Making a SPLASH
As the Fall 2004 issue of Agriculture at OSU magazine is released, I am in my sixth month as Interim Dean and Director of Oklahoma State University’s Division of Agricultural Sciences and Natural Resources. In that time it has been my pleasure to meet with many of you and, through our interaction, reaffirm the goals and core values held by both the Division and those we serve.

One of the perks of being Dean and Director is having the opportunity to foster increased awareness about the people involved with Division programs. First and foremost, we are about people helping to put other people in better positions to meet their dreams and objectives. It might be with traditional or non-traditional students in classrooms. It might entail helping communities discover and implement plans designed to promote increased prosperity. It might be assisting other agencies and organizations fulfill state or federally mandated requirements toward public education and service. The list goes on and on, in part because the strength of the Division is our commitment and ability to partner with individuals and groups at all levels of society, and to work together to solve issues and concerns of interest at the local, county, state, regional, national, and even international levels, as appropriate.

No single publication could detail every Division program, at least not without looking like the telephone book. However, this issue of Agriculture at OSU magazine does provide a revealing glimpse at some of the ways in which the Division is having positive effects on the lives of Oklahomans, with a particular emphasis placed on two key issues as identified by the public — water quality and technology transfer related to the state’s expanding food-related industries. I am also pleased to draw your attention to a few of our many outstanding teachers in the College of Agricultural Sciences and Natural Resources. The talents, service, and dedication of these award-winning educators vividly showcase why they have been honored at the national level by their peers.

As we head into 2005, I can say with conviction that the land-grant university ideals of teaching, research, and extension are as vital today as they ever have been in the past. With your strong support, the future — for both the Division and those we serve — can be and will be bright indeed.
Listeria: Gone in a puff of liquid smoke .......................... 2
Outstanding teacher: Dan Tilley ........... 7
Nurturing naturally ................................. 8
Outstanding teacher: Tom Kuzmic ... 10
No need to spit the seeds ..................... 13
Outstanding teacher: Kathleen Kelsey ............ 15
Capital (city) gains ............................... 17
Riding out the storm .............................. 18
Wading through the waste stream .... 24
Still water runs deep ......................... 26
Mother Nature’s buffer zone ............... 31
Dishing the ‘dirt’ on dirt roads .......... 32
A matter of perception ......................... 34
Making sure H₂O is A-OK ....................... 35
Beefing up one’s knowledge ............... 38
Outstanding teacher: David Buchanan ....... 39
Outstanding teacher: Wade Brorsen ............ 40
Who knew...Making quality bread was so complicated ...... 42
Sunny days for... Wheat improvement ....... 44
One McCool fellow ............................. 45
Outstanding teacher: Janet Cole .......... 46
Regents professors...Affecting people’s lives and loving it ...... 48

Ed Miller
Interim Dean and Director, Division of Agricultural Sciences and Natural Resources

Mary Anne Gularte
Interim Director, Agricultural Communications Services

Donald Stotts
Managing Editor

Gayle Hiner
Graphic Designer and Production Coordinator

Todd Johnson
Lead Photographer

Jennifer Adsit and Carla Chlouber
Editors

Jennifer Adsit, Trisha Gedon, Amanda Jones, Katie Reim, Allison Richard, and Donald Stotts
Writers

Oklahoma State University, in compliance with Title VI and VII of the Civil Rights Act of 1964, Executive Order 11246 as amended, Title IX of the Education Amendments of 1972, Americans with Disabilities Act of 1990, and other federal laws and regulations, does not discriminate on the basis of race, color, national origin, sex, age, religion, disability, or status as a veteran in any of its policies, practices or procedures. This includes but is not limited to admissions, employment, financial aid, and educational services.

This publication is printed and issued two times a year by Oklahoma State University as authorized by the Dean of the Division of Agricultural Sciences and Natural Resources and has been prepared and distributed at a cost of $13,078.72 for 7,500 copies. #7912 1104

To simplify terminology, trade names of products or equipment are sometimes used. No endorsement of specific products named is intended nor is criticism implied of products not mentioned. Material appearing in this publication may be reprinted without permission provided credit is given the Division of Agricultural Sciences and Natural Resources, Oklahoma State University. For a change of address, please send the old label with the new address.
By Amanda Jones

The warm smoky aroma fills the microbiology laboratory and wafts down the halls of the Oklahoma Food and Agricultural Products Research and Technology Center at Oklahoma State University (FAPC), tantalizing the appetites of everyone in range. It may be one of the most yummy smelling science projects in FAPC history, which researchers hope may become the newest trend in food safety.

“It’s possible that food companies will soon have the option of using a liquid smoke solution to safeguard processed meats from becoming infected with pathogens,” said Pete Muriana, FAPC Food Microbiologist. “The research we are doing could prove very beneficial to both food processors and consumers.”

Muriana’s project involves using liquid smoke to combat listeria. The liquid smoke contains compounds generated in burnt wood residues that promote antimicrobial activity and reduce or eliminate…

Gone in a puff of liquid smoke

Peter Muriana, FAPC Food Microbiologist (left), oversees Will Robertson, FAPC Food Microbiology Lab Assistant, as he sprays hot dogs with liquid smoke. Liquid smoke helps reduce or eliminate listeria in precooked foods. (Photo by Todd Johnson)
listeria in precooked foods such as hotdogs and deli meat.

“We were evaluating the added effect of antimicrobials in combination with the thermal processing, which we were already doing,” Muriana said. “Liquid smoke was one antimicrobial that seemed to have some data suggesting it had potential application towards reduction of Listeria monocytogenes.”

The lowdown on listeria

According to the Journal of Food Protection, listeria has several characteristics that make it a formidable pathogen and contaminant in food processing environments: relatively high heat and salt tolerance, ability to grow at refrigeration temperatures, ability to form bio-films on all kinds of surfaces, and high fatality rates in large outbreaks.

“Post-processing contamination of ready-to-eat meats has become a major concern to the value-added processed meat industry, and surface pasteurization is becoming an effective means for reducing the risk posed from listeria,” Muriana said.

Muriana has worked to define lethal levels of thermal processing on deli meats by using surface pasteurization equipment produced by an Oklahoma company, Unitherm Foodsystems Incorporated. These processes are now accepted by the USDA Food Safety Inspection Service as valid microbial intervention strategies for processors and are being widely used in the industry.

