participate in research projects alongside nationally recognized faculty members. Kansas citizens also benefit in many ways from K-State research.

Another K-State start-up company, Kansas Advanced Technologies—KATS—is developing new products from Kansas agricultural products based predominantly on the research of grain scientist Susan Sun.

KATS received a small business award from the USDA to continue developing livestock feed supplement containers from straw and binders that are derived from natural products. Such containers are edible and biodegradable and last more than two months outside in the field.



A Major Player

K-State Research and Extension also has contributed in many other important ways to the ranking of the university as a major research institution. The organization has made important advances in food safety and crops that are more disease resistant and less susceptible to environmental stresses.

Water safety is another important research focus. Residents of Scott County in western Kansas are dependent on groundwater in an area where agriculture is the chief industry. Some of the water used for personal consumption and for crops is contaminated by agrochemicals used on crops. The Kansas Agromedicine Outreach Program provided a trio of K-State researchers and scientists from the University of Kansas Medical Center to examine the health statistics of Scott County residents.

Another example of the important work being done: water purification and water recycling experiments by K-State Research and Extension scientists were aboard the Space Shuttle Columbia launched this past summer.

Another contribution is the creation of the Great Plains Cereal Grains Biotechnology Consortium, which is concentrating on improving production and profitability of wheat, corn, and sorghum through biotechnology. The consortium pools the strengths and resources of K-State, University of Nebraska, Oklahoma State University, and the private Noble Foundation of Ardmore, Okla.



The University's Role in Controversial Issues

K-State Research and Extension has a responsibility to provide 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.

Over the past three years, K-State Research and Extension scientists have:

1. Measured directly the seepage rate of 15 lagoons to determine if lagoons meet Kansas Department of Health and Environment seepage rate requirements;
2. Analyzed the waste composition of over 60 lagoons;
3. Cored the soil under lagoons to determine the fate of nitrogen in seepage and its potential to contaminate groundwater;
4. Cored agricultural fields where livestock or municipal waste has been applied to assess the potential for groundwater contamination from land application.

K-State scientists are currently evaluating a computer-based decision aid that will specify liner requirements and separation distances from water wells. **The Kansas Department of Health and Environment plans to utilize this information and the decision aid in drafting new site-specific requirements for lagoons that will protect groundwater while not overregulating sites that have low risk for groundwater contamination.**

The results of these efforts led to the conclusion that lagoon design should be done on a site-specific basis that takes into account the aquifer, soil, and other characteristics at the proposed site. The data from the study were used as a guide to formulate statewide policy on building animal waste lagoons. Prior to this study and the subsequent policy, some were calling for a moratorium on all new livestock facilities that would require waste lagoons.





K-State
Analytic
Processing
Lab

A Five-Year Plan Centered on Four Core Mission Themes

Three years ago, to continue to meet the needs of Kansans, K-State Research and Extension established a five-year plan divided into four areas:

1. Food, Nutrition, Health, and Safety
2. Agricultural Industry Competitiveness
3. Natural Resources and Environmental Management
4. Youth, Family, and Community Development

Food, Nutrition, Health, and Safety

K-State Research and Extension is a national leader in food-safety programs. K-State scientists and educators are focusing on developing and promoting a safe food supply from production to consumption; promoting healthier and safer lives; and developing new and appealing food products.

Food Science Institute Established. To utilize the entire food science resources of K-State Research and Extension, a Food Science Institute was established in 2001.

By combining its existing resources in education, research, and extension, the university can enhance the coordination, visibility, and capacity of food science programs that serve students, consumers, clientele in the food industry, the scientific community, and government agencies.

The university's current programs include food chemistry, human nutrition, food engineering, food microbiology, food safety (both preharvest and postharvest), physical chemistry and rheology, product development, sensory analysis, cereal science, fruit and vegetable processing, dairy food technology, meat science, poultry and egg science, food toxicology, and foodservice.

In addition to building on its strengths, the Institute will explore new ways of information delivery such as distance learning and new degree programs.

Serving Safe Food Program (SERVSAFE). A component of the overall statewide K-State Research and Extension interdisciplinary farm-to-table food-safety effort, SERVSAFE provides manager certification in safe food handling and sanitation through statewide workshops. **A collaborative program with the Kansas Department of Health and Environment, it is required by many national food operations such as McDonald's Restaurants.** Participants learn the principles and practices of food safety in foodservice establishments, including food-safety hazards; how to serve food safely; the safe food handler; HACCP; keeping food safe—from purchasing and receiving through preparation and service; and maintaining sanitary facilities and equipment. The course concludes with an 80-question certification examination. Assisting the extension agents and specialists with the workshops are inspectors and sanitarians from the Kansas Department of Health and Environment and local health departments.

