

MINUTES OF THE HOUSE COMMITTEE ON AGRICULTURE.

The meeting was called to order by Chairman Dan Johnson at 3:30 p.m. on January 17, 2001, in Room 423-S of the Capitol.

All members were present.

Committee staff present: Raney Gilliland, Legislative Research Department
 Gordon Self, Revisor of Statutes Office
 Kay Scarlett, Committee Secretary

Conferees appearing before the committee:

Steven Graham, Assistant to the Dean of the College of Agriculture, Kansas State University
Dr. William Hargrove, Director, Kansas Center for Ag Resources and the Environment, K-State
Milton Krainbill, Upper Delaware Watershed Specialist, Jackson County
Tracy Streeter, Executive Director, State Conservation Commission
Mike Beam, Kansas Livestock Association
Al LeDoux, Director, Kansas Water Office
Kent Lamb, Chairman, Kansas Water Authority
Cliff Mayo, Member, Kansas Water Authority
Jerry Blain, Member, Kansas Water Authority
Clark Duffy, Assistant Director, Kansas Water Office

Others attending: See attached list

Steven Graham, Assistant to the Dean of the College of Agriculture and Director of K-State Research and Extension at Kansas State University, presented K-State Research and Extension's Annual Report highlighting examples of work being done in each of the four core mission theme areas: Agricultural Industry Competitiveness; Natural Resources and Environmental Management; Food, Nutrition, Health, and Safety; and Youth, Family, and Community Development. (Attachment 1)

Dr. William Hargrove, Director, Kansas Center for Ag Resources and the Environment at Kansas State University, reported on K-State Research and Extension's new initiatives and ongoing programs aimed at helping citizens meet Total Maximum Daily Load requirements in Kansas under a voluntary compliance approach. K-State Research and Extension plays a key educational role in making producers aware of water quality issues, evaluating and identifying management options for improving water quality, educating citizens about best management practice options, and identifying sources of technical and financial assistance. (Attachment 2)

Milton Krainbill, Upper Delaware Watershed Specialist from Jackson County, explained how the five K-State Research and Extension Watershed Specialists work with landowners and farmers within the watersheds to develop action plans based on the concerns within the watersheds. They provide management expertise and develop educational program activities, including on-farm demonstrations, workshops, seminars, and other teaching methods.

Tracy Streeter, Executive Director, State Conservation Commission, reported that since the development of Total Maximum Daily Loads, the Commission's targeted areas for water quality improvement have been narrowed to the watersheds designated high priority for TMDL implementation. He reviewed major activities relative to TMDL implementation. (Attachment 3)

Mike Beam, Kansas Livestock Association, discussed the TMDL Agriculture Working Group, composed of major agriculture organizations, and their efforts to inform and assist farmers and ranchers in implementing this new water quality initiative. He reported that meetings have been held at various locations in each of the river basins affected by TMDLs. (Attachment 4)

CONTINUATION SHEET

Representative Schwartz moved to introduce a committee bill to reclassify all-terrain vehicles (ATVs) as implements of husbandry, making them sales tax exempt. Seconded by Representative Feuerborn, the motion carried.

Al LeDoux, Director, Kansas Water Office, provided an introductory overview of the Kansas Water Authority, its members, policies, and programs. (Attachment 5, Pages 1 - 4)

Kent Lamb, Chairman, Kansas Water Authority, discussed the water planning process. He reported that each of the twelve river basins in the state has its own identifiable needs and resources to be addressed. He indicated that further delineation and definition of unique areas within each basin is necessary for planning purposes in the development of appropriate and workable management practices. (Attachment 5, Pages 5 and 6)

Cliff Mayo, Member, Kansas Water Authority, discussed groundwater management, specifically, the Ogallala portion of the High Plains Aquifer which is being withdrawn much faster than it is being recharged. He said the dilemma is conserving the High Plains Aquifer, while preserving the economy of western Kansas. (Attachment 5, Pages 7 - 11)

Jerry Blain, Member, Kansas Water Authority, discussed the public water supply in Kansas, including municipal water suppliers, rural water districts, wholesale water districts, and assurance districts. Kansas has approximately 900 public water suppliers. (Attachment 5, Pages 12 - 14)

Clark Duffy, Assistant Director, Kansas Water Office, outlined Kansas Water Authority recommendations to the 2001 Legislature: 1) Amend the Multipurpose Small Lakes Act; 2) Establish a Source Water Development Fund; 3) Assist Watershed Districts administratively; 4) Transfer collection responsibility for the State Water Plan Fund; 5) Stabilize rate for water marketing; and 6) Re-establish the Water Assurance Fund. Two resolutions in support of Federal Action on High Plains Aquifer and the Reallocation of John Redmond Reservoir were recommended. Kansas Water Authority expenditure recommendations for FY 2002 were also reviewed. (Attachment 5, Pages 17 - 19)

Key water documents were distributed: Purpose and Process - Kansas Water Plan; HydroGRAM; Report to the Governor and 2001 Legislature; Executive Summary for House Substitute for SB 287; Committee Report - High Plains Aquifer; State and Federal Water Programs; and the Kansas Water Plan - FY2002. Copies of these reports can be obtained from the Kansas Water Office.

The meeting adjourned at 5:25 p.m. The next meeting is scheduled for January 22, 2001.

HOUSE AGRICULTURE COMMITTEE GUEST LIST

DATE: JANUARY 17, 2001

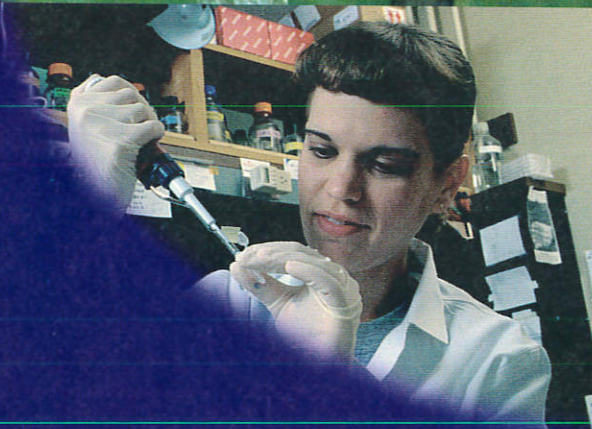
NAME	REPRESENTING
Dag Wareham	KGFA / KFCA
Paul Johnson	PAAC
Glenn M. Kralyill	REAP
Raymond Hancock	Catalyst Inc.
Justin Holstin	KS Coop Council
Kevin Street	Cows. Comm.
Chris Wilson	SW Kansas, GMD 3
Jerry Blain	KWA
Bill Hargrove	KCARE / K-State
Milton Kraibill	KSU Extension
Margaret Fast	KS Water Office
David L. Pope	KDA & KWA
Cliff Mayo	KWA - Speaker of House
Jimmie Clover Adams	KDA
Rebecca Reed	KDA
Robert Collins	Treasury Law Office
Susan Stover	KANSAS WATER OFFICE
Sharon Falk	COMO #5
Jerry Dowall	KS Water Office

HOUSE AGRICULTURE COMMITTEE GUEST LIST

DATE: JANUARY 17, 2001

NAME	REPRESENTING
Cleta Remyer	
Dixie Russell	KDOC#1 - Ag
Bill Fuller	Kansas Farm Bureau
Jim Kaup	City of Mays

2000 Annual Report



A Report by the Kansas State University Agricultural Experiment Station and Community Extension Service

House Agriculture Committee
January 17, 2001
Attachment 1



Kansas State University

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Director of Agricultural
Experiment Station and
Cooperative Extension Service**
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LETTER FROM THE DIRECTOR

The Kansas State University Agricultural Experiment Station and Cooperative Extension Service (K-State Research and Extension) has served Kansas citizens for more than 110 years. As Kansas' land-grant university, K-State maintains educational county extension offices in every Kansas county and off-campus agricultural research sites at 20 locations as well as research and education from the K-State campus.

The range of research and educational topics spans genetic improvement of crops and livestock; agricultural production and value-added processing practices; farm and agribusiness risk-management; livestock and human nutrition; 4-H youth development; rural community development; food-product development and food safety; water conservation; and environmental quality.

This annual report is representative of the many ways K-State Research and Extension affects the lives of Kansans. We appreciate the support of state, county, and federal governments and cooperating individuals, businesses, and community leaders. We are a part of a successful Kansas.

Sincerely,

Marc A. Johnson
Dean and Director

*"Knowledge
for Life"*

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Introduction

Market Research Institute Inc. conducted a statewide telephone survey of 500 Kansas residents as a follow-up to the 1996 survey taken before the consolidation of the Kansas State University Agricultural Experiment Station and Cooperative Extension Service, which is now referred to as K-State Research and Extension.

The latest telephone poll shows we're on the right track. Since 1996, we have reorganized to be more customer focused and provide "Knowledge for Life" to Kansas citizens.

We developed action teams to address the concerns of our customers and became more aggressive in promoting our message in print, radio, video, and on the Web. Our unified name with a new logo and look promotes our organization as a team ready to serve Kansas citizens.

The survey findings were compiled on awareness, exposure, attitudes, program offerings, communication, and mission.

K-State Research and Extension's credibility continues to rise. In 2000, 63 percent of all Kansans said they believed that the information provided by the organization is very credible compared to 56 percent in 1996. Ninety-four percent of the respondents said that those programs are important and must be continued, and 89 percent said that those programs were appropriate for government.

The 2000 survey showed an 11 percent increase (from 34 percent to 45 percent) over the 1996 survey in the number of people who were aware that a university system provides research-based information and educational programs. Sixty percent of the respondents could identify that university as K-State compared to 59 percent in 1996.

As might be expected, respondents involved in agriculture-related businesses are more knowledgeable about K-State Research and Extension.

One-fourth of the respondents are aware of a K-State Research and Extension office in their county, and 71 percent of those respondents have called or e-mailed their county office for information. This indicates that those who are aware of the organization's services are likely to use them.

The study shows a large increase in Internet usage. In 1996, Internet usage was 17 percent compared with 56 percent in 2000. Two of 10 respondents who used the Internet in the last month visited the K-State Research and Extension Web site <http://www.oznet.ksu.edu>.

Survey respondents were introduced to the organization's four core mission themes — Youth, Family, and Community Development; Food, Nutrition, Health, and Safety; Natural Resources and Environmental Management; and Agricultural Industry Competitiveness.

A large majority of those interviewed said that these four themes are a necessity. More than 90 percent indicated that it was necessary (very or somewhat) to focus on these areas. Each of the four areas had at least 50 percent say it was absolutely necessary.

Thirty-eight percent of those interviewed have some educational affiliation with K-State as either a student or by having a parent, spouse, or child attend K-State.

We face an exciting challenge—to stay focused, tell our story, and continue targeting our efforts to meet the needs of Kansas citizens.

K-State Ranks 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.

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 from K-State's research. Nine new patents were issued this fiscal year, including a new therapy for cystic fibrosis, work that was supported by K-State Research and Extension.

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.

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.

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 sent K-State and the University of Kansas scientists 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.

The university and K-State Research and Extension are proud of being ranked as one of the nation's major research institutions.

FOUR CORE MISSION THEMES

As part of its Five-Year Work Plan, K-State Research and Extension developed Four Core Mission Themes. Those Four Core Mission Themes are



Agricultural Industry Competitiveness



Natural Resources and Environmental Management



Food, Nutrition, Health, and Safety



Youth, Family, and Community Development

What follows are examples of work in each main area of emphasis.

Agricultural Industry Competitiveness



Agricultural Industry Competitiveness

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

Providing Science-Based Information for the Public

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. 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. 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.

Using Biotechnology to Improve Kansas Crops

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.

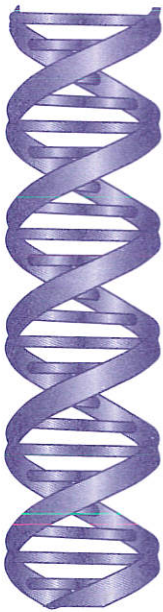
Working with the U.S. Department of Agriculture, K-State has developed and released an insect-resistant alfalfa germplasm with glandular hairs that has resulted in new alfalfa varieties and a leaf rust-resistant wheat germplasm that spawned the commercial variety, AgriPro Thunderbolt.

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.

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.

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A New Biotechnology Web Site

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/>. It is a way to keep people aware of issues surrounding biotechnology. At the Web site, readers 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.

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Birds Benefit from Sustainable Agriculture Practices

The increasing cultivation of land accompanied by greater use of pesticides and fertilizers have impacted populations of grassland birds. K-State Research and Extension biologists found that increasing use of sustainable agriculture practices could provide additional favorable habitat for birds in Kansas. Such practices use less tillage to reduce soil erosion and increase organic matter.

Contact: William Hargrove, Kansas Center for Sustainable Agriculture and Alternative Crops,
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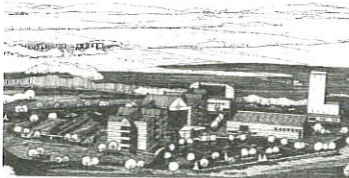
Finding Ways to Improve Wheat Straw By-Products

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. 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.

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New Facilities for One of K-State's Premier Programs



**Drawing of proposed Grain
Science Center**

Cargill and ADM Each Donate \$1 Million to Grain Center

The university is close to breaking ground on the first phase of a \$61.2 million Grain Science and Industry Complex that will ultimately include a state-of-the-art feed mill, flour mill, International Grains Program Conference Center, Bioprocessing and Industrial Value-Added Center, and Grain Science Teaching, Research, Baking, and Administration Building.

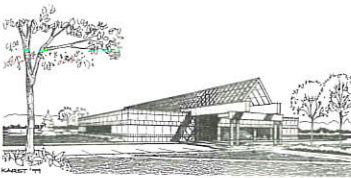
The complex will replace an aging and outdated Shellenberger Hall as the home of the department. It will include the latest in technology with an eye to the future and will sit on 16 acres just north of Kimball Ave. across from KSU Football Stadium.

Cargill Inc., the nation's largest privately held corporation, has donated \$1 million to K-State to help build the Grain Science Complex on the Manhattan campus. Funded by five Cargill business units and matched by the corporation, the \$1 million is Cargill's largest single cash grant outside the state of Minnesota. This contribution is made in conjunction with Cargill's Higher Education Initiative that seeks to build mutually beneficial relationships with key schools. Since 1996, Cargill has already provided more than \$600,000 to K-State through this initiative in support of other programs and facilities.

ADM (Archer Daniels Midland Company) has given \$1 million to the university. That contribution will help build the new flour mill. A fundamental strength of ADM has been its focus on the processing of cereal grains and oilseeds. Its agribusiness operations include linseed oil, flaxseed, wheat milling, soybean processing, value-added products, transportation, corn sweeteners, ethanol, and peanut processing, and most recently fermentation-based bioproducts, nutraceuticals, and functional ingredients.

Wheat Commission Gives \$1 Million, and Corn Commission Gives \$500,000 to Help with Grain Center Construction

The Kansas Wheat and Corn commissions donated \$1.5 million altogether to help fund building of the International Grains Program (IGP) Conference Center. This facility will provide lecture and training rooms, and the cost is projected to be \$4 million.



**Drawing of proposed IGP
Conference Center.**

The department has had contact with more than 130 countries in the past 20 years, from Argentina to Zimbabwe, Bangladesh to the Netherlands. Its International Grains Program, currently housed in the aging Waters Annex Building, hosts leaders of industry, including senior management from foreign corporations. The new building will feature world-class facilities for hosting the executives from around the world who come to learn about purchasing Kansas grains.



Drawing of proposed BIVAC building.

Construction of the \$5.5 million feed mill, which will also house demonstration and research facilities, is close to its fundraising goal and is set to begin this year. A \$5.2 million flour mill also will be built, and it will provide modern research and teaching facilities. The \$5.9 million Bioprocessing and Industrial Value-Added Center (BIVAC) that is planned will house research and pilot-scale processing, including extrusion and other thermal and mechanical processing equipment for food and nonfood products. Target dates for construction to start on the IGP, flour mill, and BIVAC are 2000, 2001, and 2004, respectively, but are subject to funding.

The new feed and flour mills will better accommodate hands-on training that benefits students and extension short course participants. The new capabilities of the feed and flour mill and the Bioprocessing and Industrial Value-Added Center will strengthen the department's position as the world leader in the research and extension arena for cereals and oilseeds. The flour mill will incorporate a built-in heat treating system that deals with infestation through heat rather than with chemicals, which is an application of research that has already been done at K-State.

Contact: Brendan Donnelly, Grain Science and Industry, Phone: 785-532-6161, FAX: 785-532-4017, E-mail: bjd@wheat.ksu.edu

Reducing Production Losses in Dairy Cattle

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. A K-State Research and Extension entomologist estimates that a three percent production loss from ectoparasites means 39,742,300 fewer pounds of milk worth \$5,087,000 by K-State Research and Extension's educational efforts. If that loss can be reduced by just five percent, 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 five percent of that loss in efficiency can be prevented, saving \$94,800. The estimated minimum total benefit of both programs would be \$349,150 annually.

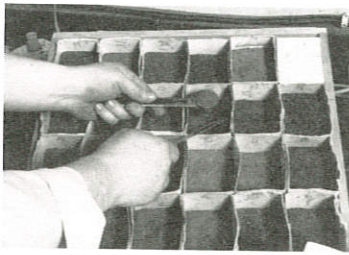
Contact: Don Mock, Entomology, Phone: 785-532-4749, FAX: 785-532-6232, E-mail: dmock@oznet.ksu.edu

Using Infrared Thermal Imaging to Help Manage Livestock in Feedlots

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. This is important economically because research has shown that sick animals have reduced average daily gains by 25 percent to 50 percent. 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.

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Checking soil samples.

Testing Soil Samples for Kansans

The Soil Testing Laboratory of K-State Research and Extension is a service for Kansas farmers and urbanites and much more. In addition to annually analyzing more than 10,000 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. Laboratory personnel also work closely with county agricultural extension agents to impart the value of soil testing to farmers and urbanites and in developing environmentally sound nutrient management plans. In work with the public, the laboratory's summaries of soil sample test results have been very helpful in tracking trends in soil nutrient levels. Extremely low pH soils started showing up in south-central Kansas in the early 1980s, alerting producers of a critical need to treat with lime. An aggressive K-State Research and Extension educational program has resulted in farmers doing more soil sampling and liming of the extremely acid soils in south-central Kansas. The result has been a decrease in the percentage of samples testing very low in pH in that area compared to 10 years earlier. These annual summaries also have shown no change in the percentage of soil samples testing very high for available phosphorus over the same time span, suggesting that farmers are following phosphorus recommendation guidelines and not applying phosphorus in excess of nutritional needs.

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The Golden Anniversary of the Southeast Agricultural Research Center

On July 12, 1950, the Southeast Agricultural Research Center was established. Over the years, the center has grown, agronomic research has become more specialized, beef cattle research was begun, and dairy research was discontinued. The research has changed to reflect the changes in agriculture in southeast Kansas.

Plans for the center began in 1948 when the U.S. government transferred a 242-tract of land near Mound Valley to K-State, land that previously was an auxiliary U.S. Air Force landing field. Farmers and other citizens of southeastern Kansas had been interested in establishing a branch experiment station in that part of the state.

An adjoining small farm of 40 acres with a house and outbuildings were purchased and added to what became the Mound Valley Branch Experiment Station. Other adjoining land was purchased and added to the facility. In 1966, a 49-acre tract of land near Columbus that had previously been a K-State agronomy field was leased, and the station's name was changed to the Southeast Branch Experiment Station.