Outbreaks associated with ready-to-eat foods have resulted in many new safety regulations and have left food processors looking for new and inventive ways to combat food-borne illnesses. The FAPC liquid smoke research may aid companies in their search for new food safety practices.

Project principles

FAPC researchers have had the opportunity to test many methods of both applying the liquid smoke to ready-to-eat meats and examining the products for listeria cells.

“The hotdogs are then inoculated with listeria and vacuum-packed and stored,” said Will Robertson, Food Microbiology Lab Assistant. “Samples are then periodically checked for growth or reduction of the listeria cells.”

Project partners

Currently, FAPC is collaborating with Master Taste Incorporated, a Tennessee-based company that specializes in the development and manufacturing of a variety of flavor additives, ranging from vanilla extract to liquid smoke.
FAPC professionals also have the opportunity to further study the possible effects of liquid smoke as a viable means of promoting food safety, thanks to an American Meat Institute grant. The AMI grant specifies that hotdogs should be the meat tested.

“The hotdogs provide the perfect meat matrix, and we can apply what we learn with them to all ready-to-eat meats,” Robertson said. “It’s really the difference between working with an easy to manipulate two-ounce hotdog versus a difficult to maneuver 20-pound roast.”

FAPC professionals also are working with Bar-S Foods Company on the liquid smoke project, focusing on finding a possible spray-on ingredient that would eliminate food safety concerns.

“Through the Center, OSU offers companies a safe place to run tests without having to slow down their production,” Muriana said. “Our facilities are set up better for long-term testing. We have good working relationships with many companies.”

Muriana said FAPC professionals also have been in contact with Advance Food Company and are interested in working with the manufacturer on the liquid smoke project.

“Companies know that food safety strategies must be shared in order to protect the industry from over-regulation and food pathogen scares,” he said. “Food safety is not a competitive issue.”

Ensuring food safety

There are three levels of food safety measures that companies can achieve to meet new government regulations.

“The least complex level involves implementing sanitation efforts,” Muriana said. “The next level includes either a post-process lethality step, such as surface pasteurization, or antimicrobial ingredients in addition to sanitation efforts.”

The third and highest safety level receives the least food safety testing by USDA. However, it requires the implementation of both post-process lethality steps and antimicrobial chemicals.

Muriana said food companies try to reach a higher level in order to ensure a safe product and to decrease the amount of regulatory testing of their product.

“The liquid smoke extract may be a valuable tool in improving the food safety activities of companies that produce precooked meats by giving them the opportunity to produce the safest possible product and reach the least regulated food safety level,” he said.

It’s plump, it’s tasty, and it’s a winner of a weiner as Oklahoma State University researchers are using an American summertime favorite — the hotdog — to test food safety protocols that might reduce the threat of listeria outbreaks. (Photo by Todd Johnson)
Students who enroll in Dan Tilley’s freshman-level agricultural economics class at Oklahoma State University learn quickly that there will not be any surprises if they are present and paying attention.

“I try to communicate early on how my classes are organized and how student effort and participation influence the outcomes they receive,” Tilley said. “My students should know that I’m going to ask questions about specific topics and there are specific things they should know how to do, including analyses and evaluations.”

But Tilley also gives his students more than factual information. In Agricultural Economics 1114, he tries to teach study habits and a process of learning that will help students become successful in other classes.

His approach to teaching was one of many reasons Tilley was honored this year with the “Distinguished Teaching Award: Undergraduate Teaching — More Than 10 Years Experience” from the American Agricultural Economics Association.

James Trapp, Head of the Department of Agricultural Economics, said Tilley has taught many of the courses offered through the department.

“He enjoys the challenge of a new course and switching from one course to another,” Trapp said. “Each time Dan takes on a new course, he brings new and creative components to the course that both update the class and increase the level of student satisfaction.”

Four years ago, Tilley and his wife, Marcia, designed and initiated one of the most active study abroad courses in the OSU College of Agricultural Sciences and Natural Resources. Eighty students have participated in Agricultural Economics 4803 since its inception, with most of the two-week trips going to Scotland, England, and France.

“The fundamental purpose of these trips is for students to see that the perspective of the United States from Glasgow or Edinburgh is different than the perspective from Oklahoma City or Tulsa,” Tilley said. “Students learn to see the world differently by gaining an understanding about how people abroad see the United States.”

Students learn a lot about how American culture benefits from having relatively free trade and lower food prices. In addition, students are exposed to agricultural policy issues and rural development efforts in the United Kingdom, and gain fundamental skills needed to travel internationally.

“One thing that marks Dan’s teaching is that he is a creative individual who ‘thinks outside of the box’ and is always looking for a new challenge,” Trapp said.
Oklahomans are enriching themselves with the varied landscapes the Sooner State provides, reflecting on Mother Nature’s beauty and bounty.

A partnership with Mother Nature called the Oklahoma Master Naturalist Program provides a series of in-depth workshops designed to certify participants as qualified naturalist educators.

“If you’ve ever had a desire to do more to help conserve our natural heritage, this program would be a perfect fit,” said Marley Beem, Oklahoma State University Cooperative Extension Natural Resource Specialist.

Beem said Oklahoma needs knowledgeable volunteers willing to hold educational programs at state parks, lead nature walks, work with outdoor education programs or “nature days” at schools, develop and maintain nature trails, and many other activities.

“Participants are exposed to some of the most interesting wildlife habitats in Oklahoma,” Beem said. “Not only are the workshops a lot of fun, they help determine the future direction of naturalist programs and the recruitment of volunteers.”

Many participants feel they have been provided an enrichment experience, which they can carry on to others.

“I appreciate the opportunity to participate in the Oklahoma Master Naturalist Program,” said Harry Henson, a retired biology professor from Weatherford.

“It provides me an avenue to share information that has been included in the instructional program, as well as subject matter from my educational background,” he said.
Walt and Fran Riggs of Blanchard, have always enjoyed the outdoors, plants, and animals. “The program has given us the tools to share our appreciation with others and help protect these natural assets for future generations,” Fran Riggs said.

Participants are certified at the conclusion of the Master Naturalist Program training period. They then “pay back” the instruction and education received with service hours. “Participants can choose where, how, and when they will help enhance public awareness and appreciation of Oklahoma’s natural resources,” Beem said.