A National Leader in Food Safety.

It's no accident that K-State Research and Extension is a national leader in food-safety research and education. K-State scientists have been in the forefront of making new discoveries and developing new processes that are helping the meat industry make safer products and reassuring consumers that those products are safe to eat.

In research, successful work has been done in such areas as steam pasteurization of slaughterhouse carcasses, processed meat validation studies, and detecting the prevalence of the pathogen *E. coli* in beef cattle herds from farm to feedlot. Work also has focused on creating new safety standards for ground beef and microbiological and chemical testing for early detection of microorganisms.

Extension efforts have involved food-safety training, putting food-safety advice on the World Wide Web, and providing information on shelf-life studies of food products.

The Hazard Analysis and Critical Control Point Program. All state and federally inspected meat and poultry processing plants in the United States are required to establish a preventative food-safety system called Hazard Analysis and Critical Control Point or HACCP. **K-State Research and Extension has been providing HACCP training programs for meat processors, foodservice personnel, and others involved in food production, distribution, and marketing. HACCP focuses on preventing hazards, relies on science, and places food-safety responsibilities on food operations.**

Product that Reduces Fat in Rats and Pigs Could Benefit Humans. K-State Research and Extension has shown that modified tall oil (MTO) in rat and pig diets reduces fat—in rats by as much as 21 percent body fat and 50 percent abdominal fat. MTO comes from pine trees and is similar to polyunsaturated fatty acids in vegetable oils. The researchers would like to use MTO as a dietary supplement to lower body fat in humans and expect to begin trials soon. MTO also could be a value-added product for the paper and pulp industry. Consumers could benefit because the meat they buy at the grocery store will lose less moisture, slice better, and be slightly darker. Meat from MTO-fed pigs will have an additional two days of product shelf life.

Garlic Can Protect Against Food Microorganisms. A recent study determined that two to five teaspoons of garlic powder added to ground meat can provide protection against the deadly pathogen *E. coli* O157:H7 in undercooked meat products. An earlier study indicated that garlic and four other spices—cinnamon, oregano, cloves, and sage—made ground beef safer. The added benefit is that spices make food taste better. The garlic and other spices give added protection but do not substitute for good cooking practices, including cooking meat to a temperature of 160°F.

The PATH to Health and Wellness. Helping older Kansans stay healthy is the focus of the PATH project. In cooperation with the Kansas Health Foundation, PATH (Personal Actions to Health) has established 129 exercise and nutrition programs for older adults across the state. The program also is focusing on research that involves assessing statewide health intervention programs.

The Family Nutrition Program (FNP). This project works with low-income citizens in Kansas to provide nutrition education and food safety. In southwest Kansas, the program focuses on the Latino community.

Helping Older People with Disabilities. Safety hazards and accessibility barriers limit those with disabilities to safely perform the daily activities for living independently. K-State Research and Extension helps older people identify hazards and barriers in their homes and implement solutions. More than 20 counties have provided programs on devices that assist people with such disabilities as mobility problems, blindness, or hearing impairments.

The Office of Community Health.

As part its responsibilities, this office offers such aids as distance learning, networking, help with training, a healthy youth evaluation system, and basic and applied research expertise and support. For example, one program, Healthy Places, focuses on helping communities create healthy environments by coordinating community resources. Other programs involve stroke prevention, youth development, arthritis assistance, and more.

Providing Nutrition Education. Low-income families with children can learn through the Expanded Food and Nutrition Education Program (EFNEP) to develop skills and attitudes needed to improve their diets. Through EFNEP, K-State collaborates with WIC (Women, Infants, and Children) agencies, Head Start programs, and other state agencies.

Detecting Microorganisms in Food. For more than 20 years, K-State has held the Rapid Methods and Automation in Microbiology International Workshop and Symposium. It attracts more than 1,500 participants from around the world who come to K-State for eight days of intensive training in the practical application of conventional and new commercial systems of rapid identification of microorganisms from food, water, medical specimens, and the environment. No other institution in the world offers such a comprehensive workshop of its kind, and it gives K-State Research and Extension a worldwide reputation for excellence in this area.