Further expansion occurred in 1967 when the Legislature transferred 465 acres of land from Parsons State Hospital and Training Center to the Kansas Board of Regents. This land was added to the station, as was 200 more acres near Altamont as the result of a gift to the KSU Foundation. The research center currently operates on about 1,100 acres of land at Altamont, Columbus, Mound Valley, and Parsons.

The research center headquarters was moved in 1980 to a remodeled building on the grounds of the Parsons State Hospital and Training Center. The name was changed again in 1994 to the Kansas State University Southeast Agricultural Research Center.

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Visit a Wheat Field Day in Cyberspace

Without leaving your home or office, you can attend a wheat field day. It's on the Internet courtesy of K-State Research and Extension, and it resembles closely a field day that you would visit in the spring. There are four tour stops. You can see the varieties and their descriptions. You can inspect the wheat variety performance test results and the county extension demonstration plot yields. You can examine the major wheat disease problems and variety resistance to those diseases. And you can "hear" a discussion of nitrogen, phosphorus, pH, and chloride management. You can even bring a friend, or two, or more. The Web address is www.oznet.ksu.edu/wheat.

Contact: Jim Shroyer, Agronomy, Phone: 785-532-5776, FAX: 785-532-6094, E-mail: jshroyer@oznet.ksu.edu



A view of wheat from the Web site.

Assisting Decatur County Producers to Manage Their Risks

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. 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.

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K-State's involvement in crop insurance reform receives national attention.

Helping Producers Make Informed Decisions About Crop Insurance

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. 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.

Contact: Art Barnaby, Agricultural Economics, Phone: 785-532-1515, FAX: 785-532-6925,
E-mail: abarnaby@agecon.ksu.edu

Leadership Program Focuses on Global Agricultural Issues

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

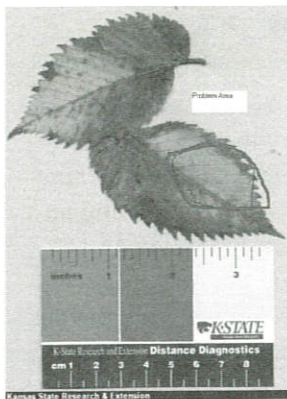
Contact: Jack Lindquist, KARL Office, Phone: 785-532-6300, FAX: 785-532-7036,
E-mail: jwlindqu@oznet.ksu.edu



Milling Trial Gives Millers and Bakers Preview of White Wheat Characteristics

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. 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.

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A plant problem sent by Internet for diagnosis.

Diagnosing Plants at a Distance

If the local county 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. 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. Distance diagnosis won't replace what K-State Research and Extension has been doing for years. Agents and other faculty are still scouting problems in fields and landscapes and talking to Kansans personally. 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.

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Extra Value Means Extra Income

It wasn't long ago that shoppers had just two choices of snack chips on supermarket shelves—potato or corn. When the cook of the family made roast beef, it took nearly all afternoon. Now, consumers can find a wide array of chips, from blue corn chips to crunchy palate pleasers made from sweet potatoes or turnips. And the meat aisle offers oven-ready, marinated, and pre-seasoned meats that sharply cut time from refrigerator to table.

Such 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. It is another area that K-State Research and Extension has been working on for the benefit of the state and its citizens.

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.

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.

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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 can help farmers improve their efficiency and their economic competitiveness. 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/pr_forage/.

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Helping Customers Abroad Store U.S. Grain

The way corn is produced, handled, and harvested in the United States causes few problems but creates problems in tropical storage. The export of U.S. grain is vital to the nation's agricultural economy, but not much research has been done on storage of grain in hot, tropical environments—not until recently, however, when K-State began investigating the situation. As a result, a how-to manual is being prepared that will provide the best methods to store U.S. grain once it arrives in a tropical country. Cooperators in Taiwan, Malaysia, Indonesia, and the Dominican Republic are assisting with the project. They take samples of corn as it arrives on ships and send them back to K-State where they are compared with samples of the corn before they left the United States. Recommendations are made from the research. This is the first time that recommendations from such research have been available to overseas customers.

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DNA sequencer.

Great Plains Cereal Grains Biotechnology Consortium

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, Okla., 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.

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.

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**Natural
Resources
and
Environmental
Management**



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.



New Center Supports Sustainable Agriculture

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

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, an 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.

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Helping to Teach Environmental Awareness

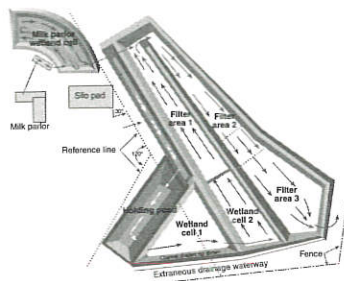
In Sedgwick County, 800 middle and elementary school students are involved in a community collaboration program called EARTH, which stands for Earth Awareness Researchers for Tomorrow's Habitat. The program provides materials and activities for teachers and students in a curriculum created by the EARTH Steering Committee. The curriculum contains 23 lessons on soil, air, water, and living resources. The program is designed to give students information that they can use to make sound environmental decisions on their own. EARTH recently completed its pilot year with a workshop for about 600 participating teachers and students. It featured a guest speaker and 40 presenters from various organizations involved in environmental issues.

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A New System to Control Dairy Waste

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. 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.

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Drawing of dairy waste control system.

Water Purification in Space

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. The work has potential benefits for developing new procedures for NASA and for drinking water on Earth.

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Profiting while Protecting the Environment

The statewide Crop Management and Marketing program of K-State Research and Extension helps Kansas agricultural producers learn to manage their risks better. The goal is to keep Kansas farms strong and profitable. 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.

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The Ogallala Aquifer.

Water Quality Initiative: A Statewide Effort

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.

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 percent 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.

In 1998, Kansas settled a lawsuit out of court, promising to establish maximum-allowable standards for many water contaminants, including nutrients, fecal coliforms, and pesticides. The state must have all plans in place by 2006. Officials say the Governor's Water Quality Initiative has put Kansas ahead of other states facing similar deadlines.

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The Water Quality Initiative at Work

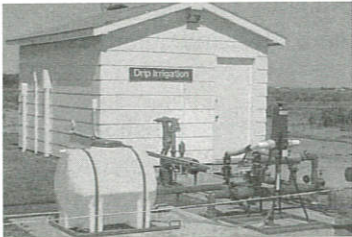
The 1,885 residents of Horton, Kan., have come to appreciate clean drinking water. In 1997, water engineers said that the town's water supply from Mission Lake was contaminated with atrazine, a pesticide often applied to corn and grain sorghum fields. At levels above 3 parts per billion in drinking water—the state's "acceptable" standard—atrazine is considered a health threat. Because their water's atrazine levels were well above 3 ppb, Horton's 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. Today, the water in Mission Lake meets water-quality standards for atrazine.

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New Watershed Specialists Help Clean Up Kansas Waters

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. This represents a major effort to do something on a voluntary basis to clean water and avoid regulation.

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Pump house for drip irrigation.

The Leader in Subsurface Drip Irrigation

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 percent 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.

According to surveys conducted by Irrigation Journal, approximately 2,500 acres utilized micro-irrigation in Kansas in 1989, when K-State began its SDI development. Those 2,500 acres were mainly surface drip irrigation for horticultural crops and not SDI. That publication's most recent survey, which is about a year out of date, showed about 8,500 acres in SDI and 10,500 acres altogether (including the horticultural crops).

Changing economic factors and resource constraints could rapidly affect SDI adoption by producers. Kansas is the 7th largest irrigated state with nearly three-million irrigated acres, the declining Ogallala Aquifer is the primary source of the water used.

When research compared SDI to center pivot sprinkler irrigation on corn, it was found that under full irrigation SDI helped to produce 288 bushels an acre, and center pivot corn yields were 264 bushels an acre. This 24 bushels an acre yield advantage will easily pay for the increased investment costs associated with SDI.

Applying 53 percent less water with the SDI treatment than with the fully irrigated center-pivot treatment still resulted in 260 bushels an acre.

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.”

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Four Phases of Whole Farm Planning Process



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

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 percent of farmers have a clear idea of their break-even costs for their major market commodities, and only five percent have done a recent calculation. 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.

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.

A barrier to Whole Farm Planning is absentee ownership of farms. More than 50 percent 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.

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**Food,
Nutrition,
Health,
and
Safety**



Food, Nutrition, Health, and Safety

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.



New Approaches to Community Health

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. The office also is sponsoring the Connect Kansas program and is forming state planning teams on important community health topics.

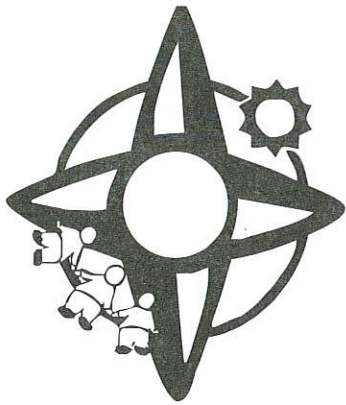
Connect Kansas was developed to measure the outcomes of community health efforts and to train community leaders to look at health factors and create conditions of health. (see article below)

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.

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.

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.

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Healthy Places

Community Health Focuses on Healthy Places

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, which is part of K-State Research and Extension.

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 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.

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.

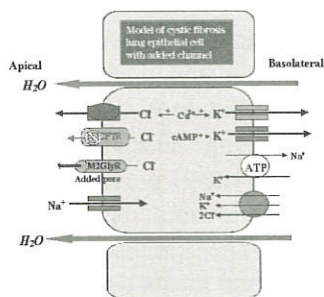
As part of its responsibilities, the Office of Community Health offers such aids as distance learning, networks, help with training, a healthy youth evaluation system, a healthy places developmental process survey, and basic and applied research expertise and support.

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Influence of Dyes on Ultraviolet Protection by Fabrics

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. 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.

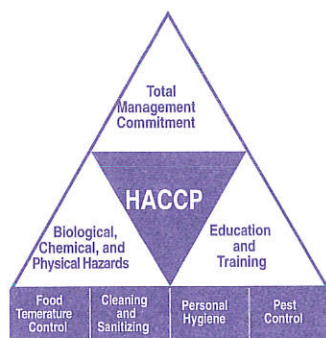
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Uncovering a Potential Cystic Fibrosis Treatment

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. 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.

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Across the Nation K-State Makes a Difference 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.

Foodborne illnesses generally cause temporary disorders of the digestive tract, but they also can lead to serious long-term health consequences

The latest statistics compiled by the Centers for Disease Control and Prevention show that foodborne diseases in the United States cause approximately 76 million illnesses, 325,000 hospitalizations, and 5,000 deaths each year. Known pathogens account for an estimated 14 million illnesses, 60,000 hospitalizations, and 1,800 deaths.

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

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Steam Process Brings Food Safety Closer to Consumer

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 scientists are finding that pasteurization kills any disease-causing bacteria present on wrapped food surfaces. 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.

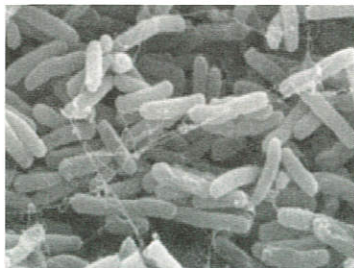
Contact: Randy Phebus, Animal Sciences, Phone: 785-532-1215, FAX: 785-532-7059,
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K-State Gets State-of-the-Art Meat Safety Testing Equipment

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. The impact of using post-process pasteurization could be large. Millions of pounds of ready-to-eat meats are processed every year.

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.

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Escherichia coli O157:H7

Tracking Down a Pathogen

The foodborne pathogen *Escherichia 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. 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.

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

K-State Research and Extension, through the Family Nutrition Program (FNP), provides nutrition education in 84 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 112,000 food-stamp eligible people. Analysis of evaluation data showed a statistically significant intention to change behavior of participants in the following areas: 52 percent intended to move closer to the recommended number of servings of the Food Guide Pyramid; 63 percent intended to move closer to the Dietary Guidelines recommending that Americans include a greater variety of foods in their diets; and 30 percent intended to increase their level of physical activity. FNP's collaboration with communities 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.

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Creating a Home for a Lifetime

Kansas has an increasing number of elderly home owners whose homes may not be accessible or may not allow independent living as the residents age. The Creating a Home for Lifetime program was designed to be used with older audiences or with people who are concerned about older family members. The objectives of the program are to increase awareness of sensory losses and physiological changes that often occur during the aging process and to be able to adapt the home to compensate for changes to make it accessible throughout life. This should enable elderly home owners to remain independent in their own homes for as long as possible. The program is being used in 2000 by the Family and Community Education (FCE) organization in Kansas. The FCE programs in Kansas consistently reach 1,500 or more members, primarily rural and older women, each year. Evaluations returned from this group indicate that participants plan to use the information in their homes and will recommend the program to people they know.

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Take It Outside: Healthy Indoor Air for Kansas Homes

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. The expected benefit is that health risks from secondhand smoke would be reduced. 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 benefited from the changed law.

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Kansas Nutrition Network

Kansas Nutrition Network

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. 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.

Contact: Karen Fitzgerald, Kansas Nutrition Network, Phone: 316-363-7636, FAX: 316-264-9965, E-mail: knn@feist.com



Healthy Eating For Life

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. Approximately 45 percent 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.

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Green Tea May Lower Cholesterol Levels in Menopausal Women

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. 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.

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Zinc Deficiency Lowers Absorption of Vitamins A and E

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. 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.

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Older Adults with Eye Disease Face Diet Problems

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. 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.

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Personal Actions to Health

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. 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. 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.

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

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. 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.

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Expanded Food and Nutrition Education Program

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. In Kansas, EFNEP programs in Sedgwick, Shawnee, Crawford, and Wyandotte counties help youth and homemakers with limited resources develop skills and obtain knowledge to better feed and care for their families. During FY 2000, 1,570 Kansas families benefited from EFNEP programs, with more than 90 percent of participants showing improvements in their diets after completing the series of EFNEP lessons. In addition, EFNEP youth programs enriched the lives of 17,935 Kansas youth last year.

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Youth, Family, and Community Development



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 to be responsible citizens; balance demands of work, family, community, and time for self; and develop consumer and financial management skills.

Rural Leaders Use the Internet

According to a study at K-State, the most common use of the Internet among rural leaders was to find information. Using e-mail was a close second. Buying or selling products ranked low. Nearly 62 percent of the state's rural community leaders use the Internet, but the study suggests that state governments could do more to promote it for distance learning and electronic commerce. Other findings: older citizens used the Internet less; use was highest among business executives and lowest among city officials; use was more common in the office than at home; and more than 60 percent of nonusers said they will use it within five years.

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Opportunities for Prevention

Education & Networking in Kansas

OPEN-K Helps Native American Youths

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. 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.

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Kansas County Government Fiscal Database

The K-State Office of Local Government has developed a database that tracks 34 categories of county expenditures and 20 categories of revenues between 1989 and 1998. 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. Future plans involve updating the database annually and distributing the information through the county K-State Research and Extension network. A similar project will be developed for Kansas cities.

Contact: John Leatherman, Office of Local Government, Phone: 785-532-2643, FAX: 785-532-3093, E-mail: jleather@agecon.ksu.edu

A Program 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. 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. 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.

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National Awards and National Recognition

Each year many K-State Research and Extension faculty are nationally recognized for their expertise and leadership roles. Those honors range from becoming fellows in national scientific societies to being named to prestigious boards and committees. One example is Jean Clarkson-Frisbie, the family and consumer sciences and 4-H agent for Pratt County. She has been named to a 30-member advisory committee for the U.S. Department of Agriculture and for Secretary of Agriculture Dan Glickman. She also served as president of the National Association of Extension Family and Consumer Sciences Agents.

Contact: Jean Clarkson-Frisbie, K-State Research and Extension Pratt County, Phone: 316-672-6121, FAX: 316-672-9566, E-mail: jcfrisbi@oznet.ksu.edu



Developing 4-H Volunteers

A healthy and vibrant 4-H program utilizes adult volunteers to plan, manage, and implement educational learning experiences for youth 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. 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.

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4-H Generating New Ideas to Help Kids

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.

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 and Marian Kauffman Foundation.

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. 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.

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4-H Reaches Out to All Youths

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.

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.

Contact: Beth Drescher, Sedgwick County Extension Office, Phone: 316-722-7721, FAX: 316-722-7727, E-mail: bdresche@oznet.ksu.edu

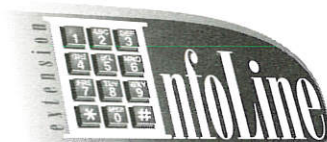
Extension InfoLine

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. The Extension InfoLine number is 913-393-1913.

Contact: K-State Research and Extension Johnson County, Phone: 913-764-6300, FAX: 913-764-6305

Helping Stop Drug Use in Shawnee County

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. 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.

Contact: Laurie Chandler, K-State Research and Extension Shawnee County, Phone: 785-232-0062 (ext. 16), FAX: 785-232-0093, E-mail: lchandle@oznet.ksu.edu

4-H Builds Community in Classrooms

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. 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.

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Cheyenne County Prepares Youths to be Responsible Citizens

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 youth ages 18 and under who face the same pressures as youth everywhere, including problems with alcohol, drugs, smoking, and peers. That is why helping youth acquire valuable life skills such as responsibility, leadership, and genuinely earned self-esteem is so important. 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.

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Empowering Families in Harvey County to Manage Financial Resources

Across the state, K-State Research and Extension is helping people to develop consumer and financial management skills. More families are faced with increased financial problems. Providing families with knowledge and skills to better manage financial resources can empower them to make better decisions. Reduced financial stress can result in fewer divorces and thus fewer single parents on public assistance and children in single parent homes. Harvey County is just one county where K-State Research and Extension financial programs are making a difference. Examples of programs there include helping senior citizens save money; assisting individuals gain sewing skills that increased their self-esteem and saved clothing dollars; helping 4-Hers learn to dress for success and manage their clothing dollars; and providing financial information on insurance and medication.

Contact: Susan M. Jackson, K-State Research and Extension Harvey County, Phone: 316-284-6930, FAX: 316-283-6183, E-mail: sjackson@oznet.ksu.edu



The K-State Gardens— Much to See and Learn

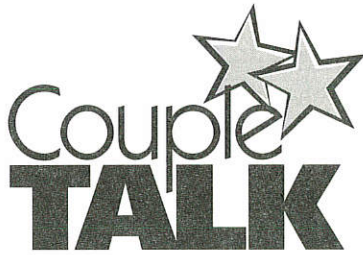
The K-State Gardens Complex on the Manhattan campus is becoming a showcase for horticultural research and education. Still being developed, it will be the largest public display garden in Kansas when finished. A butterfly conservatory and a visitor's center were dedicated on the grounds in 2000. An insect museum also is being built. The facility will demonstrate the diversity of horticultural plant materials adaptable to Kansas and how they can be used and maintained in the landscape. It will serve as an educational resource for the general public and for amateur and professional horticulturists and entomologists, homeowners, and students of all ages. It also will offer ways for the handicapped to enjoy the gardening experience. People from all Kansas are expected to enjoy this unique area of beauty on campus.

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Helping People of All Walks of Life Learn Basic Living Skills

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. 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.

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CoupleTalk: Enhancing Your Relationship

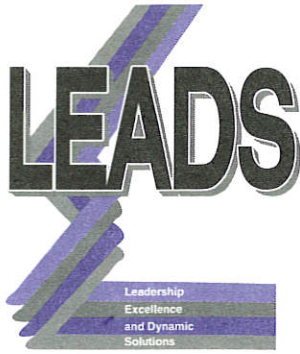
The divorce rate in Kansas has generally been higher than the national average since 1951 as reported in the Annual Summary of Kansas Vital Statistics. The exact cost of divorce to Kansas families is hard to measure both economically and psychologically, but it is no secret that the losses are enormous 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. 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." The Web-based course is being offered twice each year—once in the spring and once in the fall.