Dave Zucconi, retired Director of the Tulsa Zoo and a Tulsa resident, has become involved with the Sierra Club’s Inner City Outing Program (ICO), an effort designed to provide an outdoor experience to children who would not otherwise have the opportunity. “My participation in the Master Naturalist Program proved to be extremely helpful in bolstering my understanding of the outdoors and the effectiveness with which I can share this information to the children in ICO,” Zucconi said.

Participants take part in core workshops, which include basic ecological processes, aquatic and riparian ecosystems, urban ecosystems, and communication skills. Participants attend two or more ecosystem workshops focusing on Oklahoma’s tallgrass prairie, cross timbers area, eastern woodlands, or the Wichita Mountains in southwestern Oklahoma.

“The ecosystem workshops take place in some of Oklahoma’s most valued natural areas,” Beem said. “Participants learn from a wide range of experienced instructors from universities and natural resource agencies.”

Instructors and support for the program come from OSU; Oklahoma Department of Wildlife Conservation; Oklahoma Department of Agriculture, Food, and Forestry; USDA Natural Resources Conservation Service; U.S. Fish and Wildlife Service; and Oklahoma Tourism and Recreation Department.

“I really enjoyed and learned from the workshops, especially the tallgrass prairie tour and the OSU Herbarium session,” said Bob Gard of Sand Springs.

Did you know?

- Oklahoma is one of only four states with more than 10 distinct ecological regions (right), and has by far the most per square mile in America.
- The state has approximately 11,611 miles of shoreline, slightly less than the estimated combined general (nontidal) coastlines of the Atlantic, Gulf, Pacific, and Arctic coasts (12,383 miles).
- Oklahoma is underlain by 23 major groundwater basins containing 320 million acre-feet of water in storage, though only half of that amount may be recoverable.
- The majority of the state’s surface water (approximately 60 percent) is used for public water supplies, followed by thermoelectric power generation and irrigation.
- Oklahoma ranks ninth in the nation in timber production, which contributes more than $1.5 billion to the state’s economy annually.

Oklahoma is underlain by 23 major groundwater basins containing 320 million acre-feet of water in storage, though only half of that amount may be recoverable.

- The majority of the state’s surface water (approximately 60 percent) is used for public water supplies, followed by thermoelectric power generation and irrigation.
- Oklahoma ranks ninth in the nation in timber production, which contributes more than $1.5 billion to the state’s economy annually.

Agriculture at OSU 9
Tom Kuzmic
Department of Forestry

By Donald Stotts

To meet Oklahoma State University’s Tom Kuzmic is to realize the past is very much alive in the OSU Department of Forestry, a heartfelt legacy passed down through generations and focusing as much on the best way to educate students as on detailing what subject matter to teach.

Kuzmic is the heir to Dave Robinson, a retired 30-year member of the OSU family and one of the most active foresters in Oklahoma history. As a student, Robinson was taught by Glen Durell, Matt Walker, and Mike Afanasiev, the department’s three original faculty members in 1946. Durell and Walker also served as professional mentors of Robinson after he joined the OSU faculty in 1962, passing on a philosophy of teaching that Robinson, in turn, passed on to a young faculty member named Tom Kuzmic.

“There are three kinds of people,” Kuzmic said. “Those who watch things happen, those who make things happen, and those who look around and wonder, what happened? I’m an advocate of doing things and making things happen. I put ‘doing’ in my classes. It’s all very hands-on.”

To be in a Tom Kuzmic class is to actively engage in learning, and not just about technical forestry practices.

“Class is a blend of forestry, sociology, policy, and natural resources,” Kuzmic said. “Issues associated with forestry are always changing, sometimes slowly, and sometimes not so slowly. Show me 10 people who love the forest and I’ll show you 10 different desires and demands, each of which may have merit from a particular perspective.”

Class is in session, walls optional

Kuzmic’s students have learned that, where he is involved, the term “classroom environment” is broadly defined. Class has been in Agricultural Hall on OSU’s Stillwater campus. Class also has taken place in wilderness areas across Oklahoma and the United States, not to mention the forests of Honduras. Yes, forests, plural — the humid tropical rainforest and mangrove forest of the Caribbean coast; the subtropical deciduous forest, highland pine forest, and cloud forest of the mountainous interior; and the dry tropical forest of the southern Pacific coast.

“Our seventh study abroad group will go to Honduras in March 2005,” Kuzmic said. “It all started when a former student invited me to his homeland of Honduras. He and I began to wonder how we might create an opportunity for OSU students to step out of their comfort zones and see how a large part of the world lives and interacts with their ecosystems.”

10 Agriculture at OSU
The study abroad students gain an understanding of the Honduran people by interacting with them, while also obtaining insight into issues such as tropical deforestation, poverty, land tenure, sustainable development, building community capacity, gender roles, and eco-tourism.

“Students learn many of the same lessons by attending our Forestry Summer Camp, which I have been involved with as an instructor and camp director for the past 25 years,” Kuzmic said. “Only the specifics are different, since we are somewhere in the United States as opposed to being in Latin America.”

OSU Forestry Summer Camp has given participants a wide range of experiences, in part because it has taken place in states from coast to coast.

“Students don’t double up at locations since the camp is in a different state each year,” Kuzmic said. “Faculty have attended the locations a number of times, of course, which allows us to build changing dynamics related to resources and issues into the student’s educational experiences.”

Never-never land

Call it “the curse of Peter Pan,” a mentality that the world is viewed as largely unchanging. It is a mentality that Kuzmic’s students learn to address quickly.

“We’re all consumers,” Kuzmic said. “There is not an organism on the planet that does not exist at the expense of its environment. The trick is to learn to work with nature and understand how ecosystems function, so that we live in ways that are as compatible as possible with natural systems.”

For example, each American utilizes the equivalent of a 12-inch diameter, 100-foot tall tree every year. There are nearly 300 million Americans. Yet, forestry practices are growing biomass 1.5 times faster than it is being consumed.

“We are doing a better job of maintaining forests than we ever have before,” Kuzmic said. “Some folks are concerned about harvesting trees. The inevitable question I ask in return is, what are you willing to give up?”
One of the first class assignments Kuzmic gives freshmen students is for them to go to their house, apartment, trailer, or dorm room and conduct an inventory of 50 items made from wood. Then they must list 25 items made from paper. Finally, they must find and list their household food products made in part or whole from trees.