Helping People Cope with Arthritis. The PANE Project (Physical Activity and Nutrition Education) aims to improve the personal health of Kansans with arthritis. In cooperation with the Kansas Chapter of the Arthritis Foundation, PANE has a threefold purpose: 1. To determine the effectiveness of the Arthritis Foundation aquatics program. 2. Evaluate the effectiveness of omega-3 fatty acid on arthritis sufferers. 3. Develop educational and marketing programs that will provide information on arthritis.

Food Safety Consortium. The Food Safety Consortium conducts research on new ways to maintain and enhance food safety to ensure America will continue to enjoy high-quality food. The Consortium consists of K-State, the University of Arkansas, and Iowa State University, and its mandate is to investigate areas of poultry, beef, and pork production from the farm to the consumer's table. K-State's contribution involves beef research.

Testing a New Decontamination Foam. A new foam product that was found to kill anthrax spores also is being tested by K-State Research and Extension for application in the food and agriculture sectors.

Researchers are testing the foam, developed by Sandia National Laboratories, to kill such foodborne pathogens as *E. coli*, *Salmonella*, *Listeria*, *Staphylococcus*, and *Pseudomonas* (a spoilage organism) that may persist on equipment used to process food. Additional uses may be to sanitize meat cutters' equipment or to sanitize feedlot pens or poultry houses.

The product is nontoxic and noncorrosive, and it is more stable and more effective than other products now being used in the food industry.

Sandia Labs initially developed the foam to decontaminate tanks or other military equipment that might be exposed to various biological warfare agents. Sandia contacted K-State food scientist to test the product for food and agriculture uses.

Providing Nutrition Information.

Focus group research in Kansas found that people want more value for their food dollars. They also want nutrition education and for the information to be presented in Spanish as well as English. To meet this need, K-State Research and Extension produced and distributed nearly 13,000 bilingual brochures about Heartland SHARE, a cooperative food-purchasing program that is provided to Senior Services centers, domestic violence shelters, and other service and advocacy agencies.

Publication Helps with Food Safety.

A two-part publication, Food*A*Syst, has been developed by K-State that aids consumers, producers, and industry to independently evaluate and eliminate food-safety risks. Information ranges from food found in the home to food in the field, during harvest or slaughter, during transportation, or in storage or display. The publication also is available on the World Wide Web www.oznet.ksu.edu.



Agricultural Industry Competitiveness

In this area, K-State Research and Extension is developing better cropping systems; creating more efficient and profitable livestock production systems while protecting the environment; enhancing the value of Kansas agricultural goods; developing agricultural risk-management strategies; and improving agricultural technologies and information systems.

A Breakthrough in Swine Nutrition Research. Animal scientists with K-State Research and Extension are the first to discover that the reproductive performance of sows is improved by adding the feed ingredients carnitine (a vitamin compound) and chromium (a trace mineral). Both ingredients have proven safe and effective for raising healthy pigs. A New Jersey-based company, Lonza Inc., will market the product under the name Carnichrome®. Lonza representative Kevin Owen, said the company has already received “great demand” for the product.

Risk-Management Clubs. Because of the complexity of risk-management decisions, it is important for risk-management education to occur repeatedly and over time with the same learners. Producers must have sufficient understanding of the issues before they can make reliable business decisions. To foster this process, Risk-Management Clubs have been formed throughout Kansas. These groups of agricultural producers meet regularly and work with their local county agents and coordinators from K-State.

New Center Supports Sustainable Agriculture. Expanded research, education, and outreach on sustainable agriculture will be the result of the 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.

The Center assists farmers with identification and development of markets for products by collecting and analyzing basic information on the Kansas food system and by providing opportunities for production and direct marketing.

K-State Research and Extension also hopes to provide farmers with new research and information on organic products; energy-saving 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.

Crop Management and Marketing. The Crop Management and Marketing program helps Kansas agricultural producers increase profits by teaching them how to manage risks better, which should lead to more long-term survival and viability of Kansas farms. The environmental focus of this program will help producers and policy makers better understand the tradeoffs between profits and environmental soundness.

Reports of Progress. Each year, crop performance tests are conducted by K-State Research and Extension, providing growers with unbiased agronomic information on wheat, soybean, corn, sorghum, and other important Kansas crops. The first Reports of Progress began in 1937. Annual reports have been issued since 1955.

Research Leads to New Guidelines for Applying Swine Waste to Land.