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The WonderWise Parent Web Page

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. 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/>.

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Leadership, A Shared Process

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. 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.

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Life in the State of Poverty

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 percent 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.

A common response by participants is that the experience is difficult and frustrating but a powerful learning experience nonetheless.

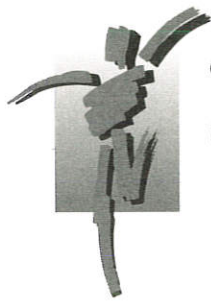
Evaluations from 99 adult participants in four counties indicated that over three-fourths of participants had an improved understanding of the financial pressures faced by low-income families in meeting basic needs; of the difficult choices low-income families face each month when trying to stretch limited resources; and of the emotional stresses and frustrations faced by low-income families in meeting basic needs.

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Offering Education and Training to Child-Care Providers

K-State Research and Extension helps to increase the quality of child care 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. Programs that improve the quality of child care through the education and training of providers help Kansas children enter school ready to learn and succeed.

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choose life balance

Choose Life Balance

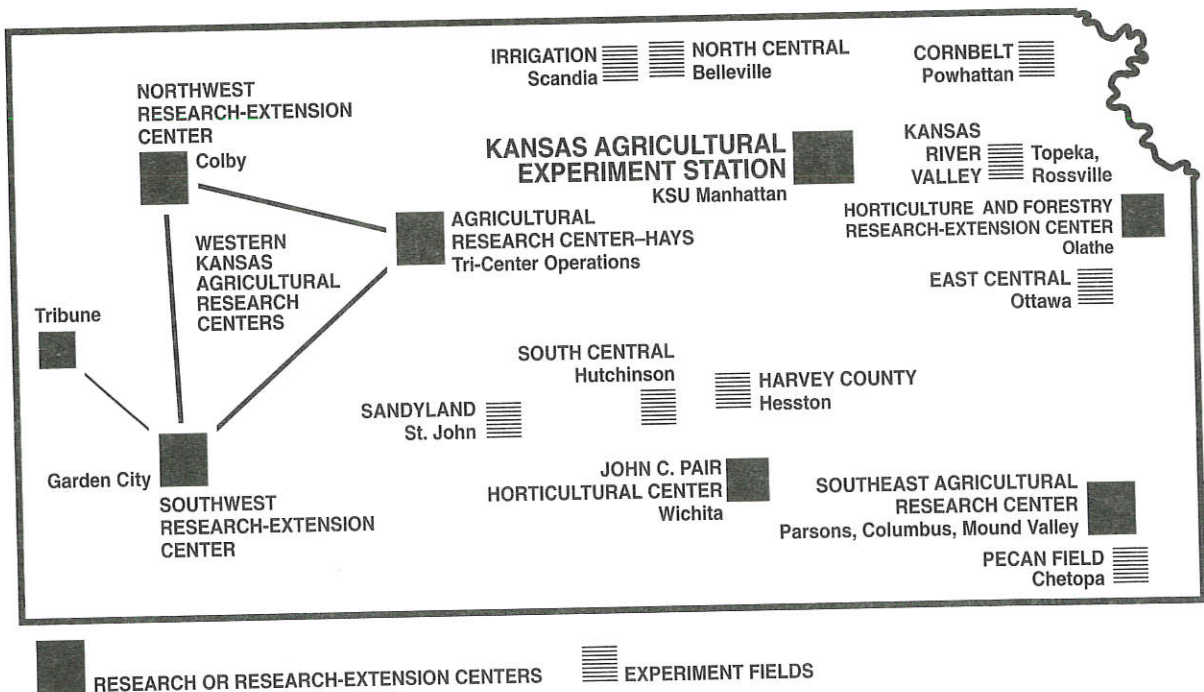
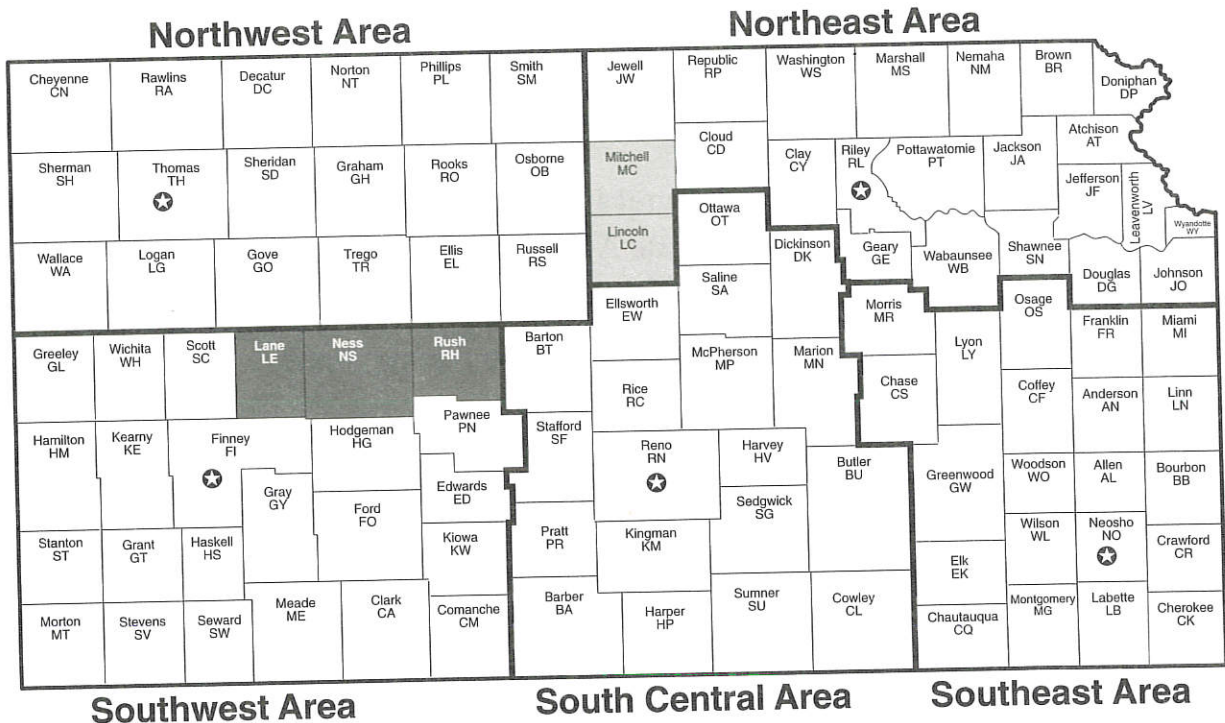
Changes in employment roles, composition of the labor force, family structures, and values and traditions have prompted a growing awareness of the interdependence of work and family life. For many people, feelings of stress and conflict indicate the need to find ways to balance their lives. Choose Life 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. 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 through self-study.

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- Extrusion Processing Center**—Keith C Behnke
- Feed Processing Center**—Keith C Behnke
201 Shellenberger
785-532-4083, kcb@wheat.ksu.edu
- Food Animal Health and Management Center**—M. Chengappa
K222 Mosier Hall
785-532-4403, chengapa@vet.ksu.edu
- Food Product Development Services Laboratory**—Fadi M. Aramouni
216D Call Hall
785-532-1668, aramouni@oznet.ksu.edu
- Food Safety Consortium**—Martha Vanier
214 Weber Hall
785-532-1210, mvanier@oznet.ksu.edu
- Food Safety Forum**—Karen P. Penner
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- Foundation Seed Conditioning Center**—Vernon Schaffer
2200 Kimball Ave.
785-532-6115, vas@ksu.edu
- Galichia Center on Aging**—Lyn Norris-Baker
203 Fairchild
785 532-5949, lyn@ksu.edu
- Grain Industry Alliance**—Ronald Madl
107D Waters Hall
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- Horticulture Response Center**—Ward Upham
3027 Throckmorton Hall
785 532-1438, wupham@oznet.ksu.edu
- International Grains Program**—John Howard
53 Waters Hall
785 532-4071, IGP@ksu.edu
- International Meat and Livestock Program**—Janice Swanson
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- Kansas Artificial Breeding Service Unit**—Charles Michaels
1402 College Ave.
785-539-3554, cmichael@ksu.edu
- Kansas Cooperative Development Center**—
David Coltrain David G. Barton
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785-532-1523 785-532-1508
coltrain@agecon.ksu.edu barton@ksu.edu
- K-MAR-105 Association**—Larry Langemeier
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785-532-1516, llange@ksu.edu
- Kansas Agricultural Mediation Service**—Forrest Buhler
2A Edwards Hall
785-532-6958, fbuhler@oznet.ksu.edu
Toll Free Number 1-800-321-3276
- Kansas Center for Sustainable Agriculture and Alternative Crops**—William Hargrove
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785-532-7419, bhargrov@ksu.edu
- Kansas Crop Improvement Association Seed Laboratory**—Denise Wood
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785-532-6118
- Kansas Farm Management Association**—Fredrick D. DeLano
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331F Waters Hall
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K-State Research and Extension Statewide Operations



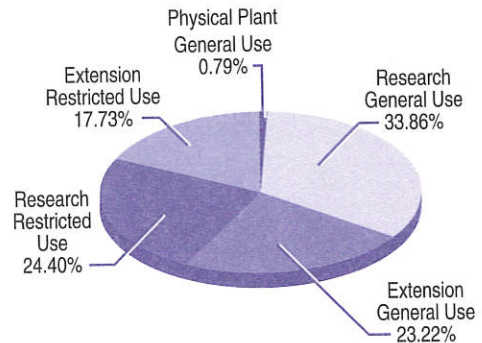
Brief History of K-State Research and Extension

- 1862**—The Morrill Act was passed paving the way for a land-grant university in every state.
- 1863**—Bluemont College was renamed the Kansas State Agricultural College.
- 1887**—The Kansas Agricultural Experiment Station was created at Kansas State Agricultural College under the provision of the Hatch Act.
- 1914**— The Smith–Lever Act created the Cooperative Extension Service.
- 1959**—The official university name was changed to Kansas State University of Agriculture and Applied Science.
- 1996**—The Kansas Agricultural Experiment Station and Kansas Cooperative Extension Service merged to form the Kansas State University Agricultural Experiment Station and Cooperative Extension Service (K-State Research and Extension).

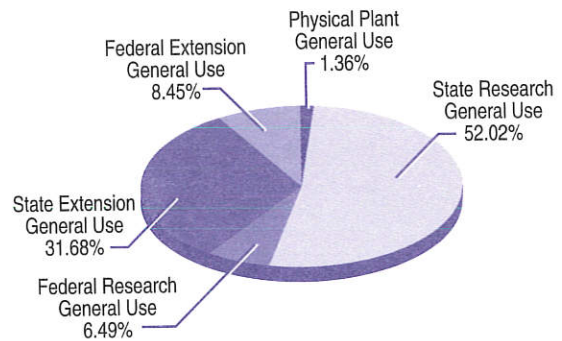
Today, K-State Research and Extension employs more than 300 research scientists, approximately 180 faculty specialists and program leaders, nearly 270 county and area specialists, and more than 400 support staff in 23 departments in five different colleges. In addition to main campus, K-State Research and Extension personnel are located in 105 county offices, 9 experiment fields, five area offices, 3 research centers, and 3 research–extension centers.

K-State Research & Extension Fiscal Year Annual Budget

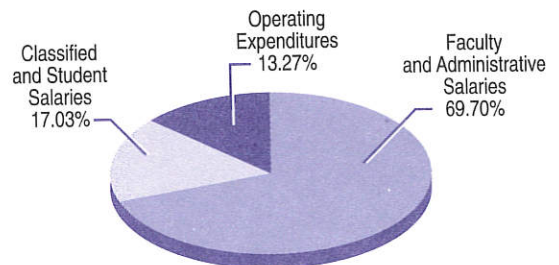
Physical Plant General Use	\$758,072
Research General Use	\$32,570,234
Extension General Use	\$22,337,094
Research Restricted Use	\$23,474,870
Extension Restricted Use	\$17,057,120
Total FY 2001 Budget	\$96,197,390



General Use Base Funding	
Physical Plant General Use	\$758,072
State Research General Use	\$28,958,303
Federal Research General Use	\$3,611,930
State Extension General Use	\$17,634,033
Federal Extension General Use	\$4,703,061
Total FY 2001 General Use Budget	\$55,665,400



General Use Budget Classifications	
Faculty & Administrative Salaries	\$38,794,313
Classified & Student Salaries	\$9,481,508
Operating Expenditures	\$7,389,579
Fiscal Year 2001 Annual Budget	\$55,665,400





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.”

This report was produced by the K-State Research and Extension Department of Communications. Steve Morgan, Gloria Schwartz, and Bob Holcombe.

Brand names appearing in this publication are for product identification purposes only. No endorsement is intended, nor is criticism implied of similar products not mentioned.

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Kansas State University Agricultural Experiment Station and Cooperative Extension Service

SM

January 2001

It is the policy of Kansas State University Agricultural Experiment Station and Cooperative Extension Service that all persons shall have equal opportunity and access to its educational programs, services, activities, and materials without regard to race, color, religion, national origin, sex, age or disability. Kansas State University is an equal opportunity organization. Issued in furtherance of Cooperative Extension Work, Acts of May 8 and June 30, 1914, as amended. Kansas State University, County Extension Councils, Extension Districts, and United States Department of Agriculture Cooperating, Marc A. Johnson, Director.

2500

K-STATE RESEARCH AND EXTENSION'S PROGRAMS AIMED AT MEETING WATER QUALITY STANDARDS IN KS

TESTIMONY PRESENTED TO THE SENATE AND HOUSE AGRICULTURE COMMITTEES JANUARY 16-17, 2001

W.L. HARGROVE, DIRECTOR, KCARE

A voluntary compliance approach to meeting TMDLs is being utilized in Kansas by the Governor's Water Quality Initiative and KDHE. Fundamental to the success of a voluntary compliance approach in agriculture are several key steps:

- producers are aware of and understand water quality issues related to their operation*
 - producers have management options (based on scientific information and evaluation) for changing practices to address issues and enhance water quality*
 - producers have access to technical and financial assistance to implement practices*
- K-State Research and Extension plays a key educational role in making producers aware of water quality issues, evaluating and identifying management options for improving water quality, educating citizens about best management practice options, and identifying sources of technical and financial assistance. We wish to highlight some of the new initiatives and ongoing programs of K-State Research and Extension that are aimed at helping citizens meet TMDLs in KS under a voluntary compliance approach.*

Statewide TMDL Communications Plan

Under the leadership of our Communications Department and in collaboration with several state agencies and private agricultural groups, we developed a statewide TMDL communications plan. The goal of the communications plan is to **provide objective, science-based information, that will inform citizens on: 1) what are TMDLs; 2) their responsibility in meeting TMDLs; and 3) how to improve water quality and help them meet TMDL requirements on a local and voluntary basis.** Target audiences include our own county level extension staff, agricultural producers and commodity groups, media, urban residents, and decision makers. Current and planned actions include disseminating fact sheets and background information, supporting the work of the watershed specialists, news releases on TMDLs for local newspapers, hosting a media day, sharing success stories, and hosting a tour for decision-makers.

Integrated Agricultural Management Systems for Protecting Water Quality

This is an ongoing program, started three years ago, and funded primarily by the KS Corn Commission, KS Grain Sorghum Commission, KS Soybean Commission, KS Wheat Commission, KS Fertilizer Research Fund, and K-State Research and Extension. The goal is to develop, evaluate, and disseminate to producers, cost-effective management options that will protect water quality. A network of six experimental sites has been established around the state in the Kansas River Basin, the Marais des Cygnes Basin, the Neosho Basin, and the Lower Ark Basin. Sites are designed to capture runoff from field size areas with various combinations of

BMPs and monitor water quality as impacted by the BMPs. Funding from the commodity commissions is scheduled to end next year.

Watershed Specialists

This “centerpiece” of our program was initiated in November, 2000 to provide educational assistance to agricultural producers aimed at meeting TMDLs on a voluntary basis. The program is funded primarily by an EPA 319 grant with additional support from the State Conservation Commission, the KS Department of Agriculture, and K-State Research and Extension. It provides support currently to six Watershed Specialists, five extension agents and one NRCS conservationist, assigned to high priority TMDL watersheds, and dedicated to working one on one with producers in that watershed to identify problems and management options to address issues that will lead to improved water quality. Watershed Specialists have been hired for the Upper Big Blue River, the Upper Delaware River, the Lower Kansas River, the Lower Arkansas River, the Cheney Reservoir watershed, and the Upper Arkansas between Garden City and Dodge City. The Cheney Reservoir Watershed Specialist is a joint program with USDA/NRCS.

State and Federally Funded Programs

A listing of other projects funded by grants from federal and state sources follows.

State Contracts

- BMPs for Reducing Fecal Coliform Contamination of Streams - Dr. Chuck Rice; funded by State Conservation Commission, Department of Agriculture, and KS Water Office
- Ecological Livestock Pollution Control Project - Dr. Kyle Mankin; funded by KDHE from State Water Plan funds
- Demonstration of Sediment Load Reduction on a Watershed Scale - Dr. Richard Nelson; funded by KDHE from State Water Plan funds

Federal Grants

EPA 319

- Dairy Environmental Cooperative - Dr. Joe Harner
- Grazing Land Water Quality Project - Dr. Paul Ohlenbush
- Kansas Environmental Leadership Program - Dr. Morgan Powell
- KS Urban Water Quality Restoration and Protection Planning - Dr. John Leatherman
- Farmer Water Quality Monitoring to Achieve TMDL Goals - Dr. Rhonda Janke
- Reducing Atrazine Runoff in the Blue River and Delaware River Basins - Dr. Dan Devlin
- Lime Application to Reduce P Loading in Cheney Watershed - Dr. John Schmidt
- Water Quality Improvement of Vegetated Riparian Areas - Dr. Charlie Barden
- Waste Management Water Quality Protection Learning Center - Dr. Bill Hargrove

USDA

- BMPs in the Blue River - Dr. Chuck Rice
- River Friendly Farm Training - Dr. Bill Hargrove

US Forest Service

- Green Topeka: Tree-Based Buffer Planning - Dr. Bill Hargrove

USGS

- Phosphorus in Surface Runoff: Evaluation of BMPs - Dr. Gary Pierzynski

HIGHLIGHTS FROM THE K-STATE STUDY OF ANIMAL WASTE LAGOONS

Dr. Jay Ham, PI

Summarized and Presented by:
W.L. Hargrove, Director, KCARE

- ▶ Seepage rates have been measured for a total of 18 lagoons in Kansas, including beef cattle, dairy, and swine
- ▶ Seepage rates in KS ranged from 0.01 in/day to 0.10 in/day and averaged 0.05 in/day (Results from Iowa for 27 lagoons were in the same range and had the same average.)
- ▶ In the past year, the focus has been on the Equus Beds Region; measured 2 swine and 2 cattle lagoons; all of these had seepage rates less than or equal to 0.03 in/day
- ▶ Lagoon chemistry has been determined from 58 samples taken from 38 lagoons; the predominant form of N is ammonium and ranges in concentration from 10 to 3500 ppm; on average, swine lagoons are about 5 times higher in ammonium than cattle
- ▶ Coring has been done on 8 lagoons ranging in age from 12 to 25 years; results show that ammonium is held in clay beneath the lagoon; significant quantities of ammonium were not found at distances greater than about 10 ft from the bottom of the lagoon and in many cases not greater than about 3 ft below the bottom of the lagoon; quantities of ammonium were greater underneath swine lagoons compared to cattle lagoons
- ▶ There is no evidence that fecal coliform bacteria seep through the bottom of lagoons; there is evidence that large amounts of chloride seep through lagoons and moves to greater depths than ammonium; it is difficult to assess the environmental impact of chloride leaching
- ▶ Very large quantities of ammonium (tens to hundreds of tons) are stored in soil beneath lagoons; this presents a concern at lagoon closure
- ▶ The risk of groundwater contamination is determined by the soil properties underneath the lagoon, the concentration of the waste, and the depth to groundwater; because these factors vary from location to location, site specific guidelines are needed for lagoon design, permitting, and closure; we have developed such guidelines and delivered them to KDHE

Released: Jan. 16, 2001

State Officials Favor Local, Voluntary Water Cleanup Efforts

MANHATTAN, Kan. – Bill Hargrove is comfortable with Kansas citizens taking control of cleaning up the state's waterways. In fact, he encourages it.