“The information on food labels has surprised more than a few students,” Kuzmic said. “Once they have an idea of the many uses forest products have in their daily lives, we expand the discussion. This is important because we are more than simply consumers of physical stuff. Nearly everyone has a special forest-related place that touches him or her on an emotional or spiritual level. It’s important to protect and manage these special places wisely, both for ourselves and for the plants and animals that exist there.”

Classic Kuzmic

Kuzmic’s mentor, Dave Robinson, finds it easy to sum up his friend and onetime fellow faculty member.

“Tom is old school,” Robinson said. “He starts from the perspective that students are important and that they are individuals. He knows that the most effective teachers are those who share of themselves. Tom doesn’t talk to people, he speaks with them; Tom doesn’t lecture, he leads discussions that help students investigate and explore ideas and concepts.”

It was the longstanding success of Kuzmic’s favored teaching method that caught the attention of the Society of American Foresters (SAF). The organization named Kuzmic the 2004 recipient of its national Carl Alwin Schenck Memorial Award. The award was presented in October at Edmonton, Alberta, Canada, and recognizes outstanding performance in the field of forestry education.

“Tom Kuzmic’s students appreciate his enthusiasm, breadth of forest knowledge, and ability to bring subject matter to life,” said Dale L. Wierman, chair of SAF’s committee for professional recognition. “Challenging and innovative forestry education is a founding principle of the Society and the forestry profession.”

The October presentation was the second time since 1991 that the Society selected an OSU forester for the national honor.

“Tom was really proud of me when I was selected,” Robinson said, “just as I am so very proud of him now. When I am asked why someone should attend Oklahoma State to learn forestry, I mention three things: Tom Kuzmic; the techniques and concepts they learn will allow them to work anywhere in the world, which is not true of every forestry program taught at universities; and the fact that OSU makes foresters out of people, and not out of trees.”
By Amanda Jones

The smooth milk chocolate slides silkily down your throat, setting off waves of mouth-watering enjoyment. A hint of watermelon flavor tickles your taste buds. You smile, knowing that the divinely delicious experience comes from eating a nutrient-dense watermelon candy bar.

A nutrient-dense watermelon candy bar? Absolutely, all thanks to Food Industry Club members and the Oklahoma Food and Agricultural Products Research and Technology Center at Oklahoma State University (FAPC).

OSU food science graduate students Todd Wills and Dharmendra Bangalore said the product was developed after their team posed the question, “Wouldn’t it be wonderful if we could enjoy the flavor and nutritional benefits of watermelon in a candy bar?”

Enter Darren Scott, an OSU doctoral student who also just happens to be a FAPC Sensory Specialist Coordinator. With Scott’s input, the club members developed the watermelon candy bar, which they called LycoTreat, and competed in national-level competitions.

“It was a chance to take what they have learned in the classroom and apply those skills in a realistic project,” Scott said. “The watermelon candy bar project allowed the students to be creative and gave them a better understanding of the food industry.”

Nutritious and delicious

After concentrating the watermelon tissue, the club members found that the resulting fruit tasted more like a cucumber than a watermelon. The students were able

---

Todd Wills, food science graduate student (left); Darren Scott, FAPC Sensory Specialist Coordinator (middle); and Dharmendra Bangalore, food science graduate student (right), prepare ingredients to produce the nutrient-dense watermelon candy bar. (Photo by Amanda Jones)
to combat the problem by adding watermelon flavoring back into the candy bar.

“The hardest parts were putting together the formulation, finding the perfect mixture, and getting the taste right,” Bangalore said.

Ideas developed here

The team that developed the watermelon candy bar consisted of students Wills, Bangalore, Dimple Kumar Kundiyana, Mireya Roman-Nunez, Kean Lien, Suparna Mitra, Beryl Henry, and Alissa Barret.

Assistance was provided by Scott; Nurhan Dunford, FAPC Oil/Oilseed Chemist; William McGlynn, FAPC Horticultural Processing Specialist; Christina DeWitt, Assistant Professor of Animal Science; and Margaret Hinds, Assistant Professor of Nutritional Science.

“Everyone loves the taste of candy and nobody likes the taste of health bars,” Wills said. “With LycoTreat, you can eat a good tasting product and not have it be such a guilty pleasure.”

The watermelon candy bar project allowed the students to be creative and gave them a better understanding of the food industry.

Darren Scott
OSU Food and Agricultural Products Center

The team conducted more than 100 surveys to test the possible success of their product. They eventually decided their target audience would consist of women ages 24 years or older who were interested in maintaining healthy eating habits while still satisfying their sweet tooth.

They submitted their product and marketing plan to NASA, the Dairy Management Institute, and the Institute of Food Technologists.

Team members hope their project might offer a new use for watermelons, which would be beneficial in an industry with few further processed food items. Watermelon candy bars could be made out of culled melons and marketed during the off-season.
Outstanding teacher

Kathleen Kelsey
Department of Agricultural Education, Communications, and 4-H Youth Development

By Katie Reim

Every research methods in agricultural education class starts off with snacks, perfect appetizers for a main course of interactive learning that both challenges and inspires, all cooked up by an educator with a flair for the dramatic, Oklahoma State University’s Kathleen Kelsey.

Kelsey, Associate Professor of Agricultural Education, joined the OSU faculty in 1999. She has been active in the teaching profession since 1987, including a stint as a Peace Corps volunteer at Grenada National College in the West Indies.

In a profession once occupied overwhelmingly by men, Kelsey is an educator who is finding the right recipe for breaking traditional molds, such as being the second woman to receive the National Outstanding New Agricultural Educator Award.

“Agricultural education has long been a male-dominated profession,” Kelsey said. “The award signifies that the American Association for Agricultural Education (AAAE) recognizes the contribution of its members. It is truly an honor.”

Kelsey believes her success is a reflection of the support she has received from the OSU College of Agricultural Sciences and Natural Resources.

“Working with students and helping them achieve their goals is the most rewarding part of being in the teaching profession,” she said. “I see myself as a facilitator and somebody to promote people on their journey in life.”

James Leising, Head of OSU’s Department of Agricultural Education, Communications, and 4-H Youth Development, nominated Kelsey for the AAAE award.

“Kathleen has contributed to the recruitment of graduate students through her role in the development of a Sitlington Fellow Award, held important leadership roles in the department, and made significant contributions to the University and the profession,” Leising said.

What is next on the menu for the award-winning teacher?