Studies show that producers who regularly apply swine waste to farmland need to base their management decisions on test samples specific to the season and production phase they are in. The findings may dispel the practice of using published reference values for nutrient content in manure. K-State's findings also indicate differences in nutrient concentrations between lagoon waste in sow, nursery, finishing, and farrow-to-finish operations. As part of this study, K-State trained on-farm workers to take accurate samples from lagoons.

History CD Set Now Available. *Harvest of Knowledge*, a set of four CD-ROMs, is now available to the public for \$36.50. The set contains nearly all of the scientific publications issued by the Kansas Agricultural Experiment Station from its start in 1888 until 1945. The collection also contains more than 100 historic pictures, history of the Station, and special audio files. A review by Harvard University said, "It would be wonderful if every other major agricultural collection were as readily and easily accessible as the information on this tightly focused, useful disc."

Controlling Insects in Stored Grain without Pesticides. K-State is part of the new Consortium for Integrated Management of Stored Product Insect Pests. Involving two other universities and the USDA, the consortium's goal is to find alternatives to harmful pesticides in controlling insects in stored grain and foods. Two of the insecticides most used now are potentially harmful to humans and the environment. The consortium scientists are studying a wide array of pest-control methods, including natural controls such as combining heat treatments with insect hormone replacement or combining ultrasound with insect hormone replacement.

Heat Stress Management in Dairy Cattle. K-State scientists conducted research at dairies in Kansas and Nebraska to find ways to use fans and sprinklers to reduce heat stress in dairy cattle. They found that using fans and sprinklers in the dairies cooled the cows during the summer months, and milk production increased about 5 percent a year or from 750 pounds to 1,000 pounds of milk for each cow in the herds.

New Hard White Wheat Variety Released. Lakin is a new hard white wheat variety from the KSU Agricultural Research Center—Hays. Named after Lakin, Kan., the new variety is adapted primarily to southwest Kansas production. It performed best in both dryland and irrigated tests. The main advantage of Lakin over Trego, a previously released hard white wheat, is that it produces better noodle quality wheat and its bread is equal to Trego.

Forage Information Now Available on the Internet. 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 Web site www.oznet.ksu.edu/forage can help farmers improve their efficiency and their economic competitiveness. The site was built around information that producers said they wanted most.

Combating Barley Yellow Dwarf. Barley Yellow Dwarf (BYD) is an important disease of small grains including wheat. A main objective of K-State scientists combating this disease is to develop a method to screen breeding material in the field for reaction to BYD that correlates with yield loss. Once this has been accomplished, current commercial cultivars may be evaluated for reaction to BYD and the results disseminated to producers. The long-term goal of this research is to develop high-yielding, high-quality hard red winter or white wheat varieties adapted for Kansas with improved resistance to barley yellow dwarf.

The Importance of Wheat Breeding.

A majority of the wheat varieties planted in Kansas originate from K-State's wheat breeding program, which has been testing, developing, and improving wheat varieties for more than a century.

K-State Research and Extension has introduced many successful varieties, including Newton, Karl/Karl92, Trego, Stanton, Lakin, 2137, and Jagger. About 75 percent of the wheat acres in Kansas are planted to varieties developed at K-State. Jagger outperformed others this year, averaging nearly 60 bushels per acre.

Wheat released from K-State occupied 60 percent (or 5.5 million acres) of Kansas wheat land. An economic analysis of the K-State wheat-breeding program revealed that the average economic benefit to Kansas wheat producers is \$52.7 million. For each dollar invested in varietal development, nearly \$12 was earned by Kansas wheat producers.

New Guides for Feeding Lactating Sows. Researchers at K-State have developed a guide for producers that provides a quick and standardized reference for feeding sows during lactation. The one-page sheet with charts, pictures, and text is designed for posting in farrowing houses. Proper feeding during lactation is one of the most important aspects of managing sows in the farrowing house. KSU studies have shown that when sows consume more feed their milk production increases and litter weights improve.

Whole Farm Planning. K-State Research and Extension ag economists and agronomists are providing studies on Whole Farm Planning. Short-term profitability will increase as farmers learn to decrease input expenses and increase gross return through alternative and value-added marketing options. Long-term financial benefit will accrue to farms that preserve water quality and improve soil quality.

Diagnosing Plants at a Distance. Producers wanting help finding a solution to a plant problem can utilize a Web site to consult with K-State experts. They can send their own analyses and digital color photos taken on the spot to a county agent who will access the Web site for them. 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.