As director of the Kansas Center for Agricultural Resources and the Environment, located at Kansas State University, Hargrove is working on a project that will help Kansans institute local cleanup practices. In the long run, local residents will not only take the credit for cleaning streams and rivers, but they won't face increased federal regulation to get it done.

"Pollution prevention," Hargrove said, "is a good way to go."

It's not a message lost on the state's top elected official. Since 1995, Gov. Bill Graves has pushed a multi-agency effort to clean and manage the state's waterways, highlighted by the Governor's Water Quality Initiative.

"There's no question that clean water is the lifeblood of every community," Graves said. "State agencies are taking a proactive approach, and are working locally so that Kansans can voluntarily improve water quality, without federal intervention."

In November, Kansas State University – with support from 16 industry groups – hired five water specialists that will coordinate work in watersheds across the state, including the Upper Blue (Northeast Kansas); Lower Arkansas (Southcentral Kansas); Kansas-Lower Republic (Northeast Kansas); Upper Delaware (Northeast Kansas); and Upper Arkansas (Southwest Kansas).

The watershed specialists will be working with landowners and farmers within the watersheds to develop action plans based on the water quality concern of that watershed.

"What works in one area may not work in another, so we need to tailor individual tactics for achieving improved water quality to conditions within a specific watershed," said Kansas Secretary of Agriculture, Jamie Clover Adams. "It's a more efficient use of our limited resources."

The push to clean waterways is not exclusive to Kansas. Upon passing the Clean Water Act of 1972, members of the U.S. Congress required all states to restore and maintain the nation's waters. The

-more-

Officials Urge Local Efforts/Page 2

act's specific objectives include eliminating the discharge of pollutants into navigable waters and creating programs that reduce non-point pollutants.

"Over the past 25 years, cleanup efforts have focused on point source pollution from municipal, industrial and other sources," Hargrove said. "The current emphasis is on reducing water pollution due to nonpoint source pollutants – or, pollution that comes from runoff from a variety of land uses, such as livestock waste from farms, oil from service stations, or fertilizer from home lawns."

In 1995, the Kansas Natural Resources Defense Council and the Kansas Sierra Club sued the U.S. Environmental Protection Agency for the federal agency's alleged failure to develop total maximum daily loads (TMDLs) in Kansas. A TMDL is a written, measurable assessment of a stream segment and its water quality problems and contributing pollutants.

The lawsuit was settled out of court and the Kansas Department of Health and Environment agreed to establish water quality standards for the state. The action allowed KDHE and various state agencies the opportunity to institute local, voluntary efforts to clean water, rather than be subjected to broad, federal rules.

"This is an issue that is close to home for everyone," said Marc Johnson, the director of K-State Research and Extension. "We all know how important clean water is in our lives. Part of the university's responsibility is to bring information to every community so that people become involved in keeping their water safe."

Persons interested in more information about water quality and how communities are implementing best management practices can contact their local Extension office. More information also is available on-line at <http://www.oznet.ksu.edu/kcare>.

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Released: Jan. 16, 2001

Subsurface Drip Irrigation May Be Option For Farmers Seeking Best Management Practices

COLBY, Kan. – Researchers in western Kansas think they've found a good way to use modern technology to bring millions of dollars in value to livestock waste.

They're using subsurface drip irrigation (SDI) to apply waste from lagoons to adjacent cropland, which not only fertilizes the land but also reduces the risk of that waste reaching public water supplies. According to Freddie Lamm, an irrigation engineer with Kansas State University, the practice takes a "nuisance or hazardous waste" and creates a financial benefit.

In one study, the estimated benefit is as much as \$4.2 million. That study estimated the annual runoff from beef lagoons in the Great Plains at 15,000 acre-feet, which could irrigate 10,000 corn acres worth \$4.2 million. Lamm and others also are studying the benefits of using swine waste.

Livestock waste has been used successfully as a fertilizer, especially for corn. SDI allows researchers to apply the fertilizer more directly to crops.

The research, which is funded through 2001, is the K-State group's newest study to improve the efficiency of irrigation, particularly in western Kansas where an estimated 2.24 million acres are under irrigation. It's also another viable option for Kansas officials – including Gov. Bill Graves – who are promoting local, voluntary efforts to protect and clean the state's waterways.

"When we began studying SDI in 1989, we really weren't in a crisis situation at the time; essentially no one in Kansas was using SDI for row crops," said Lamm, who works for K-State Research and Extension in Colby. "So before people were beating down our doors looking for answers, we got ahead of the curve and now we are able to give answers to common questions."

SDI utilizes underground lines (drip tapes) which run the length and breadth of a field. Its pronounced advantages over center pivot sprinklers is that SDI can cover square areas -- sprinklers limit irrigation to a circle in a square field -- and water and nutrients are fed directly to the plant's roots.

Lamm notes that the value of annual water savings associated with widespread adoption of SDI on currently furrow-irrigated areas of western Kansas has been estimated to range between \$175 to \$350 million. That's also important because of recent years' news reports that the region's lifeblood – the large, underground stream known as the Ogallala aquifer – is rapidly depleting.

SDI An Option For Livestock Waste/Page 2

Kansas is the sixth largest irrigated state with nearly 3 million irrigated acres. In western Kansas, irrigation accounts for nearly 95 percent of the total water use. Nearly 10,500 acres currently are under subsurface drip irrigation, but Lamm thinks approximately 750,000 acres of lower efficiency surface irrigation could be suited for SDI.

A lingering question for farmers considering installing an SDI system is cost efficiency. So far, K-State researchers estimate that an SDI system must last 15-20 years for the farmer to recover his initial investment.

“This is possible, provided the systems are properly maintained,” Lamm said. “The trends in irrigation improvements and the constraints facing irrigators indicate that SDI acres will continue to increase.”

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From Kansas State University's Agricultural Experiment Station and Cooperative Extension Service

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Released: Jan. 16, 2001

BMP Research Establishes Water-Friendly Guidelines

MANHATTAN, Kan. – Research at Kansas State University is helping Kansans establish production guidelines to improve and protect water quality.

Dan Devlin, K-State Research and Extension agronomist, has developed a series of publications that outline best management practices (BMPs) for Kansas producers. These BMPs include guidelines and management tips to minimize the environmental impact of agriculture practices.

“BMPs are management practices that maximize economic benefit and minimize environmental impact,” Devlin said. “The resulting increase in profitability – coupled with the ability to be good environmental stewards – encourages citizens to implement these practices.”

BMPs are established through extensive research and testing. Once a BMP has been identified, publications and web pages help inform citizens about these recommendations. Demonstration plots and tours, public meetings and one-on-one advising help further increase the implementation of BMPs in Kansas. The addition of watershed specialists to K-State Research and Extension's team further adds to the implementation process, Devlin said.

“The watershed specialists will be able to work with the farmers in a one-on-one setting, further helping farmers adopt BMPs in their operation,” he said.

K-State Research and Extension has identified BMPs for a number of practices, including the following:

- * atrazine timing and incorporation;
- * deep banding of phosphorus fertilizer;
- * no-till and reduced tillage cropping practices; and
- * livestock waste management systems.

Devlin said that through BMPs and other research efforts, K-State Research and Extension continues to establish and encourage the implementation of conservation practices to protect our water, soil, and air.

To obtain copies of Devlin's publications, interested persons can contact their local Extension office, or on the World Wide Web, visit <http://www.oznet.ksu.edu/library/>, then select “Water Quality.”

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Watershed Specialist Summary

K-State Research and Extension is boosting its water quality initiative with the appointment of five new watershed specialists. These specialists will provide watershed management expertise and develop watershed educational program activities in multi-county areas. The specialists, who are currently undergoing training and assessing the needs of their assigned watersheds, are:

- **Mike Christian**, Upper Blue watershed specialist. Christian is located in the northeast area office and can be reached at 785-532-5833.
- **Ron Graber**, Lower Arkansas watershed specialist. Graber is located in the south central area office and can be reached at 316-663-5491.
- **Doug Musick**, Lower Kansas watershed specialist. Musick is located Douglas County and can be reached at 785-843-8058.
- **Milton Krainbill**, Upper Delaware watershed specialist. Krainbill is located in the Jackson County office and can be reached at 785-364-4125.
- **Bob Frisbee**, Upper Arkansas watershed specialist. Frisbee is located in Edwards County and can be reached at 316-659-2149.

As watershed specialists, the five will provide management expertise and develop educational program activities in multi-county areas. They will be working with landowners and farmers within the watersheds to develop action plans, based on the concerns within the watersheds. The specialists will strive to improve water quality through educational programs, including on-farm demonstrations, workshops, seminars and other teaching methods.

The watershed specialists will work with K-State Research and Extension agents, specialists and researchers – as well as industry representatives and other water quality experts – to develop and implement action plans to improve water quality throughout the state. This initiative is one of many that illustrates K-State Research and Extension’s dedication to improving water quality in Kansas.

Mailed: Dec. 14, 2000

Nutrient Best Management Practices Can Bolster Farm Profits

MANHATTAN, Kan. – All the talk about water quality, TMDLs, WQS and BMPs can be confusing and downright frustrating, but one thing seems clear – adding nutrients to farmland in precise amounts and at specific times of the growing season can reinforce a farm's bottom line, according to Kansas State University agricultural economists.

Such practices, also known as Best Management Practices (BMPs), have been touted since the late 1980s as a means of protecting and improving the quality of surface waters in the state by reducing potentially harmful chemical runoff from farm fields. But BMPs also bring an added benefit, said Dan Bernardo, head of the agricultural economics department at K-State.

"There's a very positive relationship between the adoption of those (nutrient management) BMPs and farm profits," said Bernardo, who along with other K-State economists, conducted a survey among farmers earlier this year regarding economic issues surrounding the use of best management practices. He added, however, that there was also a small negative relationship between the use of herbicides, BMPs and farm income.

The reasons for the improved profitability when applying nutrients using best management practices aren't clear, but by carefully measuring the amounts used and not over-applying, and by applying at optimal times with respect to weather and the growing season, growers may be saving money on their nutrient inputs while at the same time enhancing their yield prospects, Bernardo said.

The survey was part of the Integrated Agricultural Management Systems (IAMS) project which was launched in 1998 by K-State Research and Extension. The goal is to evaluate agricultural management operations that address major agriculture-related contaminants that threaten the quality of surface waters, while also maintaining or improving the competitiveness of production agriculture.

The IAMS project is funded by the Kansas Corn Commission, the Kansas Grain Sorghum Commission, the Kansas Soybean Association, and the Kansas Fertilizer Research Fund.

The survey was mailed to farmers who participate in the Kansas Farm Management Association program. Through the program, KFMA economists provide production and financial management

-more-

Best Management Practices/Page 2

information to 2,700 farms and 3,400 families. A total of 963 producers responded to the survey.

“This study is the first to use actual farm-level economic and BMP adoption data to determine the relationship between BMP use and farm profitability. K-State researchers had the rather enviable situation where we could mesh the survey responses with KFMA income data,” Bernardo said.

Key elements of nutrient best management practices include:

- * Determining optimal nitrogen rates to use on the site and applying no more than necessary;
- * Using the appropriate source of nitrogen for the plant, soil, and residue situation; and
- * applying the nitrogen at the correct time.

Survey results also showed that the financial incentives necessary for farmers to adopt specific best management practices differ significantly from one producer to the next, across geographic areas and specific crops, which indicated that there’s no “universal formula” for encouraging BMP adoption.

While the survey showed a positive correlation between applying nutrients under best management practices, it also showed a small negative correlation between herbicide BMPs in corn and sorghum production and profits, Bernardo said.

“On the herbicide side, for corn or sorghum, there was a small but statistically significant negative relationship that would imply a small yield drag may exist,” he said. “That doesn’t imply that when BMPs are employed correctly, that there’s an adverse effect on profits.”

Further study is needed to determine if the farmers surveyed are in fact using BMPs correctly when applying herbicides and if more education is called for, Bernardo added.

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Total Maximum Daily Loads

Kansas State University Agricultural Experiment Station and Cooperative Extension Service

The Clean Water Act of 1972 required states to set water quality standards. The standards for any given body of water depend on the designated uses (public drinking water, fish and wildlife, recreation, agricultural, industrial, etc.) that apply to that water.

The act required states to identify and set priorities on waters not meeting those standards. These waters include streams, rivers, reservoirs, lakes, ponds (except private ponds), and wetlands.

If one or more pollutants are found to exceed the water quality standards for a given body of water, the state is required to establish a Total Maximum Daily Load (TMDL) for that body of water.

A TMDL is the maximum amount of pollution a water body can receive without violating water quality standards. Despite the seemingly simple term, Total Maximum Daily Load, a TMDL is not just a simple number that sets a maximum limit on the amount of, a given pollutant in a water body on any given day.

Rather, a TMDL establishes a range of acceptable values that vary with flow conditions. For example, a TMDL for atrazine for a lake may state that the Water Quality Standard (WQS) of 3 parts per billion (ppb) can only be exceeded in the April through September period 1 day every 3 years at seasonal flood pool levels, and in less than 10 percent of samples during spring flood conditions.

Kansas will be establishing about 900 TMDLs between 2000 and 2006. Many of the TMDLs will be in rural settings and

will rely on participation of agricultural producers to be successfully implemented. For streams in Kansas, the major issue will be reduction of bacteria levels. For lakes, the major issue will be reduction of pesticide and phosphorus levels. TMDL implementation will be done on a watershed basis.

The TMDL Plan

A TMDL plan is a written document specific to a given pollutant and a given stream segment or lake in a watershed. The TMDL document takes into account:

1. Recent water quality monitoring data over a period of 2 or more years
2. Which pollutants are occurring at levels above the WQS levels in the stream segment or lake
3. The frequency of WQS violations
4. The flow conditions existing when the high levels of pollutants were recorded
5. The sources of the pollutant within the watershed and how much each source may be contributing to the problem

Implementing a TMDL

Once the desired endpoints of pollution levels are established, the TMDL document sets into motion several important processes. First, KDHE is able to quantify how much reduction in the pollutant load is needed in the watershed area to meet the desired water quality endpoints. Second, KDHE is then able to divide responsibility for reducing pollution among possible point and nonpoint sources of the pollutant within the watershed during a specified number of years.

For nonpoint pollution sources, voluntary actions will be set in place to achieve compliance. This will consist of efforts to demonstrate, promote, design, and implement Best Management Practices for water quality improvement. These voluntary efforts will be a partnership between the private sector; K-State Research and Extension; and various state, local, and federal agencies and organizations.

If future water quality monitoring shows that the body of water is no longer impaired, no additional action is needed to reduce pollution. But if pollution levels are still too high at the end of the time period for voluntary action, KDHE will determine what measures must be taken and by whom to reduce the pollution to acceptable levels. These measures may be mandatory at that time.

The Goal of TMDLs

Monitoring data indicate the historic number of violations of WQS levels. The goal of TMDLs will be to reduce the number of those violations. It is the hope of the state that violations will occur in less than 10 percent of the samples. Violations during high flow are indicative of nonpoint source pollution, the state's primary type of pollution. The key to successful implementation of TMDLs will be setting reasonable goals for pollution reduction, focusing on specific watersheds with highest priority, concentrating on activities that occur near streams, getting voluntary participation among those who

contribute to nonpoint source pollution, providing those sources with enough time and money to implement BMPs, and making state programs available for assistance.

Water Quality Monitoring in Kansas

The Kansas Department of Health and Environment (KDHE) monitors the quality of surface waters of Kansas. KDHE prepared lists of impaired surface waters in 1994, 1996, and 1998. The 1998 list includes more than 770 impaired stream segments and 130 impaired lakes within the 12 major river basins, requiring the establishment of TMDLs.

The 1998 list of impaired waters was based on monitoring data from 1996 and 1997. This data is taken from 291 monitoring sites throughout Kansas. Sites are monitored on a bimonthly basis.

The TMDL Process

TMDLs will be established for bodies of water not meeting their designated uses due to violations in water quality standards. The TMDL assessment outlines the

amount of a pollutant that needs to be reduced to meet WQS levels, allocates control responsibilities among pollution sources in a watershed, and provides a basis for taking actions to restore water quality. The process of developing and implementing TMDLs involves:

1. Identifying the impaired water body, the pollutant(s) causing the impairment, and defining the goal for improved water quality.
2. Determining to what extent the impaired water body can assimilate the pollutants.
3. Estimating the type, location, and magnitude of the sources contributing pollutants to the water body.
4. Estimating the relationship between each source and the pollutant load in the impaired water body.
5. Allocating permissible loads of each pollutant among point, nonpoint, and background sources. Assigning responsibility for reducing pollutants among the various sources. Establishing a margin of safety for each pollutant.
6. Follow-up monitoring of water quality.

7. Establishing a mechanism to ensure that the TMDL process is working effectively so that the water body will meet established water quality standards for all designated uses.

The TMDL Schedule for Kansas

Kansas was required to submit TMDLs to the Environmental Protection Agency for impaired stream segments and lakes in each of the 12 major river basins in Kansas over an 8-year period, ending June 30, 1996. Kansas plans to accelerate this schedule. The first TMDLs were submitted on June 30, 1999 for the Kansas-Lower Republican Basin. The accelerated schedule for TMDLs in Kansas is:

1999: Kansas-Lower Republican River Basin (completed June 30, 1999)

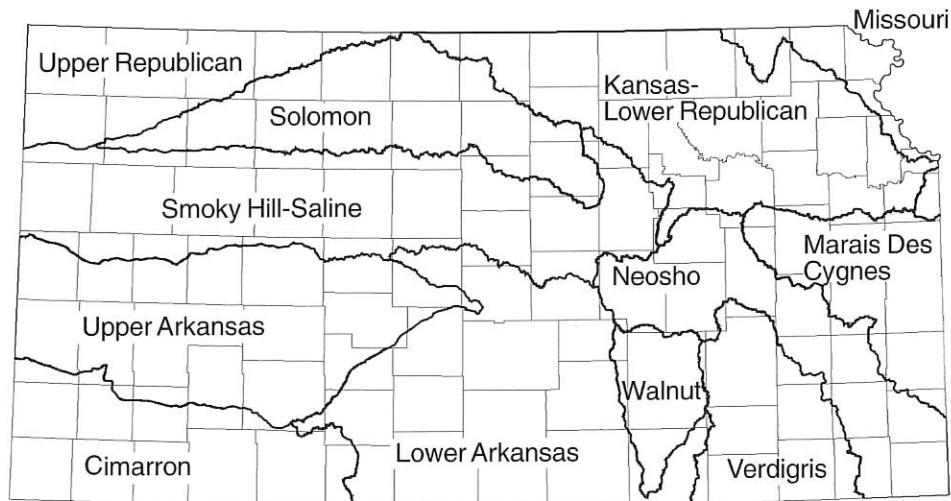
2000: Lower Arkansas, Upper Arkansas, and Cimarron River Basins

2001: Marais des Cygnes and Missouri River Basins

2002: Neosho, Verdigris, and Walnut River Basins

2003: Smoky Hill-Saline, Solomon, and Upper Republican River Basins

Twelve River Basins in Kansas



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Atrazine Herbicide: A Water Quality Concern for Kansas

Kansas State University Agricultural Experiment Station and Cooperative Extension Service

Atrazine herbicide is widely used in Kansas for selective weed control in corn and grain sorghum. It has wide application flexibility and is one of the lowest-cost herbicides on a per-acre basis. In addition, atrazine has been shown to be one of the most effective soil-applied herbicides for weed control in corn and grain sorghum. Atrazine is often used by itself, but also is included in many postemergence herbicide tank-mix programs. However, there are environmental concerns regarding the use of atrazine.