Kelsey said that she was inspired by the AAAE award to conduct research identifying barriers women face in the agricultural education profession.

Only 4 percent of high school agricultural teachers in Oklahoma are women, compared to the national average that is closer to 25 percent.
Water: a quality of life issue

It is raining cats and dogs, a fish out of water, a person who is wet behind the ears—all sayings that have become a part of the American vocabulary. The imagery is as versatile as the many uses we demand of water.

How many of us have sought out the cool refuge of a tree-lined stream on a sweltering summer day, or stared in rapture as birds, deer, or other wildlife scurried along the waterway? How many of us take it for granted that water will be fresh and fit for drinking every time we turn on a faucet? How often do we water our lawns and gardens? How many of us enjoy a little rest and recreation at one of Oklahoma’s scenic lakes or rivers?

Researchers, specialists, and educators with Oklahoma State University’s Division of Agricultural Sciences and Natural Resources think about those and many other topics related to water every day, and for good reason. The total amount of fresh water used for all purposes in Oklahoma is estimated to be 1,772 million gallons per day, according to the U.S. Geological Survey, and that figure does not even include recreational uses. The water resources that Oklahoma depends on may be renewable but they are not infinite.
By Donald Stotts

No money? No problem. That was the answer Gary Shockley of Oklahoma City’s Department of Public Works received from Oklahoma State University in 1991 when he was seeking much-needed assistance in meeting national regulations required by the U.S. Clean Water Act.

Shockley was a bit shocked, to say the least.

“We knew that one of the most important keys to implementing the required stormwater programs would be extensive public education,” Shockley said. “At the time, we didn’t have public education programs, nor did we have funding for those efforts.”

In a strange twist, the money Shockley needed was made possible, in part, by the very people for whom a portion of the money was meant.

“I started asking around, and the lack of money was always a key concern with every organization, until I asked the water quality professionals at OSU,” Shockley said. “When told there was no designated budget, they helped me secure grant funding so I would have the money to allow them to conduct the research and training that would help me.”

The OKC Department of Public Works took full advantage of the assistance provided by water quality researchers and Oklahoma Cooperative Extension Service specialists with the OSU Division of Agricultural Sciences and Natural Resources.
A stream of successes

“We’ve gone from not having any public education and environmental programs to conducting education for all aspects of society,” Shockley said, “and we still partner with the University, such as linking with the OSU Master Gardener and Integrated Pest Management programs to talk about topics such as good landscaping practices and how to properly apply chemicals to lawns and gardens.”

OKC Public Works’ scientific branch is currently conducting a full watershed characterization inventory of 203 watersheds in Oklahoma City.

“I don’t know of anyone else who is conducting a watershed inventory of an entire city,” Shockley said.

Then there are OKC Public Works’ annual environmental audits of 1,800 Oklahoma City businesses, not to mention the fact that every construction site is inspected every two weeks, and, yes, there are all those fifth graders in public schools.

Fifth graders?

“We wanted to get the biggest bang for our buck and so had a demographic study done to identify Oklahoma City groups that benefit most from environmental education,” Shockley said. “Fifth graders ranked extremely high.”

One program set up by the department was for fifth graders and their teachers to be brought into the OSU-OKC Horticulture Center. Public Works officials provided a welcome and overview, and then “tour guides” took small groups around the grounds, where experts were situated at specific locations. Students learned about the hydrologic cycle and how everything in the environment can affect everything else and gained first-hand awareness about aquatic life and plants.

“OSU’s Cooperative Extension personnel even turned us on to the Conservation Commission’s Blue Thumb Program, which is done on a county basis,” Shockley said. “They helped me get in touch with the proper people. We applied for a grant, got it, and started a Blue Thumb Program in Oklahoma County.”

A message with meaning

Shockley said the message at the heart of every public education effort is that people must be
Blue Thumb is a statewide, volunteer-based, water quality education project. A strong emphasis on education is central to the entire project, which also provides technical assistance to public officials, developers, and homeowners.

Program topics include erosion control, stream bank protection, and other non-point source pollution control activities. In addition, Blue Thumb’s trained volunteers collect water quality data and help provide public education.

It began in Oklahoma in 1992 with an Environmental Protection Agency grant to a dedicated group of agencies:

- Oklahoma Conservation Commission
- The Conservation Districts of Tulsa and Oklahoma counties
- Oklahoma State University Cooperative Extension
- USDA Natural Resources Conservation Service

Today, more than 20 agencies, civic groups, and environmental organizations participate in the state’s Blue Thumb program.

**Happily ‘blue’**

Blue Thumb is a state-wide, volunteer-based, water quality education project. A strong emphasis on education is central to the entire project, which also provides technical assistance to public officials, developers, and homeowners.

Program topics include erosion control, stream bank protection, and other non-point source pollution control activities. In addition, Blue Thumb’s trained volunteers collect water quality data and help provide public education.

It began in Oklahoma in 1992 with an Environmental Protection Agency grant to a dedicated group of agencies:

- Oklahoma Conservation Commission
- The Conservation Districts of Tulsa and Oklahoma counties
- Oklahoma State University Cooperative Extension
- USDA Natural Resources Conservation Service

Today, more than 20 agencies, civic groups, and environmental organizations participate in the state’s Blue Thumb program.

Blue Thumb is a state-wide, volunteer-based, water quality education project. A strong emphasis on education is central to the entire project, which also provides technical assistance to public officials, developers, and homeowners.

Program topics include erosion control, stream bank protection, and other non-point source pollution control activities. In addition, Blue Thumb’s trained volunteers collect water quality data and help provide public education.

It began in Oklahoma in 1992 with an Environmental Protection Agency grant to a dedicated group of agencies:

- Oklahoma Conservation Commission
- The Conservation Districts of Tulsa and Oklahoma counties
- Oklahoma State University Cooperative Extension
- USDA Natural Resources Conservation Service

Today, more than 20 agencies, civic groups, and environmental organizations participate in the state’s Blue Thumb program.

Blue Thumb is a state-wide, volunteer-based, water quality education project. A strong emphasis on education is central to the entire project, which also provides technical assistance to public officials, developers, and homeowners.

Program topics include erosion control, stream bank protection, and other non-point source pollution control activities. In addition, Blue Thumb’s trained volunteers collect water quality data and help provide public education.