Wheat Genetics Resource Center. Wheat's ancestry can be traced to wild grasses of the Middle East. After being domesticated, those grasses subsequently flourished as food supply for the world. Today, the wild grasses that remain are crucial to future advances in wheat breeding. The KSU Department of Plant Pathology holds the nation's largest collection of wheat's wild relatives in its Wheat Genetics Resource Center.

The Center has more than 3,000 accessions of species and genetic stocks of *Triticum* and *Aegilops*, the two primary ancestral lines of modern wheat. Many are from Turkey, Israel, Lebanon, Syria, Iran, and Iraq.

The wild wheats in the collection are important reservoirs of useful genetic diversity that can be used against biological pests and environmental stresses that affect the yield potential, the yield stability, and the quality of wheat. The Center's primary task is to domesticate and transfer the genes to useful germplasm for use by plant breeders.

Germplasm releases from the Center contain new genes for resistance to many diseases and pests, including Hessian fly, greenbug, leaf rust, and soilborne mosaic virus. This new germplasm provides potentially inexpensive and environmentally safe control of these pests in the high-yield wheat varieties of tomorrow.

Everything You Want to Know about Bugs. More than a century of study and observation on bugs is available as a book—"Insects in Kansas"—from K-State Research and Extension. The book has more than 500 pages and 920 color photographs. As an insect guide, it can be used to identify insects in gardens, fields, orchards, and homes. Included are comprehensive notes on observation and collection of specimens and the effect of various species on crops, the environment, and other species. Entomologists from K-State and the Kansas State Board of Agriculture produced the \$25 book.

Extra Value Means Extra Income.

Many advances in food processing and marketing come from adding value to existing commodities and products.

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 production from wheat utilizing wheat milling by-products; and use of wheat for Oriental noodles.

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.

New Center Established to Support Value-Added Activities.

K-State and three other universities are sharing \$5 million from the USDA to establish a center that supports value-added activities. The center will provide additional resources for the development and marketing of value-added ventures.



Natural Resources and Environmental Management

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.

Solving Sewage Problems in Small Towns. Many small municipalities that are growing in population do not have the funds to upgrade their sewage treatment facilities. K-State Research and Extension is investigating a process that uses sewage to irrigate farmers' fields. The research is focusing on a project near Rossville that involves taking sewage water from the city's lagoon and flushing it through irrigation systems to water farm crops. The cost for the system is less than \$100,000 or a fifth of the cost of building a larger municipal lagoon. The sewage water is chlorinated to kill bacteria and other microbes. **Peggy Baird, who was mayor of Rossville, commented: "It's going to save us a lot of money because the only other alternative would have been to add another cell lagoon, and those are quite costly."**

Reducing Water Contamination. Fecal coliform bacteria are often present in Kansas surface waters. Researchers are working to identify potential sources of fecal coliform contamination and what Best Management Practices reduce that bacteria. Vegetative filter strips were shown to reduce concentrations of the bacteria at four K-State Research and Extension sites near feedlots.

Conserving Water Resources and Energy. Efficient use of water and energy resources is the focus of K-State irrigation management programs that include field studies of subsurface drip irrigation and multiyear, on-farm demonstration projects. These practices resulted in new irrigation system designs, more effective water usage, and increased economic returns from irrigated agricultural land.

Carbon Sequestration Could Be Very Good for the Environment. Preliminary findings show that carbon sequestration can help reduce global warming while also reducing soil erosion and water runoff. K-State is leading a consortium of nine universities that are studying agricultural practices that sequester carbon. They also are determining the economic benefits of this approach.

A Natural Way to Cut Pollution on Dairy Farms. 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 are harvested as forage for feed. This project helps producers learn about waste control practices that do not require investments in equipment to pump lagoons periodically.

Helping to Preserve the Ogallala Aquifer. A state task force recommended that K-State Research and Extension provide technical assistance and leadership for the Western Kansas Irrigation Research Project to reduce depletion of the Ogallala Aquifer. Efforts range from new irrigation systems to computer models that predict the effects of various uses on this important groundwater supply.

Watershed Specialists Help Clean Up Kansas Waters.

Five new watershed specialist positions have been created for such high-priority watersheds as the Blue River, Upper Delaware, Kansas Lower Republican, and Upper and Lower Arkansas basins.

Each specialist will work with producers to promote adoption and implementation of Best Management Practices associated with livestock management, waste management, nutrient management, pesticide management, soil erosion control, reduced tillage, and other conservation practices, including vegetative buffers on river banks.