Water Quality Concerns

In recent years, there have been concerns about the level of atrazine herbicide runoff entering surface waters.

This particularly became a concern when the Environmental Protection Agency (EPA) announced that a maximum contaminant level (MCL) for atrazine had been set at an annual average of 3 parts per billion (ppb). This is an enforceable level for public drinking water systems and, according to EPA, is a concentration that is safe to drink over a 70-year lifetime with no adverse effects. Municipal water treatment plants do not typically remove atrazine during the treatment process.

In addition, an aquatic life standard for atrazine concentrations in Kansas surface water has been set at 3 ppb. A number of rivers, streams, and lakes in eastern Kansas routinely exceed the 3 ppb standard for brief periods, following herbicide application in the spring.

In 1998, the Kansas Department of Health and Environment submitted its list of impaired waters (303(d) list) to EPA in which several lakes were identified as impaired by runoff of atrazine. For the atrazine-impaired watersheds, a Total Maximum Daily Load (TMDL) will be set and an implementation plan developed to reduce atrazine levels.

It is hoped that the reductions called for in the TMDL plan will be reached voluntarily by farmers using atrazine best management practices (BMPs). However, if voluntary adoption does not bring the atrazine concentrations into compliance with water quality standards, regulatory actions may need to be implemented.

How Atrazine Can Move Into Water

Kansas State University researchers have found annual atrazine runoff losses often range from 1 to 3 percent of the total applied. The amount of atrazine lost from crop fields is determined by the chemical characteristics of atrazine; soil and site characteristics; tillage practices; and rainfall duration, intensity, and timing.

Atrazine is lost from the top inch of the soil surface. In general, the greater the slope and the lower the infiltration rate of the surface soil, the greater the atrazine runoff potential. Reducing tillage intensity may or may not reduce atrazine runoff. The surface soil moisture at time of herbicide application, length of time from herbicide application until the first runoff event, and the intensity and duration of the first runoff event greatly influence the

amount of atrazine lost in surface runoff. The drier the soil surface at atrazine application time, the more water and atrazine that will infiltrate into the soil and the less atrazine will be available to run off.

Up to two-thirds of the total atrazine runoff from a field may occur with the first major runoff event following atrazine application. The longer the time period between atrazine application and the first major runoff event, the less atrazine runoff that will occur. The most atrazine runoff often occurs during the peak atrazine application period of May, June, and July, which is also the period with the highest amount and intensity of rainfall.

Controlling Atrazine Runoff

The most effective way to minimize atrazine runoff into surface water is to implement a series of research-proven BMPs. K-State researchers have determined those BMPs that, when adopted by farmers, will minimize atrazine runoff. These atrazine BMPs are designed to:

- reduce the amount of atrazine on the soil surface at any one time, especially during high-rainfall periods in late spring and early summer;
- reduce the rate of atrazine used in a field;
- reduce the impact of the first runoff event on atrazine loss; and
- provide a mechanism for deposition of the atrazine before it leaves the field.

12 Best Management Practices for Atrazine

1. *Incorporate atrazine into the top 2 inches of soil.* Apply preplant atrazine alone or as part of a tankmix and incorporate into the top 2 inches of soil with a field cultivator, tandem disk, or other appropriate tillage implement. This can reduce atrazine runoff by **60 to 75 percent** compared to a surface application without incorporation.
2. *Use fall or early spring applications.* Atrazine runoff can be reduced by **50 percent** by applying atrazine the previous fall or prior to April 15 of the current cropping year. Rainfall intensity, duration, and amount is lower during these time periods.
3. *Use postemergence atrazine premix products.* Many postemergence herbicide premix products are available that, when used at recommended rates, result in less atrazine being applied than with typical soil-applied atrazine applications. Using these products can result in **50 to 67 percent** less atrazine runoff.
4. *Reduce soil-applied atrazine application rates.* The lower the atrazine rate applied, the less potential for atrazine runoff. This can reduce the amount of atrazine applied by as much as **33 percent**.
5. *Use split applications of atrazine.* Using split applications reduces the amount of atrazine available for runoff at any given time. This has the potential to reduce atrazine runoff by **25 percent** compared to applying all the atrazine at planting.
6. *Use reduced soil-applied atrazine rates followed by a postemergence herbicide application.* Applying atrazine at a reduced soil-applied rate of approximately 1 pound per acre at planting, followed by a postemergence application of a premix product that contains low rates of atrazine, results in **25 percent** less atrazine runoff compared to surface applying all atrazine at planting time.
7. *Use non-atrazine herbicides.* New herbicides that do not contain atrazine are available for use in corn and grain sorghum. These alternative herbicides may require greater management or be more expensive. This can reduce the amount of atrazine applied by as much as **100 percent**.
8. *Use integrated pest management strategies.* Integrated weed management strategies combine prevention, suppression, monitoring, and pesticides to control weeds while minimizing the amount of herbicide needed. These strategies have the potential to reduce atrazine runoff by **0 to 100 percent**.
9. *Band herbicides at planting or cultivation.* Applying atrazine over the row in a 10- to 15-inch band reduces the total amount of atrazine applied to a field by **50 to 67 percent** resulting in a corresponding reduction in atrazine runoff compared to a broadcast surface application without incorporation.
10. *Establish vegetative and riparian buffer areas.* These buffers are effective at slowing down runoff and settling out soil particles from erosion. The buffers also may reduce the amount of water runoff by increasing infiltration of runoff water within the buffer. To the extent that water infiltrates into the buffer strip soils, atrazine loss will also be reduced.
11. *Use proper atrazine rates, mixing, loading, and disposal practices.* Read and follow all label directions. Develop and implement a spill prevention and response plan.
12. *Utilize conservation practices and structures.* Conservation practices and structures that slow or reduce water runoff and soil erosion reduce atrazine runoff.

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2-15

Phosphorus and Water Quality In Kansas

Kansas State University Agricultural Experiment Station and Cooperative Extension Service

A report in 1994 by the Kansas Department of Health and Environment indicated that 24 percent of stream miles and 89 percent of lakes in Kansas were impaired by excessive levels of nutrients.

Phosphorus is the nutrient that is most often responsible for the impairment of surface water. Phosphorus is essential for crop plant growth, and economic yield increases to phosphorus fertilizer occur where there are soil deficiencies. In some cases, however, phosphorus can move into surface waters and cause impairments of normal uses. Phosphorus is primarily a surface water quality problem, rather than a groundwater problem. In most soils, nearly all the phosphorus exists in organic and inorganic compounds of very low solubility. As a result, phosphorus generally does not leach downward far enough to reach groundwater.

Concerns About Phosphorus in Water

Excess phosphorus in water is not considered to be a human health concern, according to the Kansas Department of Health and Environment (KDHE).

Excess phosphorus, however, is a concern for aquatic ecosystems. Under most natural conditions, phosphorus is the limiting factor in the growth of aquatic plants.

When large amounts of phosphorus enter lakes and streams, it enhances the growth of algae and other aquatic weeds, leading to excessive aquatic plant growth, often referred to as algae blooms. This unwanted burden of aquatic plant growth is termed "eutrophication." Water clogged with overabundant aquatic plant growth can

lead to a number of undesirable consequences. The water can become undesirable for recreational activities. In addition, when these aquatic plants die and decompose, they consume oxygen in the water and severe fish kills may occur. Decaying algae and plants may cause undesirable odor and taste in drinking water.

Improving water quality in a lake impaired by excessive phosphorus is difficult and takes considerable time. Therefore, it is best to take preventive steps to limit phosphorus movement into surface waters.

Sources of Phosphorus

Phosphorus comes from both point and nonpoint sources. Point sources include municipal waste treatment plants, industrial operations, and large, confined livestock operations. These sources generally are regulated by federal and state laws requiring them to have environmental controls.

Phosphorus also comes from nonpoint sources. Nonpoint sources of phosphorus include soil erosion and water runoff from cropland, lawns and gardens; private waste treatment systems; urban areas; small livestock confinement operations; and livestock grazing operations. It is believed that much of the excess phosphorus in surface water comes from agriculture, with both crop production and livestock operations contributing.

Phosphorus in the Environment

In the environment, phosphorus exists either in the particulate or dissolved form.

1. Particulate phosphorus includes phosphorus that exists in one of three forms: (a) associated with soil particles; (b) in mineral form as aluminum, iron, or calcium compounds; or (c) incorporated in organic matter. This form of phosphorus can move into surface waters attached to soil and organic matter particles through soil erosion. Particulate phosphorus is largely unavailable to aquatic organisms. But if particulate phosphorus levels are high in surface waters, such as in areas where significant erosion problems occur, this form of phosphorus can play a role in eutrophication.
2. Dissolved phosphorus includes phosphorus compounds dissolved in water. A small amount of dissolved phosphorus exists naturally in all soils. Runoff water also can contain dissolved phosphorus, either from the top layer of the soil or from recently applied fertilizer or manure still on the soil surface. Dissolved phosphorus can be quickly utilized by aquatic organisms and even low levels can cause eutrophication.

In Kansas, about 75 to 90 percent of phosphorus movement into surface water occurs is particulate phosphorus with soil erosion. About 10 to 25 percent is dissolved phosphorus in water runoff. Therefore, generally, preventing soil erosion is very important in limiting phosphorus movement from cropland, rangelands, and pastures.

Factors that affect the level of nonpoint source phosphorus pollution from cropland include soil phosphorus content and the rate and method of phosphorus applied as either fertilizer or manure. Generally, the higher the soil test phosphorus level, the greater the potential phosphorus runoff to surface waters.

Dissolved phosphorus becomes more important where: (a) soil test levels are high, (b) higher fertilization rates are applied, (c) phosphorus fertilizer is not incorporated or is surface applied on frozen soils during a time of year when runoff is likely, or (d) livestock waste is spread on pastures or cropland and not incorporated.

Livestock waste washed from livestock confinement areas, pastures, or other feeding areas also can be a significant source of phosphorus entering surface waters.

Failing septic systems disposing of toilet and wash water from indoor plumbing can contribute phosphorus locally. Failing septic systems can be generally categorized in the following manner: (1) septic systems that discharge directly into a stream or ditch from the tank without any lateral field or lagoon; or (2) septic systems that discharge domestic wastewater to the soil surface due to a failing lateral field or lagoon. In failing systems, human waste and wastewater comes to the soil surface where it can then be transported by water runoff to surface water.

In urban areas, construction sites where soil is disturbed may lead to soil erosion and phosphorus losses to surface water. In addition, phosphorus runoff losses can occur from lawns, gardens, and turfgrass areas through soil erosion or surface water runoff containing dissolved phosphorus. Fertilizer applied to lawns, gardens, and turf can be lost in runoff waters, particularly if fertilizer is spilled on driveways, sidewalks, or roadways.

Eutrophication

Lakes and ponds naturally support a healthy population of aquatic life. But if nutrient levels, especially phosphorus, become too high, the following undesirable changes can occur:

- Increased algae growth
- Reduced water clarity
- Unpleasant odor and taste
- Increased filtration costs
- Reduced oxygen in the water
- Changes in fish populations, or fish kills
- Toxins from bluegreen algae

Controlling Phosphorus Runoff

Point source phosphorus pollutant sources are largely controlled through federal and state regulations and permits.

Nonpoint source phosphorus pollutant sources are generally controlled through the voluntary actions of citizens. Technical assistance and cost share are available from local and state agencies to assist in implementing pollution control practices.

Cropland. In cropland, phosphorus losses can be controlled by implementing a series of best management practices



Particulate phosphorus can move into surface water through soil erosion.

(BMPs). These BMPs for phosphorus fall into two categories:

(1) Phosphorus use practices. Producers can help reduce the potential for phosphorus runoff by applying phosphorus fertilizer only when needed and by using application timing and placement methods that minimize rate and incorporate the phosphorus below the soil surface. Manure also should be incorporated. Producers can use buffer areas, where no phosphorus is applied, around water resources.

(2) Erosion control. Most phosphorus under field conditions is strongly attached to soil particles. In this form, it will not dissolve and move off-site in runoff water, but it can move off-site with soil particles as soil erosion occurs. BMPs that reduce soil erosion play a major role in reducing the potential for phosphorus movement. Vegetative filter strips also can reduce erosion losses.

Livestock Production. With confined livestock operations, facilities need to be located away from surface water drainage ways. Waste collection, storage, and handling operations need to be properly designed. In addition, a nutrient management plan for land application of animal wastes needs to be developed and implemented. Improved grazing management systems may reduce soil erosion in pastures and rangelands. In addition, developing alternative water sources and improving riparian areas along streams also may reduce phosphorus runoff into streams. *Domestic Sources.* Repairing or replacing failing septic systems will substantially reduce phosphorus runoff losses associated with septic systems. Controlling erosion from construction sites also can help reduce phosphorus losses.

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Bacterial Contamination

Of Surface Waters In Kansas

Kansas State University Agricultural Experiment Station and Cooperative Extension Service

Water is important to the citizens of Kansas. All of us depend on water for drinking, agriculture, industry, recreational, and household use. In addition, wildlife and aquatic life depend on quality surface water for their existence.

Concerns exist in Kansas about the quality of our surface water. The most common health-threatening contamination of Kansas surface waters is bacterial contamination. Monitoring of surface water in 1994 by the Kansas Department of Health and Environment (KDHE) found that 75 percent of Kansas streams and 7 percent of lakes were impaired by bacterial contamination. Bacteria are considered to be an impairment of primary and secondary water uses in most river basins in Kansas. Because of the threat to human health and widespread surface water contamination, concern and awareness of bacterial contamination of surface water in Kansas are increasing.

Understanding Bacterial Contamination

Surface water often contains a variety of pathogens including viruses, fungi, protozoans, and bacteria. Human health risks generally occur when there is fecal contamination from human sources. However, certain pathogens deriving from animal sources, such as domestic livestock, pets, and wildlife, can be human health threats. Some common waterborne diseases include typhoid, hepatitis, dysentery, giardiasis, and cryptosporidiosis. Bacteria represent the largest number of organisms present in

surface water, are easily grown under laboratory conditions, and have been the most closely scrutinized. For that reason, fecal coliform bacteria (FCB) levels in surface water are monitored and used as indicators of other fecal contamination and for risk of disease associated with drinking, swimming, or other uses of the water. It is assumed that if FCB levels in water are high, there is a high probability that there are other fecal pathogens present.

FCB are associated with fecal material, but similar organisms may be found naturally in soil, the surface of leaves, and water. Bacterial levels in water vary widely depending upon the time of the year, rainfall, environmental conditions, and distance from the source of contamination. Typically, bacterial levels in water decrease with distance from the source of contamination. FCB are always present in the digestive tracts of warm-blooded animals and are found in their wastes. Fecal bacteria require a food source and warm, moist conditions for survival and once in the water and the environment, begin to die. Therefore, FCB presence in surface water is considered an indication of a nearby source of contamination.

Kansas Water Quality Standards for Bacterial Contamination

KDHE has responsibility for water quality monitoring of surface waters of Kansas for environmental pollutants, including FCB. Surface water samples are systematically collected and tested to

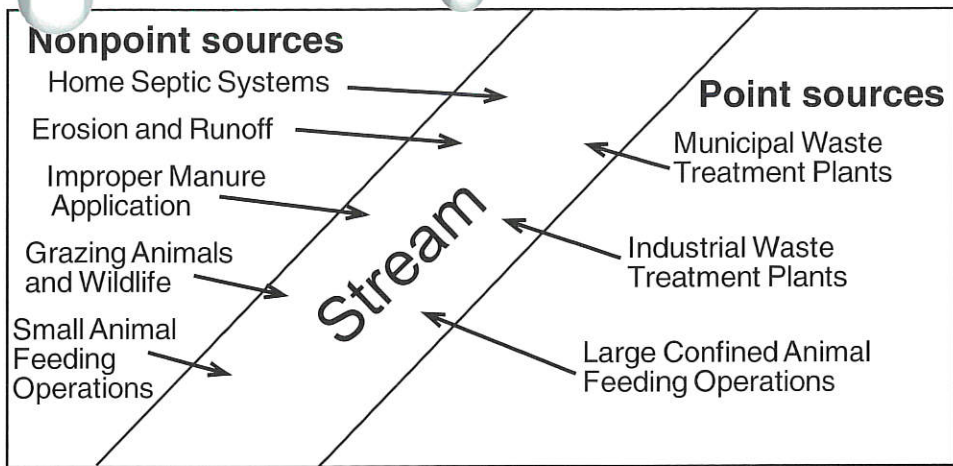
determine if the water meets the water standards for FCB contamination.

Allowable levels of FCB in surface water depend upon the intended use of the water. The allowable limit for finished drinking water for FCB is less than one colony forming unit (CFU) per 100 mL of water. Since Kansas surface water may be impaired by FCB, surface water used for drinking purposes must undergo considerable treatment before use.

Allowable FCB levels for recreation vary depending upon the type of recreational use. The standards are based on a geometric mean of five separate daily samples. For primary recreational contact use, the allowable standard for FCB is 200 CFU/100 mL of water. Primary contact would include swimming and other recreational uses in which it is likely that water would be ingested by humans. For secondary recreational contact, e.g., boating and fishing, the standard is 2,000 CFU/100 mL of water.

Sources of Bacterial Contamination

Most surface waters in Kansas contain FCB. Most FCB enter streams and rivers through direct deposition of wastes into water, or runoff of wastes from areas with high concentrations of domestic livestock, wildlife, or human wastes. Potential sources of FCB include feedlots, grazing lands, septic systems, municipal wastewater treatment plants, and sewer overflows. Wildlife is thought to be less a contributing source of FCB than are domestic livestock or humans.



Sources of bacterial contamination

Since the passage of the Federal Clean Water Act in 1972, significant improvements have been made to municipal and industrial wastewater treatment plants. In addition, large confined livestock operations were required to eliminate the off-site movement of their livestock wastes. This has resulted in reduced levels of FCB in Kansas surface water. The reduction in these point sources of FCB has resulted in greater emphasis being placed on nonpoint sources of FCB contamination. Nonpoint sources of FCB contamination include runoff from small livestock feeding operations, pastures, and failing septic systems. Typically, individual nonpoint sources of pollution are more difficult to identify and regulate. In addition, there may be thousands of individual nonpoint sources in a watershed, each contributing only a small amount to the problem. The accumulative effect can impair water resources.

Controlling Bacterial Contamination

Reductions of FCB levels in surface water can be accomplished through proper waste collection, treatment, disposal, and land management. Practices that reduce bacterial survival and introduction into surface waters are most effective. In

municipal treatment plants, chemical or ultraviolet treatment kill pathogens in the waste water. Bacteria can be reduced by urban storm water management systems that reduce runoff rates and volumes and allow for filtering by vegetative buffer areas. With septic systems, proper site selection and management uses the soil to filter out bacteria and eliminate it. With livestock feeding operations, it may be necessary to construct livestock waste containment structures and develop management plans for land application of



With livestock feeding operations, it may be necessary to construct livestock waste containment structures and develop management plans for land application of wastes.

wastes. Reducing bacterial contamination from grazing lands may be accomplished by improved grazing management and, in certain situations, by limiting livestock access to streams.