It began in Oklahoma in 1992 with an Environmental Protection Agency grant to a dedicated group of agencies:

- Oklahoma Conservation Commission
- The Conservation Districts of Tulsa and Oklahoma counties
- Oklahoma State University Cooperative Extension
- USDA Natural Resources Conservation Service

Today, more than 20 agencies, civic groups, and environmental organizations participate in the state’s Blue Thumb program.

Blue Thumb is a state-wide, volunteer-based, water quality education project. A strong emphasis on education is central to the entire project, which also provides technical assistance to public officials, developers, and homeowners.

Program topics include erosion control, stream bank protection, and other non-point source pollution control activities. In addition, Blue Thumb’s trained volunteers collect water quality data and help provide public education.

It began in Oklahoma in 1992 with an Environmental Protection Agency grant to a dedicated group of agencies:

- Oklahoma Conservation Commission
- The Conservation Districts of Tulsa and Oklahoma counties
- Oklahoma State University Cooperative Extension
- USDA Natural Resources Conservation Service

Today, more than 20 agencies, civic groups, and environmental organizations participate in the state’s Blue Thumb program.

Blue Thumb is a state-wide, volunteer-based, water quality education project. A strong emphasis on education is central to the entire project, which also provides technical assistance to public officials, developers, and homeowners.

Program topics include erosion control, stream bank protection, and other non-point source pollution control activities. In addition, Blue Thumb’s trained volunteers collect water quality data and help provide public education.

It began in Oklahoma in 1992 with an Environmental Protection Agency grant to a dedicated group of agencies:

- Oklahoma Conservation Commission
- The Conservation Districts of Tulsa and Oklahoma counties
- Oklahoma State University Cooperative Extension
- USDA Natural Resources Conservation Service

Today, more than 20 agencies, civic groups, and environmental organizations participate in the state’s Blue Thumb program.

Blue Thumb is a state-wide, volunteer-based, water quality education project. A strong emphasis on education is central to the entire project, which also provides technical assistance to public officials, developers, and homeowners.

Program topics include erosion control, stream bank protection, and other non-point source pollution control activities. In addition, Blue Thumb’s trained volunteers collect water quality data and help provide public education.

It began in Oklahoma in 1992 with an Environmental Protection Agency grant to a dedicated group of agencies:

- Oklahoma Conservation Commission
- The Conservation Districts of Tulsa and Oklahoma counties
- Oklahoma State University Cooperative Extension
- USDA Natural Resources Conservation Service

Today, more than 20 agencies, civic groups, and environmental organizations participate in the state’s Blue Thumb program.
By Donald Stotts

Sailing through the often turbulent waters of stormwater regulations has proven to be a tricky trip for all of Oklahoma. After all, the massive listing of regulations in the U.S. Clean Water Act is enough to make even the most enthusiastic mathematician swear off numbers.
The regulations may be designed to promote a positive environmental benefit when applied properly, but getting to that point can be a challenge, and that is where Oklahoma State University’s Division of Agricultural Sciences and Natural Resources comes in.

“Regulations can’t be applied properly if people don’t understand them, and understanding always involves having everyone on the same page,” said Mike Smolen, OSU Cooperative Extension Water Quality Coordinator. “In short, regulations don’t work without education.”

The OSU Water Quality Program is working at two levels, educating both the public and regulators.

“Regulators know what is required by law, but they don’t always know what works or what the public faces when trying to comply with the regulations,” Smolen said.

“The regulated public often sees the regulations as an unnecessary burden. People don’t always understand what the regulations are designed to achieve.”

Smolen said regulators come from varied backgrounds. Some are engineers, others are not. Many of them previously were charged with inspecting building codes or septic tank installation.

“Stormwater technologies are new to them,” Smolen said. “Even the engineers have varied backgrounds, and their experiences don’t always include hydrology or sediment control technologies.”

Education works two ways, of course. Even as Division researchers, specialists, and OSU Cooperative Extension educators are teaching regulators about water quality aspects and the hydrologic cycle, the regulators are instructing Division personnel about the rules and how they will be enforced.

“When we understand how the regulators are interpreting the rules, we are then able to communicate the interpretations to communities through our other public education programs,” Smolen said. “Literally, everyone benefits.”

Dollar-conscious delivery

Division water quality specialists worked with the Oklahoma Department of Environmental Quality (DEQ) to provide educational courses on stormwater issues and sediment control in 2004. The three-day course was presented twice, once privately for DEQ staff and once for the public.

Oklahoma’s often fearsome storms can wreak havoc on lives and the land if measures are not taken to protect against stormwater-related damage, as seen in flooding (far left) and erosion (below).
“Cost of attending the course normally is $695 per participant, but we were able to reduce it to $495 for Oklahoma residents by taking advantage of OSU Cooperative Extension’s involvement,” Smolen said. “OSU Cooperative Extension has much of the needed infrastructure in place to put on workshops at rock bottom prices without sacrificing quality. This type of course often runs $1,000 per person in other states.”

OSU alumnus Roger Gose, principal owner of Gose and Associates, a water engineering firm, helped the Division set up field trips around Stillwater to provide course participants insights into real-world situations.

“Participants were able to see the magnitude of what goes on at a construction site,” Gose said. “They were able to see first-hand that some of the things they would like to see done in terms of erosion control are not easily implemented.”

Regulators always have to interpret the regulations because it is often impossible for those being regulated to follow the rules letter-for-letter, given the massive number of rules.

“The shortfall in the system is that regulators may not understand the intent behind the rules, which

When we understand how the regulators are interpreting the rules, we are then able to communicate the interpretations to communities through our public education programs. Literally, everyone benefits.

Mike Smolen
OSU Department of Biosystems and Agricultural Engineering
Minimum controls required of municipalities

Stormwater regulations require municipalities to prove they are conducting successful programming annually in regard to the following:

- Public education and outreach on the effects of stormwater discharges
- Public involvement and participation
- Detection and elimination of illicit stormwater discharges
- Regulation of stormwater flows from construction sites
- Continued management of real estate development or redevelopment after the construction phase
- Pollution prevention for municipal operations

is why educational programs such as those put on by OSU in cooperation with other agencies are important,” Gose said.

Getting down and dirty

Ask people to name the major cause of water quality degradation in the state and any number of answers will be forthcoming, often failing to list the prime culprit — sediment, soil eroded from fields of row crops, unpaved county roads, and, yes, construction sites.