The specialists also will work with local advisory committees, collaborating agencies, and others to plan and implement educational programs that meet local water-quality needs.

This new effort is a way for Kansans to voluntarily clean their water and thereby avoid regulation.



To Make
the Best
Better

I PLEDGE
my HEAD
to clearer thinking,
my HEART
to greater loyalty,
my HANDS
to larger service, and
my HEALTH
to better living, for
my club, my community,
my country,
and my world

Name Page
Flag Salute
Prayers and Hymns
Roll Call
Song

Youth, Family, and Community Development

The complex issues of today require new perspectives and skills. K-State Research and Extension provides them by helping to build strong, healthy communities; improve parenting skills and family relationships; prepare youth through 4-H and other programs to be responsible citizens; balance demands of work, family, community, and time for self; and develop consumer and financial management skills.

OPEN-K Helps Native American Youths. K-State Research and Extension is developing an OPEN-K program with Haskell Indian Nations University in Lawrence. 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. The program will serve as a hub to connect nine targeted American Indian communities on tribal land and in Kansas cities so that 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 that they can advance in society, particularly in Kansas.

A Program that Helps Reduce Juvenile Crimes.

Kansas is one of four states utilizing federal funds for Opportunities for Prevention Education and Networking in Kansas (OPEN-K). The program involves education and early intervention to improve the quality of life for youth and their communities and, at the same time, reduce crime.

Programs to Develop Leaders—An Example in Republic County. K-State Research and Extension works with Kansas counties to help them build programs to strengthen their communities. For example, the Republic County Extension Council was approached by concerned citizens who expressed the need to develop informed leaders who would then provide guidance and ideas to improve county government. As a result, K-State Research and Extension implemented the first leadership program in the county.

Youngsters Learn Leadership Skills. Four counties in the Kansas City metropolitan area have consolidated efforts and resources to provide youth in that area with skills in leadership and citizenship. The participating counties are Douglas, Johnson, Leavenworth, and Wyandotte.

Youngsters in Kansas are vulnerable to increased pressures and situations in our fast-paced society. They need guidance and direction to help them become productive and successful citizens. Kansas River Youth Leadership (KRYL) is a new youth development program of K-State Research and Extension.

Adults, businesses, and institutions in the communities become involved with the program, which helps youth to increase communication skills, prepare them for entry-level jobs, foster healthier behaviors, increase their confidence, and encourage them to become more involved in community service.

Providing Skills for Juveniles in Detention.

When youth detained for delinquent behaviors are released, they often become repeat offenders. A 4-H youth development program, in cooperation with the Douglas County Juvenile Detention Center, is working with detainees and adult mentors to help those juveniles build interpersonal and other skills so they can live more responsibly.

Keeping Track of County Expenditures. 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 and allows for comparisons between or among various counties. The objectives of this project are to help local officials manage county government finances more effectively and save Kansas citizens tax dollars.

Program for Kids Brings Communities Together. For the past several summers, residents in the cities of Coffeyville and Independence in Montgomery County have teamed with K-State Research and Extension and local agencies, organizations, businesses, and volunteers to help youth learn to be good citizens. Students 18 and under eligible for the USDA “lunch p-l-u-s” program can take more than 40 educational programs—all free—during the summer school lunch hour. A few of the topics have been “Getting Started with Spanish,” “Road Trip, USA,” “Magnets,” and “Who is Uncle Sam?” **More than 400 students participate each year in the program.**

CD Covers the Basics of Community Development. K-State Research and Extension has produced a “how-to” CD on community development.

The CD, available for \$35, provides information on understanding a community and its economic function; applying economic concepts to the community; and choosing community goals. It also explains how economic development benefits a community.

It can be used by the general public to get a basic understanding of community economic development or by those involved with local government, chambers of commerce, or related agencies dealing with community planning.

Communities Benefit from Tree Program. Last year, more than 104 Kansas Tree City USA communities spent \$9.4 million toward the care and management of forest resources in the state. They also planted almost 15,600 trees, pruned about 61,400, and removed 6,400. K-State Research and Extension sponsors this program in cooperation with other state and federal agencies.

Getting Answers by Telephone. K-State Research and Extension is cooperating with University of Missouri/Lincoln Outreach and Extension on a telephone access system, Extension InfoLine, for the residents of the Kansas City area. Topics include gardening and horticulture; family and parenting issues; food preparation and preservation; youth activities; agriculture; community development, and many others.