Health Hazards

What are the health hazards associated with bacterial contamination of streams and lakes? Will high FCB levels in surface water mean that we should not swim, fish, or use the water as a source of drinking water? These are difficult questions to answer. The source of contamination is just as important as the level of contamination. If the source of the water contamination is human, there is a much higher likelihood of illness. Most illnesses are caused by pathogens that are species specific. There is a much lower chance of human illnesses being caused by a disease that affects swine. Therefore, if high FCB levels in water are derived primarily from domestic livestock or wildlife, there is less risk to humans of swimming in the water than if the FCB is derived from a human source.

Surface water FCB monitoring and testing results indicate the level of contamination by fecal wastes of all warm-blooded animals, not just humans. New methods are being developed to identify the animal source of a FCB sample. The bacteria may get in the water from runoff containing the wastes of livestock, wildlife, or pets. In addition, some coliform bacteria live naturally in soil or water.

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Water Quality Protection: Best Management Practices for Cropland

Kansas State University Agricultural Experiment Station and Cooperative Extension Service

Best Management Practices for Cropland Pollutants						
Potential to Reduce Pollutant Loss						
Best Management Practice	Pesticides		Soluble Phosphorus	Nutrients		Suspended Solids
	Alachlor	Atrazine		Total Phosphorus	Nitrogen	
Preplant incorporate into the top 2 inches of soil	High	High	High	Negative	High	Negative
Use postemergence herbicide applications	N/A	High	No Effect	No Effect	No Effect	No Effect
Use alternative herbicides	High	High	No Effect	No Effect	No Effect	No Effect
Use in-season cultivation to minimize herbicide use	Low	Medium	No Effect	Negative	No Effect	Negative
Band herbicides, nitrogen, or phosphorus prior to or at planting	High	High	High	Medium	High	No Effect
Band herbicides or nitrogen at cultivation or sidedress	N/A	High	N/A	N/A	Medium	N/A
Apply atrazine in fall for next year's row crop	N/A	High	No Effect	No Effect	No Effect	No Effect
Apply herbicide in early spring, prior to May 1	Medium	Medium	No Effect	No Effect	No Effect	No Effect
Use split applications of herbicide, e.g. 1/2 to 2/3 prior to May 1 and 1/2 to 1/3 at planting	Medium	Medium	No Effect	No Effect	No Effect	No Effect
Use reduced soil-applied herbicide application rates followed by a postemergence application	N/A	Medium	No Effect	No Effect	No Effect	No Effect
Crop rotations	Medium	Medium	Medium	Medium	Medium	Medium
Establish vegetative buffer strips	Medium	Medium	Medium	High	Medium	High
Do not spray / apply herbicides or nutrients near streams or near where runoff enters a stream	High	High	High	Medium	High	No Effect
Do not apply herbicide/phosphorus/or nitrogen to saturated or wet soil	Medium	Medium	Medium	Medium	Medium	No Effect

Best Management Practices for Cropland Pollutants

Potential to Reduce Pollutant Loss

Best Management Practice	Pesticides		Nutrients			Suspended Solids
	Alachlor	Atrazine	Soluble Phosphorus	Total Phosphorus	Nitrogen	
Retain and reuse application equipment rinse waters	Medium	Medium	Medium	No Effect	Medium	No Effect
Read and follow herbicide label directions	Low to High	Low to High	No Effect	No Effect	No Effect	No Effect
Use weed scouting / integrated pest management	Low	Low to High	No Effect	No Effect	No Effect	No Effect
Use nonchemical cultural weed control methods to minimize herbicide use	Low to High	Low to High	No Effect	No Effect	No Effect	No Effect
Avoid overspray and drift, back siphoning, and do not mix, load, or clean equipment near wells and water bodies	Medium to High	Medium to High	Medium to High	Low	Medium to High	No Effect
Conservation tillage farming	Low to Medium	Low to Medium	Low to Medium	High	Low to Medium	High
No-tillage farming	Low to Negative	Low to Negative	Low to Negative	High	Low to Negative	High
Contour farming	Medium	Medium	Medium	High	Medium	High
Contour strip farming	Medium	Medium	Medium	High	Medium	High
Terraces with tile outlets	Low	Low	Low	Medium	Low	Medium
Terraces with grass waterways	Low to Medium	Low to Medium	Low to Medium	Medium	Low to Medium	Medium
Use lowest soil-applied herbicide rate necessary to control weeds	Low	Low	No Effect	No Effect	No Effect	No Effect
Soil sampling and testing	No Effect	No Effect	High	High	High	No Effect
Use optimum phosphorus / nitrogen fertilizer rate	No Effect	No Effect	High	High	High	No Effect
Spill response plan for pesticides and fertilizers	High	High	High	High	High	No Effect

Daniel L. Devlin

Extension Specialist and Coordinator
Environmental Quality

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Kansas State University Agricultural Experiment Station and Cooperative Extension Service

MF-2462

August 2000

It is the policy of Kansas State University Agricultural Experiment Station and Cooperative Extension Service that all persons shall have equal opportunity and access to its educational programs, services, activities, and materials without regard to race, color, religion, national origin, sex, age or disability. Kansas State University is an equal opportunity organization. Issued in furtherance of Cooperative Extension Work, Acts of May 8 and June 30, 1914, as amended. Kansas State University, County Extension Councils, Extension Districts, and United States Department of Agriculture Cooperating, Marc A. Johnson, Director.

2-21

Terms and Definitions

Kansas State University Agricultural Experiment Station and Cooperative Extension Service

Atrazine - A herbicide widely used to control broadleaf and grass weeds in corn and grain sorghum. It is the most commonly used herbicide in the United States.

Best Management Practices (BMPs) - Management practices used to reduce the amount of a pollutant generated or delivered from human activities to water resources.

Bioremediation - The process by which living organisms act to decompose or transform hazardous contaminants into nonhazardous forms. Examples include filter strips and wetlands.

Buffer Strip - A type of vegetative filter strip that can help prevent potential pollutants from getting into surface waters, such as streams and rivers. Types of buffers include grassed waterways, contour grass strips, field borders, field windbreaks, shelterbelts, and riparian (streamside) buffers.

Clean Water Act - Act established by Congress in 1972 with the objective of restoring and maintaining the nation's waters. Under the act, states are required to develop and implement water quality standards, including TMDLs. For more information, see <http://es.epa.gov/oeca/ag/lcwa.html>.

Cost sharing - Financial aid, often from federal, state, or local government sources, to assist landowners implementing best management practices.

Designated Use - Refers to how a body of water is being used. Designated uses include drinkable, swimmable, and fishable.

Drinkable - The highest classification of water quality.

Fecal coliform - Bacteria living in the digestive tract of warm-blooded animals that are excreted in solid wastes. Fecal coliform is an indicator of fecal contamination in water and the most common reason for impaired waters in Kansas.

Fishable - The third highest classification of water quality.

Impaired streams - Streams that do not fully meet the water quality standards for their designated use established by the Kansas Department of Health and Environment. 1,692 streams in Kansas are classified as impaired.

Maximum Containment Levels (MCLs) - Legally enforceable public drinking water standards. MCLs as set by EPA establish the maximum permissible concentration of contaminants in public water supplies.

Non-point source pollution - Pollution that originates from many diffuse sources. NPS pollution is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, depositing them into water bodies.

Point source pollution - Pollution that originates from a well-defined source. Examples include large feedlots, industry, or municipal waste water discharges.

Riparian - Vegetated areas next to water resources that protect them from non-point source pollution and provide bank stabilization and aquatic and wildlife habitat.

Swimmable - The second highest classification of water quality.

Total Maximum Daily Load (TMDL) - The maximum amount of pollution a surface water body can receive without violating water quality standards.

Vegetative filter strip - An area along a ditch, gully, stream, pond, lake, or sink hole that is covered by vegetation such as grass, hay, or timber. The vegetation reduces or removes sediments, chemicals, nutrients, and organic materials carried in runoff.

Watershed - The land area that drains into a body of water by surface or subsurface flow. Kansas has 12 major watersheds: Kansas-Lower Republican, Upper Arkansas, Lower Arkansas, Cimmaron, Upper Republican, Neosho, Missouri, Marais des Cygnes, Smoky Hill - Saline, Solomon, Walnut, and Verdigris. These are composed of smaller watersheds and subwatersheds.

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IAMS

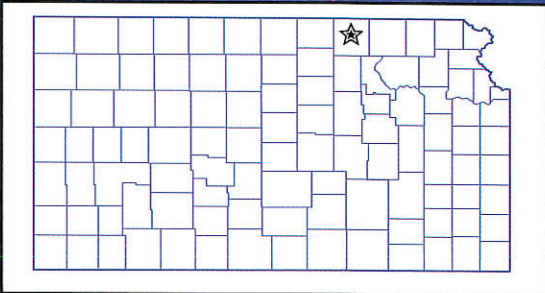
Integrated Agricultural Management Systems:

Washington County

Producers and K-State Research and Extension personnel are involved in a cooperative research and extension project called Integrated Agricultural Management Systems (IAMS). The results of this research will be important to nearly all farmers in eastern and central Kansas.

The aim is to discover how producers can reduce pollution runoff through voluntary practices and help them adopt new Best Management Practices. The ultimate goal is to protect and improve the quality of surface waters in the state.

No one wants to see government-mandated limits on how much pesticide or fertilizer each farmer can use, or



Washington County site specifications:

Soil: Crete silty clay loam, Longford silt loam, Muir silt loam

Slope: 1 to 7 percent, with terraces

Crop rotation: Grain Sorghum / Soybeans

What Is the IAMS Project?

The Integrated Agricultural Management Systems (IAMS) project is the first large, field-scale test of how different systems agricultural production practices may affect potential pollution runoff. There are five IAMS sites in Kansas.

Until now, research has focused primarily on the effect of individual Best Management Practices (BMPs) on a specific pollutant. For example, knifing in phosphorus (a BMP for phosphorus) can reduce

the amount of phosphorus runoff into surface water. Or, using no-till farming (a BMP for suspended solids) can reduce soil erosion.

But what is the net effect on the entire spectrum of possible pollutants from using certain combinations of BMPs and other farming practices? That is what the IAMS project intends to find out. Put all these farming practices together, the way a producer would, and what is the net effect on pollution runoff and economics?

K-State Research and Extension scientists will be measuring the amount of runoff of atrazine and other herbicides, nitrogen, phosphorus, and soil particles from soil erosion from each farming system at the sites. This will help producers, scientists, and government officials decide whether voluntary adoption of certain farming practices will be effective enough in reducing pollutants and achieving Total Maximum Daily Load limits that more stringent regulations will not be needed right away.

how and when they can be applied. But it could happen some day as Kansas, along with other states, begins to establish and implement Total Maximum Daily Loads (TMDLs) for surface waters. TMDLs will set certain limits on the total amount of pesticides, nutrients, soil particles from erosion, and other pollutants that can enter a stream or river segment during a specified period of time. In many watersheds, agriculture is the primary source of one or more these pollution problems.

Hopefully, it will be possible for agriculture as a whole to reduce pollution runoff enough by voluntary means to meet the new TMDL requirements. To find out exactly which system of farming practices would be best in reducing pollutant runoff while maintaining profits, K-State Research and Extension scientists have established five large-scale IAMS projects in Kansas.

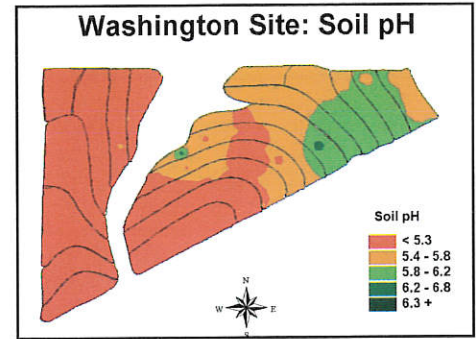
One such IAMS site is located in Washington County, on the north

side of U.S. Highway 36, about 7 miles east of Washington. In 1998, the K-State team began to establish the research site on this 30-acre location. About 10 K-State personnel are involved, along with cooperation and funding from the Kansas Grain Sorghum, Corn, Soybean, and Wheat commissions and the Kansas Fertilizer Research Fund, and the USDA Fund for Rural America program.

Results will be made available as the research progresses.

Other IAMS locations in Kansas are near Topeka, Ottawa, Girard, and Hutchinson.

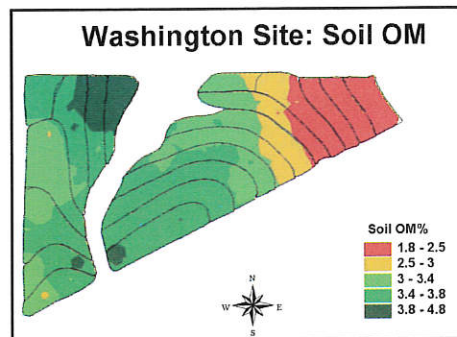
Initial Soil pH Levels at the Site



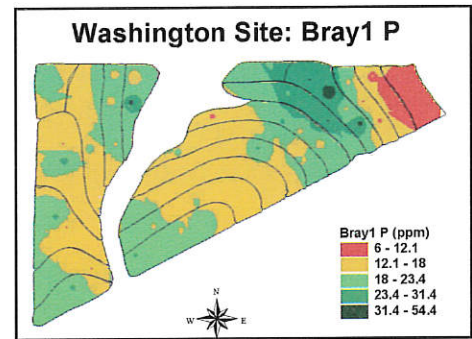
For more information on the IAMS project site in Washington County, contact either:

- Washington County Extension Office (785) 325-2121, or
- Dan Devlin, K-State Extension Environmental Quality Coordinator and Specialist (785) 532-5776

Organic Matter Levels at the Site



Phosphorus Levels at the Site



IAMS Treatments: Washington County Site

<u>Treatment</u>	<u>Tillage</u>	<u>Atrazine</u>	<u>Nutrient</u>
1	Full-width Full-width tillage (fall chisel, field cultivate, plant); 2.1 qt. Bicep II Magnum broadcast with shallow incorporation (grain sorghum only); N and P broadcast with shallow incorporation (grain sorghum only).	Preplant incorporated	Broadcast and incorporated
2	Full-width Full-width tillage (fall chisel, field cultivate, plant); 2.1 qt. Bicep II Magnum broadcast preemergence on surface (grain sorghum only); N and P deep-banded prior to field cultivation (grain sorghum only).	Preemergence	Deep band
3	No-till No-till; 1.5 lb atrazine surface-applied in fall, 1.5 qt. Bicep II Magnum broadcast preemergence on surface (grain sorghum only); N and P broadcast in early spring (grain sorghum only).	Fall/Preemergence	Surface broadcast
4	No-till No-till; 1.55 qt. Bicep II Magnum broadcast 30 days before planting followed by 1.0 qt Bicep II Magnum preemergence on surface (grain sorghum only); N and P deep banded as dual application prior to first Bicep II Magnum application, and starter fertilizer applied with the seed (grain sorghum only).	Early preplant/Preemergence	Dual application/Starter
5	No-till No-till; 2.1 qt. Bicep II Magnum preemergence on surface (grain sorghum only); N surface broadcast with preemergence herbicide application and starter fertilizer in planting time band (grain sorghum only).	Preemergence	Preplant banded/N broadcast

IAMS

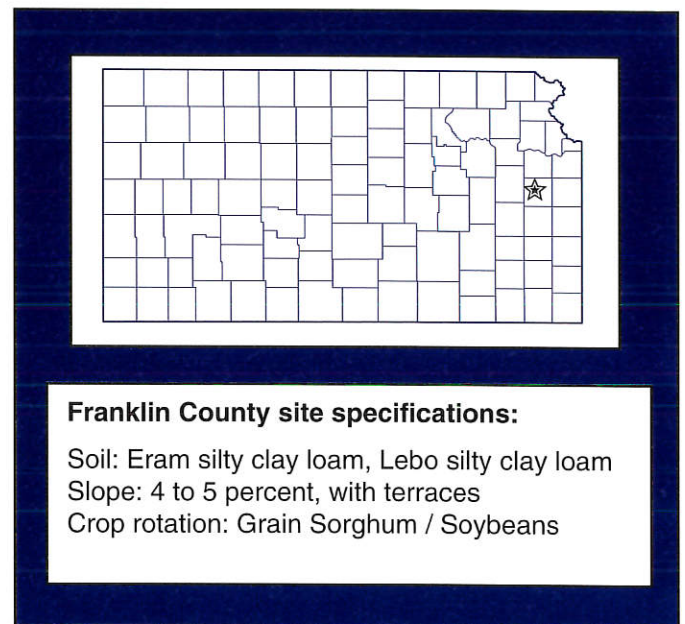
Integrated Agricultural Management Systems:

Franklin County

Producers and K-State Research and Extension personnel are involved in a cooperative research and extension project called Integrated Agricultural Management Systems (IAMS). The results of this research will be important to nearly all farmers in eastern and central Kansas.

The aim is to discover how producers can reduce pollution runoff through voluntary practices and help them adopt new Best Management Practices. The ultimate goal is to protect and improve the quality of surface waters in the state.

No one wants to see government-mandated limits on how much pesticide or fertilizer each farmer can use, or



What Is the IAMS Project?

The Integrated Agricultural Management Systems (IAMS) project is the first large, field-scale test of how different systems of agricultural production practices may affect potential pollution runoff. There are five IAMS sites in Kansas.

Until now, research has focused primarily on the effect of individual Best Management Practices (BMPs) on a specific pollutant. For example, knifing in phosphorus (a BMP for phosphorus) can reduce

the amount of phosphorus runoff into surface water. Or, using no-till farming (a BMP for suspended solids) can reduce soil erosion.

But what is the net effect on the entire spectrum of possible pollutants from using certain combinations of BMPs and other farming practices? That is what the IAMS project intends to find out. Put all these farming practices together, the way a producer would, and what is the net effect on pollution runoff and economics?

K-State Research and Extension scientists will be measuring the amount of runoff of atrazine and other herbicides, nitrogen, phosphorus, and soil particles from soil erosion from each farming system at the sites. This will help producers, scientists, and government officials decide whether voluntary adoption of certain farming practices will be effective enough in reducing pollutants and achieving Total Maximum Daily Load limits so that more stringent regulations will not be needed right away.

how and when they can be applied. But it could happen some day as Kansas, along with other states, begins to establish and implement Total Maximum Daily Loads (TMDLs) for surface waters. TMDLs will set certain limits on the total amount of pesticides, nutrients, soil particles from erosion, and other pollutants that can enter a stream or river segment during a specified period of time. In many watersheds, agriculture is the primary source of one or more of these pollution problems.

Hopefully, it will be possible for agriculture as a whole to reduce pollution runoff enough by voluntary means to meet the new TMDL requirements. To find out exactly which system of farming practices would be best in reducing pollutant runoff while maintaining profits, K-State Research and Extension scientists have established five large-scale IAMS projects in Kansas.

One such IAMS site is located in Franklin County, near Lane, about 15 miles southeast of Ottawa. In 1998, the K-State team began to establish the research site on this 10-acre location. About 10 K-State personnel are involved, along with cooperation and funding from the

Kansas Grain Sorghum, Corn, Soybean, and Wheat commissions, the Kansas Fertilizer Research Fund, and the USDA Fund for Rural America program.

Results will be made available as the research progresses.