“Urban or rural, the problem can be seen, even though some people like to point their fingers at specific groups,” Gose said. “Truthfully, the national environmental regulations came about because we collectively were poor stewards of the land and didn’t control our land-use practices to the degree they needed to be controlled. That’s why environmental education is so important. We as a people need to get a better handle on what can and should be done.”
By Donald Stotts

To some livestock producers, dealing with waste management issues can seem to be as easy as punching a hole in water, with the added threat of winding up in hot water if their well-intentioned management plans fail to address practical options and perform less than swimmingly.

That is a major reason why Oklahoma State University’s Cooperative Extension specialists and educators strive to give producers the latest scoop on how to deal effectively with the pitfalls of animal poop.

Jason Hollenback, Delaware County Extension Educator, said producers generally respond to the massive number of regulations better than one might expect.

“State producers have been greatly affected by environmental regulations,” Hollenback said.

“They typically do a good job of trying to use the regulations and new land-use management practices they learn from OSU Cooperative Extension and other agencies to help improve their day-to-day operations.”

For some, the choice to keep up with the latest in management practices is no choice at all.

“Poultry operators are required by law to earn three hours of approved education credit every year,” said Doug Hamilton, OSU Cooperative Extension Waste Management Specialist. “This has been in addition to nine hours of state-mandated education when the law went into effect in 1999.”

OSU Cooperative Extension specialists and educators helped producers meet all designated training requirements that first year. Sessions focused on environmental regulations, soil and litter testing, spreader calibration, animal-waste management plans, litter nutrient management, phosphorus control, conservation practices, litter marketing, and more.

“Oklahoma is committed to having the best-trained poultry managers in the United States,” Hamilton said.

Hollenback said it is essential for OSU Cooperative Extension to continue providing the best possible training to the public.

“As part of a land-grant university, our mission is to tackle concerns and issues that affect people’s lives,” he said. “We do a lot of regional training in eastern Oklahoma, in part because certain Extension educators have more expertise than others in terms of dealing with specific issues, plus we’re able to call upon area, district, and state specialists for additional assistance.”
Unwanted chemicals trash Oklahoma

Leftover household hazardous waste products should never be thrown away with regular trash. Trash is dumped in landfills where materials harmful to the environment can get into groundwater.

The same thing happens when homeowners pour excess pesticides, weedkiller, and fertilizer solutions on the ground. The excess finds its way back into natural waters.

“Emptying these products into a sink or toilet is equally harmful,” said Sarah Kimball, OSU Cooperative Extension Solid Waste Management Coordinator. “Even though sanitary sewer lines take wastewater to a plant for cleaning, not all the residues can be removed. The chemicals end up in the discharged treated wastewater, meaning they are back in the environment.”

U.S. Environmental Protection Agency data show Americans generate 1.6 million tons of household hazardous waste per year. EPA statistics indicate the average home can accumulate as much as 100 pounds of household hazardous waste in a basement, garage, or storage closet.

Practical tips and information regarding water quality are available at http://waterquality.okstate.edu via the Internet.

Soil tests valuable in both rural and urban settings

By Donald Stotts

It is impossible to provide an accurate fertilizer recommendation without an accurate soil test, and that is why many Oklahomans rely on the Oklahoma State University Soil, Water, and Forage Analytical Laboratory.

Fertilizing without soil test data makes farming largely guesswork. Producers do not know what nutrients are needed, nor the amount needed to ensure a good crop.

“It is possible to under- or over-apply fertilizer or animal manure,” said Hailin Zhang, Laboratory Director and OSU Assistant Professor of Plant and Soil Sciences. “This not only costs money, it also means additional nutrients may enter water supplies and cause problems.”

Guessing low also is a problem. Inadequate amounts of fertilizer could reduce yields and decrease profits.

Soil testing also is valuable to homeowners wanting to ensure they have a lush, green lawn or productive garden.

“Homeowners have the same basic challenge as farmers in under- or over-applying fertilizer; too little and the results are not what they desire, too much and runoff occurs, leading to possible environmental problems, which could in turn be costly for an entire community,” Zhang said.

Urban or rural, it makes no difference where a person lives. Soil tests should be a standard management tool for farmers and homeowners alike.

Soil testing gets it right

A soil test estimates the ability of soil to provide nutrients to plants. This analysis takes some of the guesswork out of fertilizer application. Soil test results come with recommendations for the type and quantity of fertilizer needed. A recent study found the following nutrient levels for bermudagrass lawns in Stillwater.

```
<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Range</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>5.5-7.0</td>
<td>21%</td>
</tr>
<tr>
<td>Nitrogen (N)</td>
<td>21-40 lbs/ac</td>
<td>19%</td>
</tr>
<tr>
<td>Phosphorus (P)</td>
<td>65-210 lbs/ac</td>
<td>18%</td>
</tr>
<tr>
<td>Potassium (K)</td>
<td>250-350 lbs/ac</td>
<td>18%</td>
</tr>
</tbody>
</table>
```

Agriculture at OSU 25
Still water runs deep

By Donald Stotts

Up the creek without a paddle, that is where many Payne County residents felt they were upon learning that local domestic activities were contributing mightily to pollution in the Stillwater Creek watershed.
A recent Oklahoma State University study showed a significant over-application of fertilizer on the lawns of one in five homes situated in two Stillwater residential areas.

“That was not good news,” said Chris Stiegler, Payne County Extension Educator for Horticultural Programs. “Pollution from runoff is responsible for more than half of existing water quality problems in the United States, and a large amount of runoff can be traced back to driveways, gardens, lawns, and sidewalks.”

Rain washes fertilizer, oil, soap, antifreeze, pesticides, and even pet waste into storm drains or nearby lakes and streams — the same lakes and streams used for drinking, bathing, swimming, and fishing.

“Although the link between water quality and agricultural chemical use has received a great amount of publicity, fertilizers and pesticides used on residential gardens and landscapes also are a water quality concern,” Stiegler said. “On a per-acre basis, homeowners actually use more fertilizer and pesticides than farmers.”

Lush yet lethal

Studies show most homeowners love a lush, green lawn. It is a point of pride, actually, almost as though one is doing his or her neighbors a disservice by having a lawn that is less than picture perfect.

All plants, including grasses, need 16 essential nutrients. Most of these are plentiful in soil. Nitrogen, phosphorus, and potassium, however, may be depleted by removing grass clippings or harvesting a garden.