Discovery Days. Every year, about 600 Kansas 4-Hers attend Discovery Days at K-State. The 13- to 18-year-olds come from nearly all of Kansas’ 105 counties. They attend skill-building sessions, explore career interests, and learn about campus life.

After-School Hours in Rural Kansas. Growing up in very rural Kansas can be akin to growing up in a crowded urban center. Physical isolation can affect youngsters much like emotional isolation in inner cities. In western Shallow Water in Scott County, a K-State program in partnership with Big Brothers and Big Sisters, provides youth with after-school programming that involves them in activities during their most vulnerable hours of the day.

Parent Support Center. K-State Research and Extension is providing information and techniques for the Consortium on Parenting Education (COPE), a program to support parents in raising happy, healthy children. It is in cooperation with the Mental Health Association of South Central Kansas and other service agencies.

4-H Youth Give Kansas Communities a Helping Hand.

All across Kansas, 4-Hers provide community services.

A good example is in Leavenworth County. Some 250 youth this year replanted, repaired, refined, and enriched the towns of Leavenworth, Basehor, McLouth, and Tonganoxie.

One of the largest projects was at the county fairgrounds in Tonganoxie that involved repair of damage from a tornado. The project included planting trees and shrubs and repairing fairground facilities. It taught youth about planning and executing a large-scale project.

—In Leavenworth, youth helped reestablish an urban 4-H garden. Another project there involved bringing care packages and offering games and activities to residents of the Veterans Affairs Medical Center nursing home.

—In Basehor, youth teamed with the PRIDE organization to beautify the community, including a community clean up and planting flowers.

—In McLouth, youth gave the football field a facelift and also painted and cleaned the town’s park.

Want to know more?

K-Staters who can provide more information on topics in this report.

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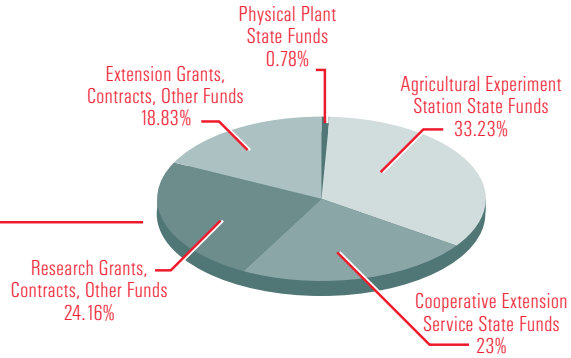
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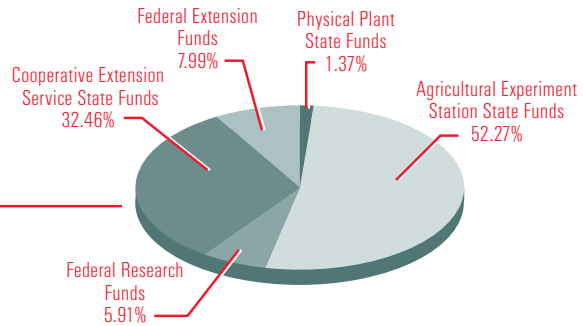
K-State Research and Extension General Use Base Funding FY2002

Physical Plant State Funds	\$787,672
Agricultural Experiment Station State Funds	\$33,381,645
Cooperative Extension Service State Funds	\$23,101,900
Research Grants, Contracts, Other Funds Use	\$24,269,255
Extension Grants, Contracts, Other Funds Use	\$18,914,676
Total FY 2001 Budget	\$100,455,148



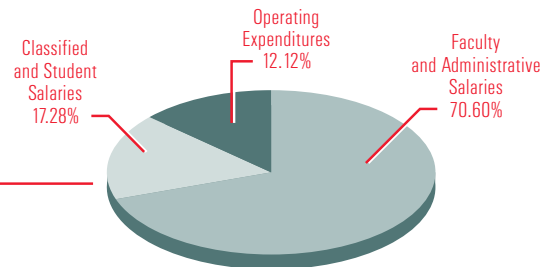
State and Federal Base Funding

Physical Plant State Funds	\$787,672
Agricultural Experiment Station State Funds	\$29,992,666
Federal Research Funds	\$3,388,979
Cooperative Extension Service State Funds	\$18,620,418
Federal Extension Funds	\$4,581,482
Total FY 2001 State Funding Support	\$57,371,217