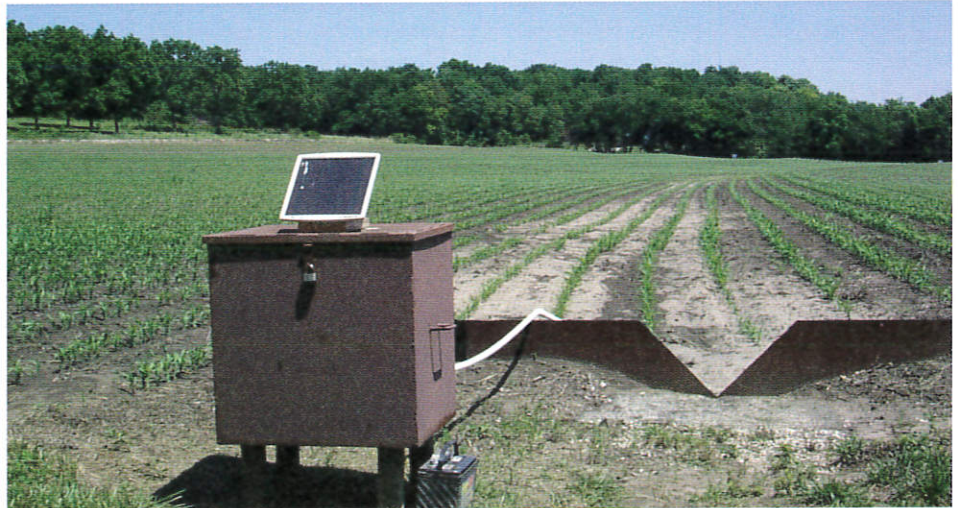


Other IAMS locations in Kansas are near Topeka, Washington, Girard, and Hutchinson.

For more information on the IAMS project site in Franklin County, contact either:

- Franklin County Extension Office (785) 229-3520, or
- Dan Devlin, K-State Extension Environmental Quality Coordinator and Specialist (785) 532-5776

Tillage systems being studied at the Franklin County IAMS site include no-till (left) and full-width tillage. The field is alternated between grain sorghum one year and soybeans the following year. Water runoff is collected (below) and analyzed for several potential pollutants, including atrazine, nutrients, and suspended solids.



IAMS Treatments: Franklin County Site

<u>Treatment</u>	<u>Tillage</u>	<u>Atrazine</u>	<u>Nutrient</u>
1	Full-width Full-width tillage (fall chisel, disk, field cultivate, plant);	Preplant incorporated 1.5 qt Atrazine 4L broadcast with shallow incorporation (grain sorghum only);	Broadcast and incorporated N and P broadcast with shallow incorporation (grain sorghum only).
2	No-till No-till;	Preemergence 1.5 pt Roundup Ultra applied 30-45 days before planting, followed by 1.5 qt Atrazine 4L broadcast preemergence on surface (grain sorghum only);	Surface broadcast N and P surface broadcast (grain sorghum only).
3	No-till	Early preplant/Preemergence 1.0 qt Atrazine 4L surface broadcast 30-45 days before planting, followed by 0.5 qt Atrazine 4L preemergence on surface (grain sorghum only);	Deep band N and P deep banded prior to planting (grain sorghum only).

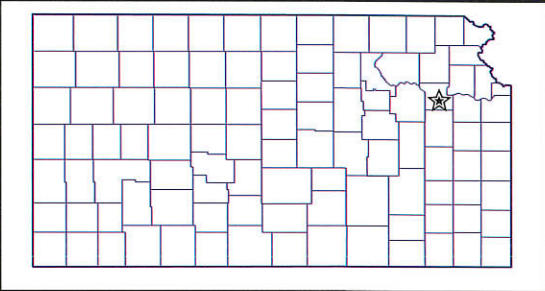
IAMS

Integrated Agricultural Management Systems:

Shawnee County

Producers and K-State Research and Extension personnel are involved in a cooperative research and extension project called Integrated Agricultural Management Systems (IAMS). The results of this research will be important to nearly all farmers in eastern and central Kansas. Results from this project are being used to implement Best Management Practices to achieve Total Maximum Daily Loads (TMDLs) in the Kansas-Lower Republican Basin.

The aim is to discover how producers can reduce pollution runoff through voluntary practices and help them adopt new Best Management Practices. The ultimate goal is to protect and improve the quality of surface waters in the state.



Shawnee County site specifications:

- Soil: Wabash silty clay loam
- Slope: Field 1 – 2.5 percent Field 2 – 7 percent
- Cropping system: Continuous corn

What Is the IAMS Project?

The Integrated Agricultural Management Systems (IAMS) project is the first large, field-scale test of how different systems of agricultural production practices may affect potential pollution runoff. There are five IAMS sites in Kansas.

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K-State Research and Extension scientists will be measuring the amount of runoff of atrazine and other herbicides, nitrogen, phosphorus, and soil particles from soil erosion from each farming system at the sites. This will help producers, scientists, and government officials decide whether voluntary adoption of certain farming practices will be effective enough in reducing pollutants and achieving Total Maximum Daily Load limits that more stringent regulations will not be needed right away.

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Hopefully, it will be possible for agriculture as a whole to reduce pollution runoff enough by voluntary means to meet the new TMDL requirements. To find out exactly which system of farming practices would be best in reducing pollutant runoff while maintaining profits, K-State Research and Extension scientists have established five large-scale IAMS projects in Kansas.

One such IAMS site is located in Shawnee County, near Rossville, about 15 miles northwest of Topeka. In 1997, the K-State team began to establish the research site on this 10-acre location. About 10 K-State personnel are involved, along with cooperation and funding from the Kansas Grain Sorghum, Corn, Soybean, and Wheat commissions, the Kansas Fertilizer Research Fund, and the USDA Fund for Rural America program.

Results will be made available as the research progresses.

Other IAMS locations in Kansas are near Ottawa, Washington, Girard, and Hutchinson.

For more information on the IAMS project site in Shawnee County, contact either:

- Shawnee County Extension Office (785) 232-0062, or
- Dan Devlin, K-State Extension Environmental Quality Coordinator and Specialist (785) 532-5776



IAMS Treatments: Shawnee County Site

<u>Treatment</u>	<u>Tillage</u>	<u>Atrazine</u>
1	No-till	Fall-applied
2	No-till	Early preplant
3	No-till	Preemergence
4	No-till	Postemergence

- Grass Filter Strip (one terrace-width wide, or about 33 feet)

There are two fields on which these treatments are applied. One field has a 2.5 percent slope and the other field has a 7 percent slope. There are 3 replications of each treatment.

Runoff water is collected on each treatment to measure flow and pesticide concentration before it enters the filter strip. The runoff water for each treatment is then passed through a grass filter strip and is measured again for flow and concentration after it leaves the filter strip.

With this data, the weight pesticide in runoff water can be calculated, which will be required in calculating loading for TMDLs.



State Conservation Commission

109 SW 9th Street
Suite 500, Mills Building
Topeka, KS 66612-1215

Telephone: (785) 296-3600 • Fax (785) 296-6172



MEMORANDUM

January 16, 2000

MEMO TO: Senate and House Agriculture Committees

FROM: Tracy Streeter, Executive Director

A handwritten signature in cursive script that reads 'Tracy Streeter'.

SUBJECT: Total Maximum Daily Load (TMDL) Status Report

The State Conservation Commission (SCC), along with KSU, Department of Agriculture, Water Office, Department of Health and Environment, Department of Wildlife and Parks, Forest Service and the USDA – Natural Resources Conservation Service, play various roles in the water quality arena. Initially, these agencies joined forces to implement the Governor's Water Quality Initiative. However, with the development of Total Maximum Daily Loads, the targeted areas for water quality improvement have been narrowed to the watersheds designated high priority for TMDL implementation. While the elements of the Water Quality Initiative continue to be carried out and include education, incentives, technical assistance, research and data collection, the focus has shifted to address TMDL concerns.

Below is a summary of the major activities relative to TMDL implementation:

TMDL Needs Inventory – SCC is charged with preparing an inventory of practices needed to address the impairments identified in TMDL areas. Using existing data, and input and assistance from KSU, KDHE, NRCS and the county conservation districts, the Inventory was completed for the Kansas Lower Republican (KLR) River Basin. The total estimated cost to treat the affected watersheds is approximately \$87 million. SCC began the inventory process for the Cimarron, Lower and Upper Arkansas River Basins last fall. The inventory for these basins will be completed in February.

Program Funding – Funding initially targeted to the KLR under the Governor's Water Quality Initiative has been redirected to the TMDL watersheds within the basin. The Buffer Initiative has been expanded to include all TMDL areas as well. The Buffer Initiative enhancement proposed by the Governor would allow for continued enrollment in the KLR in addition to newly identified TMDL areas in the Cimarron, Lower Arkansas and Upper Arkansas River Basins. The Governor's budget also includes additional funding for the NPS Pollution Control Program that would be targeted to TMDL areas as well.

House Agriculture Committee
January 17, 2001
Attachment 3

Watershed Specialists – SCC is also providing matching money to this effort through the NPS Pollution Control Program. The Watershed Specialists fill a void at the local level by working cooperatively with conservation districts and NRCS in providing education and information to landowners and livestock producers.

Fecal Coliform Bacteria Study – The majority of the identified TMDL areas are impaired by fecal coliform bacteria (FCB). To better target program resources, KSU has recently completed a study of FCB sources and their relative impacts on surface and groundwater. A major focus of this study was directed at the impact of failing onsite wastewater or septic systems.

Development and Evaluation of Best Management Practices (BMP) – KSU has played a major role in establishing BMP's for pesticides and other NPS pollutants. In conjunction with the FCB study, the effect of buffer or filter strips in reducing runoff from confined livestock operations was also evaluated.

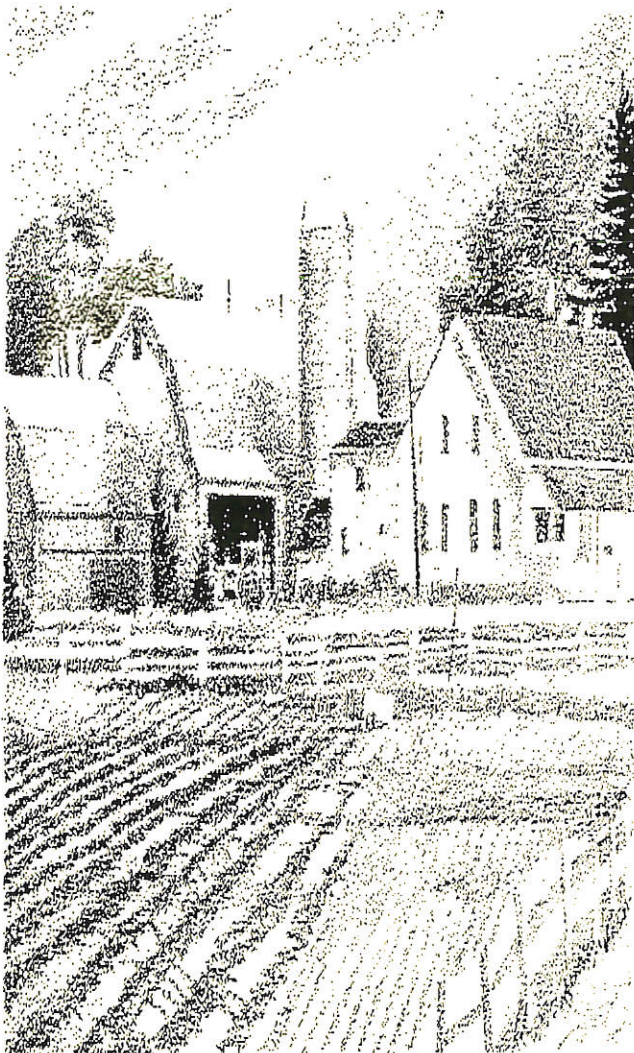
TMDL Ag Working Group - SCC, KSU and the Department of Agriculture assisted the major agriculture organizations in a number of outreach efforts aimed to inform local ag leaders of the TMDL issue. Meetings were held at various locations in each of the river basins thus far affected by TMDL's.

Technical Assistance (TA) – A number of agencies are involved in the delivery of technical assistance. NRCS, with staff located in every county, is the main provider of TA at the local level. KSU's ag engineering staff has designed a number of innovative livestock waste management systems throughout the state. SCC, KDHE, Department of Wildlife and Parks and Forest Service staff has assisted landowners in stream bank stabilization, riparian area restoration and wetland restoration/enhancements. Landowners also utilize private engineering consultants in the development of confined livestock waste systems.

This concludes a brief rundown of the major agency activities relative to TMDL's. I will address any questions you might have at the appropriate time.

TMDL

Agriculture Working Group



Members:

Kansas Agricultural Aviation Assn.
Kansas Assn. of Conservation Districts
Kansas Assn. of Wheat Growers
Kansas Cooperative Council
Kansas Corn Growers Assn.
Kansas Dairy Assn.
Kansas Farm Bureau
Kansas Fertilizer & Chemical Assn.
Kansas Grain & Feed Assn.
Kansas Grain Sorghum Producers Assn.
Kansas Livestock Assn.
Kansas Pork Producers Council
Kansas Seed Industry Assn.
Kansas Soybean Assn.

Cooperators:

Kansas Department of Agriculture
K-State Research & Extension
State Conservation Commission

...agriculture working to protect water quality!

Why?

TMDL Agriculture Working Group

The goal of the "TMDL Agriculture Working Group" is to inform and assist farmers and ranchers in implementing this new water quality initiative.

The intent of these informational meetings is to address a number of questions for agricultural producers:

- ✓ What are TMDL's?
- ✓ Why are TMDL's being established?
- ✓ What will be the responsibilities of landowners?
- ✓ How do we inform and encourage farmers and ranchers to become involved?
- ✓ Is technical assistance available?
- ✓ Will there be cost-share programs?
- ✓ Who will administer the program?

AGENDA

“TMDL Meetings for Agricultural Leaders”

October 12, 1999

Washington 12:00 noon
Holton 6:00 p.m.

Opening Remarks	
Introductions.....	Bill Fuller Kansas Farm Bureau
Overview.....	Allie Devine Kansas Livestock Assn.
The Problem.....	Tom Stiles Kansas Dept. of Health & Environment
Questions & Answers	
Possible Management Solutions.....	Jere White Kansas Grain Sorghum Producers Assn. Kansas Corn Growers Assn.
	Mike Beam Kansas Livestock Assn.
Financial & Technical Assistance.....	Tracy Streeter State Conservation Commission
Local Action.....	Doug Wareham Kansas Grain & Feed Assn. Kansas Fertilizer & Chemical Assn.
Questions & Answers	
Adjourn	

AGENDA

“TMDL Meetings for Agricultural Leaders” February 28 - 29, 2000

Garden City February 28, 2000 at 6:30 P.M.
Great Bend February 29, 2000 at 12:00 Noon
Newton February 29, 2000 at 6:30 P.M.

Opening Remarks,
Introductions & Overview.....Allie Devine
Kansas Livestock Assn.

The Problem..... Tom Stiles
Kansas Dept. of Health & Environment

Dale Lambley
Kansas Department of Agriculture

Questions & Answers

Possible Management Solutions.....Jere White
Kansas Corn Growers Assn.
Kansas Grain Sorghum Producers Assn.

Financial & Technical Assistance..... Tracy Streeter
State Conservation Commission

Local Action..... Doug Wareham
Kansas Grain & Feed Assn.
Kansas Fertilizer & Chemical Assn.

Questions & Answers

Adjourn

Kansas Water Authority

Briefing on

Water Issues

Before the

2001 Legislature

January 2001

Introductions

Overview of Entire Briefing

**Al LeDoux, Director
Kansas Water Office**

Overview of Planning Process

**Kent Lamb, Chairman
Kansas Water Authority**

STATE OF KANSAS



Bill Graves, Governor

KANSAS WATER OFFICE
Al LeDoux
Director

901 S. Kansas Ave.
Topeka, Kansas 66612-1249

785-296-3185
FAX 785-296-0878
TTY 785-296-6604

**KANSAS WATER AUTHORITY
LEGISLATIVE BRIEFINGS**

Introductory Comments

Al LeDoux, Director, Kansas Water Office

House Environment Committee
Senate Natural Resources and Agriculture Committees
House Agriculture Committee
January 16th & 17th, 2001

Introductions of Kansas Water Authority members present and presenters for today.

Kent Lamb, Chairman, Kansas Water Authority, will address the overall planning process, Cliff Mayo, Member, Kansas Water Authority, will discuss groundwater management issues, and Jerry Blain, Member, Kansas Water Authority, will discuss public water supply issues. I will come back and make a few comments about water quality and Clark Duffy, Assistant Director, will summarize our legislative initiatives.

Those of you who know me, know of my abiding interest in water. What you may not know is that when I'm not thinking water, I'm tending my cattle. My bet is that you share a commitment to whatever it is you do for a living or a pastime. No matter how important water is, it is not at the forefront of your world. That is why the water plan process is so valuable. Water is in good hands, whether or not it is the center of your work

Kent will speak to you now.

THE KANSAS WATER AUTHORITY

NAME	OCCUPATION	REPRESENTING	TERM EXPIRES
Kent Lamb, Chairman (316) 348-2315 RR 1, Box 69 Macksville, KS 67557-9402	Farmer/Irrigator	Governor	Pleasure
Al LeDoux, Secretary (785) 296-3185 901 S. Kansas Avenue Topeka, KS 66612-1249 al@kwo.state.ks.us	Director	Kansas Water Office	Ex Officio
Dr. M. Lee Allison (785) 864-3965 University of Kansas – Campus West 1930 Constant Avenue Lawrence, KS 66047-3726 lallison@kgs.ukans.edu	Director	KS Geological Survey	Ex Officio
Gerald Blain (316) 269-4764 1815 W. Pine Wichita, KS 67203-3230 blain_j@ci.wichita.ks.us	Superintendent City of Wichita	GMD's #2 & #5	05/01/02
Dr. Roger L. Boyd (785) 594-3172 (h) P. O. Box 65 (785) 594-4547 (w) Baldwin City, KS 66006-0065 boyd@harvey.bakeru.edu	Professor of Biology Baker University	Environment/ Conservation	01/15/01
David Brenn (316) 276-3246 P. O. Box 597 Garden City, KS 67846 dbrenn@odsgc.net	Sr. Vice-President/ General Manager Garden City Co.	GMD's #1, #3, and #4	01/15/03
Jamie Clover Adams (785) 296-3558 109 SW 9 th Street, Suite 400 Topeka, KS 66612 jadams@kda.state.ks.us	Secretary	KS Department of Agriculture	Ex Officio
William R. Hamm (316) 284-0707 P. O. Box 884 Newton, KS 67114-0884 wrh@southwind.net	Insurance/ Investments	State Association of KS Watersheds	05/01/02
Dr. Ron Hammerschmidt (785) 296-1535 KS Dept. of Health & Environment Forbes Field, Building 740 Topeka, KS 66620-0001 rhammers@kdhe.state.ks.us	Director	Division of Environment	Ex Officio
Dr. Marc Johnson (785) 532-7137 113 Waters Hall Kansas State University Manhattan, KS 66506 agdean@ksu.edu	Director	Agricultural Experiment Station	Ex Officio
Cliff Mayo (316) 276-7583 1909 Grandview East Garden City, KS 67846-8325	Farmer/Stockman	Speaker of the House	07/12/03
David Mueller (785) 965-2628 1172 330 th Tampa, KS 67483 muel@tctelco.net	Farmer/Stockman	Kansas Rural Water Association	05/01/04
Don Paxson (785) 421-2364 P. O. Box 487 Penokee, KS 67659-0487 dpaxson@ruraltel.net	Businessman/ Farmer	KS Assoc. of Conservation Districts	05/01/04

NAME	OCCUPATION	REPRESENTING	TERM EXPIRES
David L. Pope (785) 296-3717 Kansas Department of Ag 109 SW 9 th Street, 2 nd Floor Topeka, KS 66612 dpope@kda.state.ks.us	Chief Engineer	Division of Water Resources	Ex Officio
Paul Sasse (316) 331-2253 (h) 215 N Second Street (316) 332-2506 (w) Independence, KS 67301 citymgr@horizon.hit.net	City Manager City of Independence	League of Municipalities	01/15/01
Gordon Schmidt (316) 543-2628 10320 N Wheat State Road Inman, KS 67546-8109	Farmer	Public	08/31/04
Gary Sherrer (785) 296-2741 700 SW Harrison, Suite 1300 Topeka, KS 66603-3712 gsherrer@kdoch.state.ks.us	Lt. Governor/ Secretary	Department of Commerce & Housing	Ex Officio
Sharon Steele (785) 462-2558 965 Prairie View Colby, KS 67701-4303 psteel@colby.ixks.com	Farmer	Public	01/15/04
Tracy Streeter (785) 296-3600 109 SW 9 th Street, Suite 500 Topeka, KS 66612 tstreeter@scc.state.ks.us	Executive Director	State Conservation Commission	Ex Officio
Paul Tobia (316) 529-7463 P. O. Box 12283 Wichita, KS 67277-2283 paul_tobia@vul.com	Plant Manager Vulcan Chemicals	KS Association of Commerce and Industry	01/15/03
Dick Weisser (913) 681-2697 (h) 20004 Riggs Stillwell, KS 66085-9459 dweisser@prodigy.net	Board Chairman WD #1 JO County	President of the Senate	07/01/01
Steve Williams (785) 296-2281 900 SW Jackson, Suite 502 Topeka, KS 66612 steve@wp.state.ks.us	Secretary	KS Department of Wildlife and Parks	Ex Officio
John Wine (785) 271-3100 1500 SW Arrowhead Road Topeka, KS 66604 j.wine@kcc.state.ks.us	Chair	Kansas Corporation Commission	Ex Officio

The Kansas Water Authority

The Kansas Water Authority is within and a part of the Kansas Water Office. It is responsible for advising the Governor, the Legislature, and the Director of the Kansas Water Office on water policy issues, for approving the *Kansas Water Plan* and revisions thereto, for approving water storage sales, federal contracts, administrative regulations, and legislation proposed by the Kansas Water Office.

KANSAS WATER AUTHORITY

901 South Kansas Avenue, Topeka, KS 66612-1249 (785) 296-3185



Kent Lamb, Chairman

RR 1, Box 69, Macksville, KS 67557 (316) 348-2315

KANSAS WATER AUTHORITY LEGISLATIVE BRIEFINGS

Kent Lamb, Chairman, Kansas Water Authority
WATER PLANNING PROCESS

House Environment Committee
Senate Natural Resources and Agriculture Committees
House Agriculture Committee
January 16th & 17th, 2001

The greatest challenge of a challenge is the gap of time between the present and the D-day of confrontation. One could embrace apathy, denial, or dissension to deal with the particular problem instead of collectively, proactively committing our resources, citizens, and governmental agencies to bridge the uncertainties into successes for the people of Kansas. You are facing many challenges, one of which is water, this session that will test your best cooperative efforts.

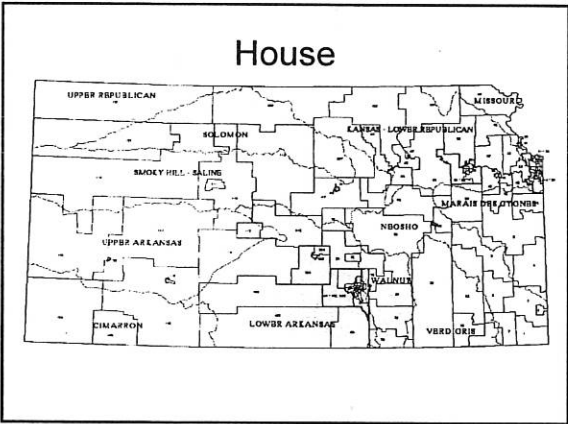
We could leave to chance the future water decisions of our state by doing nothing or embracing a "quick fix". Only through the faithful exercise of sound data collection and evaluation, participation of all affected stakeholders, and the unbiased commitment of everyone to the development of achievable goals and policies will Kansans, in the future, have the quantity and quality of water that is so necessary and precious. I am certain that our first challenge is one of process before solution and implementation.

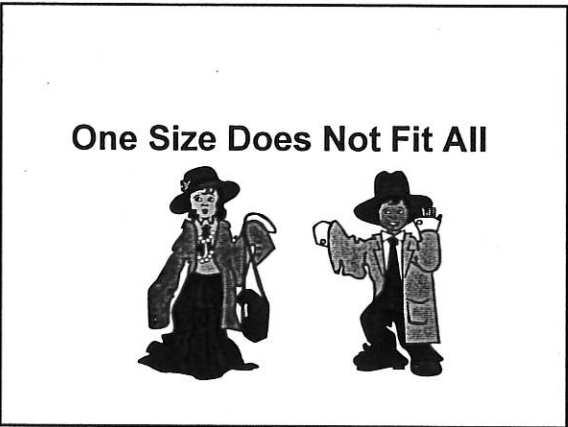
The most frustrating challenge is the one in which either it doesn't directly impact you or with which you are not particularly familiar or has been around a long time without any successful solution. Today's water issues are included in all the above.

Each of the twelve basins in the state have their own identifiable needs and resources to be addressed. Further delineation and definition of unique areas within each basin is necessary for planning purposes in the development appropriate and workable management practices. The "one size fits all" concept will not produce acceptable outcomes.

The Kansas Water Authority believes in the planning process that has been established by the Legislature and the Governor to formulate and initiate best management practices that will secure the sound and stable water policies for all Kansans for the future.

State Water Plan Coordinates
With Stakeholders On An
Annual Basis







Kent Lamb, Chairman

RR 1, Box 69, Macksville, KS 67557 (316) 348-2315

KANSAS WATER AUTHORITY LEGISLATIVE BRIEFINGS

Cliff Mayo, Member, Kansas Water Authority GROUNDWATER MANAGEMENT

House Environment Committee
Senate Natural Resources and Agriculture Committees
House Agriculture Committee
January 16th & 17th, 2001

1) (slide: map of Ogallala)

I am an irrigator in western Kansas. I can attest to the fact that our biggest water issue is groundwater depletion. The single most important source of water for western Kansas, the Ogallala portion of the High Plains Aquifer, is being withdrawn much faster than it is being recharged.

Pumping practices for irrigation is the largest single use for this water. But, I want to impress upon you, irrigation is not a dirty word, the produce derived from irrigation is not a dirty practice and the economy and lifestyle of that area is not a dirty reality. Irrigation is the lifeblood of western Kansas.

2) (slide: map of water use reductions necessary for sustainability)

The dilemma then is... sustaining our natural resource, water, while retaining the economy.

The colors in this slide indicate various amounts of water use reduction necessary to achieve zero depletion. The red indicates a reduction of 75%, while lighter colors represent a lesser amount of reduction to accomplish zero depletion.

You can imagine what this would do to the economy if this were suddenly implemented, not only for western Kansas, but for all of Kansas.

The Kansas Water Authority is working on this challenge.

3) (slide: map of estimated usable lifetime)

Without a reasonable, workable plan of attack for conserving our water, in many areas the water will be depleted. This map indicates 25 years or less in red with yellow being 100 to 150 years left.

please note the spottiness; it isn't all red.

4) (slide: title of KWA Report on SB 287)

The Kansas Water Authority 2000 report for House Substitute for Senate Bill 287 addressed our aquifer resources in two of the reports:

1. Aquifer resources, surface water and long-term prospects for transition to dryland farming; and
2. The potential for competing water needs and the means to address that competition.

The atlas to the Kansas High Plains Aquifer, from the Kansas Geological Survey, developed out of the need to answer those questions put to us by the 1999 legislature. It has been extremely helpful in determining the state of our groundwater resources.

5 (slide: a new idea for managing the Ogallala Aquifer)

In the Kansas Water Authority recommendations in the report is a practice to develop a new management approach for the Ogallala Aquifer. We will be reviewing a new proposal at our meeting this week.

This approach, which we reviewed briefly in December, would address the ground water decline rates in the Ogallala, and protect some water for future generations. A portion of the aquifer, based on the amount of recharge, would be managed for zero depletion. It hasn't yet been reviewed by the Full Authority, and it would need a lot of discussions with those who live in western Kansas, but it is a new idea that might help us best manage the aquifer for today's and tomorrows water needs.

6) (slide: Mayo Committee Report)

Last fall, I chaired an ad hoc committee appointed by Al LeDoux. Our report, "Federal Actions Necessary for The Conservation and Environmental Preservation of the High Plains Aquifer" included the concept of "while preserving the economy".

The recommendations were for specific federal actions to be taken to help conserve the High Plains Aquifer through the eight states it

underlies. Texas, Oklahoma, New Mexico, and parts of Colorado, Wyoming, and Nebraska all face severe decline areas in the aquifer. The committee consisted of men whose professional lives involves the High Plains Aquifer in some way; many of the committee members are irrigators that rely on that water source. All of us agreed that action is needed at the federal, as well as the state and local and individual levels, to better manage this depleting resource.

Governor Graves has reviewed and endorsed the efforts of this report, and sent it to Senators Brownback and Roberts, and Representative Moran. We want to promote action for federal legislation. Support from the state legislature on these efforts are greatly appreciated. At the end of this briefing, Clark Duffy will summarize all of the Kansas Water Authority legislative needs, including possible action on this item.

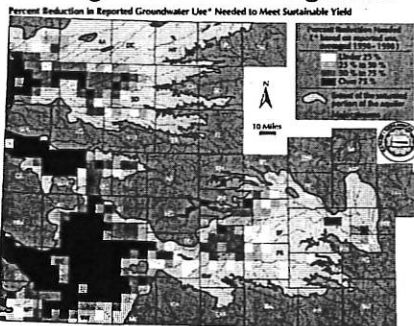
High Plains Aquifer Ground Water Management

Cliff Mayo
Kansas Water Authority

High Plains Aquifer Management of the Ogallala

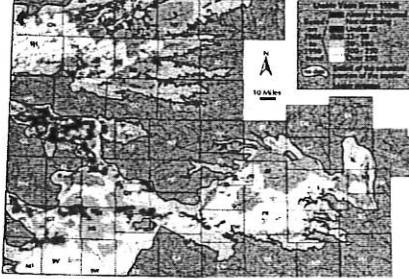


High Plains Aquifer Management of the Ogallala



High Plains Aquifer Management of the Ogallala

Estimated usable lifetime for large volume pumping from the High Plains Aquifer, assuming current water-level trends continue and the aquifer is exhausted when saturated thickness is 30 feet or less.



Kansas Water Authority 2000 Report For House Substitute For SB 287

- Aquifer resources, surface water and long term prospects for transitions to dryland farming.
- The potential for competing water needs and means to address that competition.

High Plains Aquifer Management of the Ogallala

➤ A New Idea for Managing the Ogallala Aquifer that will:

- Address the Rate of Ground Water Depletion in Western Kansas
- And Protect Some Water for Future Generations

**High Plains Aquifer
Management of the Ogallala**

➤ Committee Report on:

- Federal Actions Necessary for the Conservation and Environmental Preservation of the High Plains Aquifer

Public Water Supply

**Jerry Blain
Kansas Water Authority**

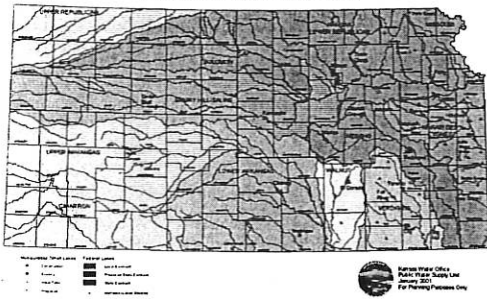
Public Water Supply

- Public water supplies are crucial to the State of Kansas.
- Public water supplies include municipal water suppliers, rural water districts, wholesale water districts, and assurance districts.
- Kansas has approximately 900 public water suppliers.

Water Plan Goals

- Develop water reservoir storage to meet current & future.
- Assure that municipal water systems can meet drought conditions.
- Assure that water suppliers meet safe drinking water standards.
- Assure that water suppliers have technical, financial, & managerial capacity.
- Encourage local planning that supports State water programs.

Public Water Supply Lakes in Kansas



Existing Programs

- Water Supply & Demand Estimates.
- Water Marketing Program – 12 COE Reservoirs.
- Kansas Water Assurance Program – 8 Reservoirs.
- Large Reservoir Finance Program.
- Multipurpose Small Lakes Program.

Drought Monitoring

- Monitors minimum desirable streamflows.
- Monitors drought conditions.
- Influences the operations of assurance districts.
- Informs the Governor, influences Governors Drought Response Team.

Public Water Supply Program

- Reviews the technical, financial and managerial ability of a public water supply.

Public Water Supply Financial Assistance Programs

- Public Water Supply Revolving Loan Program.
- U.S. Rural Development Financial Assistance Program.
- Community Development Block Grant Program.

STATE OF KANSAS



Bill Graves, Governor

KANSAS WATER OFFICE
Al LeDoux
Director

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**KANSAS WATER AUTHORITY
LEGISLATIVE BRIEFINGS**

Al LeDoux, Director, Kansas Water Office
WATER QUALITY

House Environment Committee
Senate Natural Resources and Agriculture Committees
House Agriculture Committee
January 16th & 17th, 2001

You will hear from the Kansas Department of Health and Environment and/or Kansas State University and the State Conservation Commission on activities related to the development and implementation of TMDL's. The primary role of the Kansas Water Authority is coordination of public input on setting implementation priorities, and the coordination of where and when we put our resources to get the most bang for the buck. Overall, this process is working extremely well. We want to assure you that it will continue.

We have a 9-minute video that emphasizes the Kansas approach to implementation of water quality. This is the voluntary, incentive-based approach highlighted in the Governor's Water Quality Initiative. Bill Curtis narrates.

**Role of Kansas Water Authority
& State Water Plan in Water Quality**

➤ *Kansas Water Plan* contains high priority TMDLs

➤ *Kansas Water Plan* makes recommendations on targeting resources to priority TMDLs

➤ *Kansas Water Plan* has identified need to ensure comprehensive and coordinated implementation and tracking of progress

**Kansas Water Authority
Recommendations to the 2001 Legislature**

Clark Duffy
Kansas Water Office

Legislation

Governor's Recommendation

- | | |
|--|----------------------------|
| > Amend Multipurpose Small Lakes Act | > Concur |
| > Establish Source water Development Fund | > Defer |
| > Assist Watershed Districts | > Address Administratively |
| > Transfer Collection Responsibility for State Water Plan Fund | > Defer |
| > Stabilize Rate for Water Marketing | > Appropriation Proviso |
| > Re-establish Water Assurance Fund | > Technical Clean-Up |

Recommendations HS for SB 287

Governor's Recommendations

- | | |
|---|------------------|
| > Resolution in support of Federal Action on High Plains Aquifer | > Support |
| > Resolution in support of Reallocation of John Redmond Reservoir | > Not Considered |

Recommended Expenditures

- State Water Plan Fund ➤ See Attached
- \$45,000 for Ogallala Aquifer Institute ➤ Not Recommended
- \$300,000 to Compare Water Quality in Kansas with other States ➤ Not Recommended

Approved Water Marketing Contracts

- Miami County RWD #1 from Hillsdale Reservoir ➤ The Legislature has 30 days to disapprove

Potential Future Contract

- Purchase of Storage from Kanopolis Reservoir

Key Water Documents

- Purpose and Process – *Kansas Water Plan*
- HydroGRAM
- Report to the Governor & 2001 Legislature
- Executive Summary for House Substitute for SB 287
- Committee Report – High Plains Aquifer
- *Kansas Water Plan* – FY 2002

KANSAS WATER AUTHORITY RECOMMENDATION
Expenditures by Agency

WPF REQUESTS	FY 2001	FY 2002 Agency Request	FY 2002 KWA Recommendation	FY 2002 Governor's Recommendation
KDHE				
Non-point source technical assistance	469,430	479,832	479,832	482,435
TMDL initiative / Use attainability	420,000	420,000	420,000	406,900
Assessment of sediment quality	50,000	50,000	50,000	50,000
SWP contamination remediation	1,397,840	1,397,023	1,397,023	1,397,506
Local environmental protection	1,800,000	1,800,000	1,800,000	1,800,000
Subtotal	\$4,137,270	*\$4,146,855	4,146,855	4,136,841
Carryover/other			(532,910)	
Total		\$3,900,000	*\$3,613,945	
KDWP				
Biological monitoring	50,000	50,000	50,000	50,000
River Recreation	0	100,000	100,000	
Total	\$50,000	\$150,000	\$150,000	50,000
KCC				
Oil and gas remediation	\$400,000	\$400,000	\$0	400,000
KDA				
Floodplain management	131,849	135,576	135,576	136,647
Interstate water issues	202,795	241,073	241,073	243,905
Subbasin water resources	649,145	643,255	643,255	651,597
Best Management Practices	50,000	0	0	
Subtotal	\$1,033,789	**\$1,019,904	\$1,019,904	1,032,149
Carryover/other			(226,946)	
Total			**\$792,958	
SCC				
Non-point source pollution control	3,000,000	3,000,000	3,000,000	3,150,000
Water resources cost-share program	4,450,000	4,450,000	4,450,000	4,450,000
Riparian and wetland protection	200,000	200,000	200,000	200,000
Water quality buffer initiative	80,000	80,000	140,134	265,134
Aid to conservation districts	1,035,500	1,038,000	1,038,000	1,038,000
Watershed dam construction assistance	805,000	805,000	805,000	805,000
Multipurpose small lakes	230,000	230,000	422,750	230,000
Water rights purchase			***69,433	69,433
Total	\$9,800,500	\$9,803,000	\$10,055,884	10,207,567
KWO				
PMIB loan	270,413	263,991	263,991	263,991
O & M per MOU	370,787	387,833	387,833	437,883
Cedar Bluff O & M	59,000	50,000	50,000	
Assessment & evaluation	200,000	250,000	250,000	200,000
KWRI (research)	0	140,000	140,000	
Weather modification	349,000	349,000	349,000	178,000
Stream gaging program	370,000	****0	****0	416,000
Technical assistance to water users	440,000	440,000	440,000	440,795
Groundwater condition evaluation	70,000	0	0	
DASC support	159,500	133,773	133,773	143,773
GIS database development	250,000	250,000	250,000	250,000
GIS administrative support	17,800	10,000	10,000	
Public information	30,000	56,500	56,500	30,000
Public education	60,000	100,000	100,000	60,000
Stream team	0	50,000	50,000	
Federal cost-share program	250,000	250,000	250,000	250,000
Total	\$2,896,500	\$2,731,097	\$2,731,097	2,670,392
University of Kansas				
Geological Survey				50,000
Grand Total	\$18,318,059	\$17,777,055	\$17,343,884	18,546,949

* Request for FY 2002 State Water Plan is \$3,900,000. Kansas Department of Health & Environment's (KDHE) 404B includes a balance forward of \$418,210 from FY 2001 and \$57,200 as charges for technical and skilled services. The 404B shows total FY 2002 expenditures of \$4,146,855 and a balance forward of \$228,855. The Kansas Water Authority recommends that KDHE's request of \$3,900,000 be reduced by \$57,200 charges for technical and skilled services and the \$228,855 balance forward.

** Request for FY 2002 State Water Plan Fund is \$792,958. The amount shown includes a balance forward of \$226,946.

*** Not included in total for State Conservation Commission (SCC). Agency will identify \$69,433 from other SCC programs.

**** Funding for the Stream Gaging Program (\$416,000) is being requested as a State General Fund enhancement.