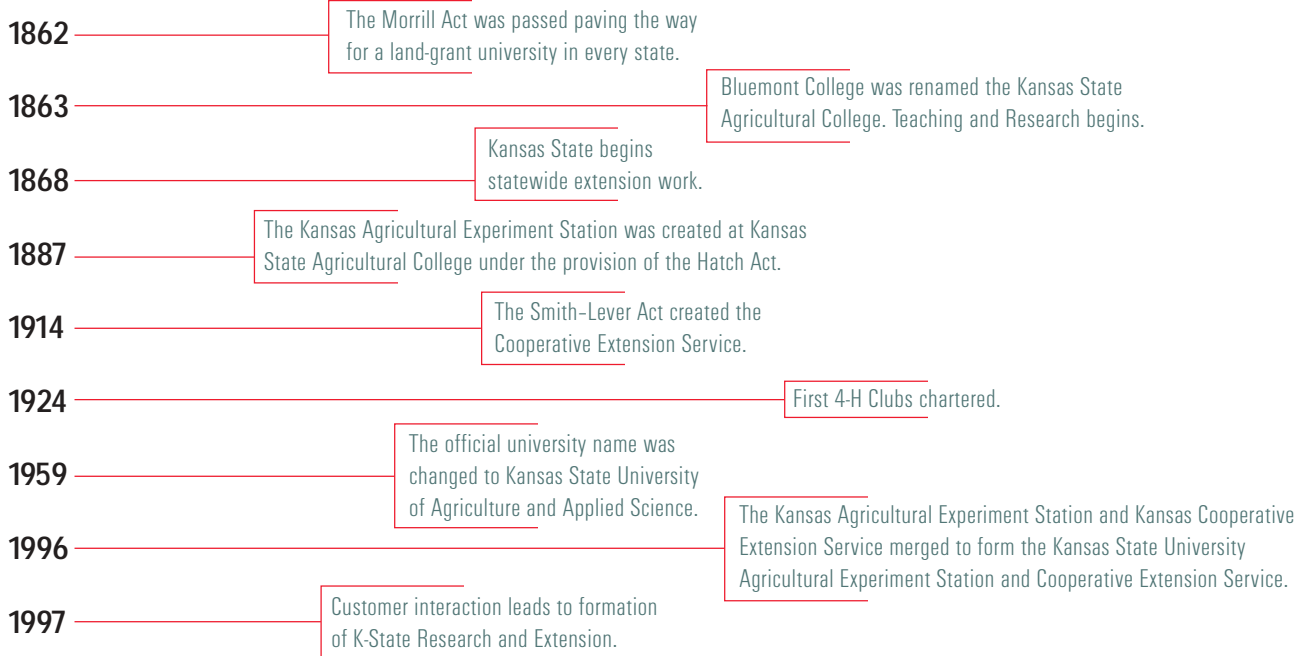


Budget Classifications

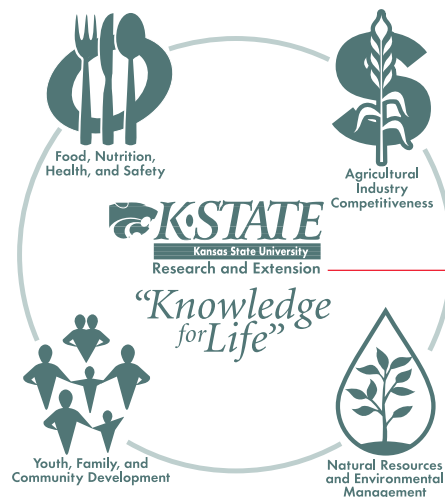
Faculty & Administrative Salaries	\$40,505,168
Classified & Student Salaries	\$9,915,286
Operating Expenditures	\$6,950,763
Fiscal Year 2001 Annual Budget	\$57,371,217



Brief History of K-State Research and Extension



Today, K-State Research and Extension employs more than 300 research scientists, approximately 180 faculty specialists and program leaders, nearly 270 county and area specialists, and more than 400 support staff in 23 departments in five different colleges. In addition to main campus, K-State Research and Extension personnel are located in 105 county offices, eight experiment fields, five area offices, three research centers, and three research-extension centers.



Our Mission Statement:

We are "dedicated to a safe, sustainable, competitive food and fiber systems and to strong, healthy communities, families and youth through integrated research, analysis, and education."

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Kansas State University Agricultural Experiment Station and Cooperative Extension Service

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