“For this reason, most commercial fertilizers contain these three nutrients, which promote healthy plant growth and maintenance when applied per label directions,” Stiegler said. “It’s when homeowners go for the green a little too aggressively that pollution problems with runoff occur.”

What is in the water?

The frequent observations of high nitrogen, phosphorus, and potassium levels in soil tests conducted by OSU researchers provide ample evidence of over-fertilization. While the levels are not high enough to cause damage to plants, they do pose a threat to Stillwater Creek. Of particular concern to water quality were the number of lawns and gardens with phosphorus levels above the recommended values.

“Phosphorus is a limiting nutrient for aquatic systems,” said Mike Smolen, OSU Cooperative Extension Water Quality Coordinator. “Nutrients that reach lakes and streams start a process called eutrophication. Rapid growth of aquatic weeds and algae can occur, using up the oxygen in the water. Extreme cases of eutrophication can lead to fish kills.”

The eutrophication process can be difficult and expensive to stop. The best cure is prevention.

Cyanobacteria, or blue-green algae, are a particular concern. They commonly bloom where there is excess phosphorus in a body of water. In addition to taste and odor problems, the blue-green
algae can produce toxins under the right conditions.

“The toxins may cause skin or eye irritation on contact, as well as nausea, vomiting, or diarrhea if ingested,” Smolen said. “Think of it as yet one more reason for property owners to follow best management practices. Recommended practices include having soil tests performed on lawns or gardens prior to applying fertilizer and applying only the specific nutrients recommended by the soil test.”

Quantifying quality

Ongoing OSU research and Cooperative Extension projects, many of which are being conducted in cooperation with the Oklahoma Conservation Commission, are helping local officials and residents to get a better grasp on the scope of pollution problems in the Stillwater Creek watershed.

“We are monitoring three streams through the Blue Thumb program,” said Lisa Fultz, OSU environmental sciences senior and Payne County Extension Educator Chris Stiegler get back to nature while looking for signs of environmental degradation in Payne County creeks (above and far left). Testing streams, rivers, and lakes is one way to “take the pulse” of a watershed. (Photos by Todd Johnson)
Blue Thumb volunteer. “That’s been a benefit. We have one stream that is in excellent shape and acts as a control for the two others, which are not in such good shape.”

A Stillwater native, Fultz believes getting county residents talking and taking positive action is important, citing that the Stillwater Creek watershed encompasses about half of Payne County and parts of Noble County.

“What goes in the water is a reflection of what is going on in the community,” Fultz said. “Environmental science looks at the interaction between nature and land use. It’s always a social science. People are part of the problem, but people also can be part of the solution. They just have to want to take part.”

Getting the word out is a concept that OSU’s Water Quality Team embraces fully.

“We’re working with the City of Stillwater to label storm drains with ‘Don’t Dump It Here’ messages,” said LaDonna McCowan, OSU Cooperative Extension Water Quality Specialist.

McCowan said the University has a presence at local events such as the Payne County Fair. University water quality specialists and educators are working directly with local homeowners, providing educational programs about integrated pest management and environmental stewardship.

“The more we can apply technology to promote environmentally friendly practices, the better off we are,” McCowan said.
By Donald Stotts

The producer raised his hand and stood when called upon. “Are you telling us,” he asked, gesturing to the group of livestock operators at the Oklahoma Cooperative Extension Service meeting, “that we’re going to have to start putting diapers on our cattle to protect our stream water from nutrient runoff?”

Discussions on livestock waste management and erosion caused by animal access to sensitive stream banks followed, eventually melding into information on what, back in the 1990s, was a new term for many producers: riparian areas.

“Riparian areas are the lands adjacent to water bodies, from creeks and rivers to lakes, ponds, and wetlands,” said Mitch Fram, Oklahoma State University Cooperative Extension Area Water Quality Specialist. “It’s a term most state producers have come to know well, and one about which our urban audiences are hearing about more and more.”

Because of their unique position between land and water, riparian areas act as a buffer between upland land-use activities and the water. They store water and reduce the effects of flooding, recharge groundwater supplies, reduce erosion, trap sediment and other pollutants, and provide shelter and food for wildlife.

Ironically, it is primarily the location and attractiveness of riparian areas that have jeopardized their existence. Riparian forests and bottomland are fertile and often valued as pasture or farmland. They are generally considered prime waterfront property for developers.

“Agricultural activities may get the majority of press, but urban encroachment and development — including the straightening of natural water channels — also have contributed significantly to the destruction and alteration of native riparian areas,” Fram said.

The Oklahoma landscape, crisscrossed by rivers, contained millions of acres of riparian land prior to European settlement.

Fram said the OSU Division of Agricultural Sciences and Natural Resources, working with other state and federal agencies, takes it as a point of pride that the organization has been actively involved in public education designed to help reduce the rate of riparian destruction and promote protection and preservation.

“One of the best resources available to the public is the Riparian Management Handbook, created by OSU Cooperative Extension in cooperation with other agencies,” Fram said.

“The handbook provides practical application tips and guidelines for protection, management, and appropriate restoration of streams and riparian habitats, and yes, it even lays out how a producer can run cattle in riparian areas without harming the environment.”

Internet users can visit http://osuextra.okstate.edu/dept/bioageng/waterqual.shtml to view the management handbook.
Just about all the major natural attractions you find in the West — the Grand Canyon, the Badlands, the Goodlands, the Mediocrelands, the Rocky Mountains, and Robert Redford — were caused by erosion.

Dave Barry
Author and Humorist
Yes, erosion can be funny, but it is never, ever a joke.

Thanks to erosion problems, dirt roads may be literally leaving Oklahomans in the dust, with the movement of sediment destroying the foundation upon which many people drive while also threatening delicate ecological balances.

“State officials have identified the water quality in Stillwater Creek as being impaired by sediment, and a major source of sediment is erosion of rural, unpaved roads,” said Don Turton, Oklahoma State University Associate Professor of Forest Hydrology.

Turton is the lead investigator on a project seeking to evaluate erosion control practices used on rural, unpaved roads in the Stillwater Creek watershed. The eventual goal is to demonstrate techniques that can be employed by county road crews to reduce erosion and improve road conditions.

“This project has a head start on others of its kind because we actually have data from an earlier OSU study,” Turton said.

Across the country, many people are concerned about sediment movement from rural, unpaved roads, even though, in truth, there are few data available about quantities of sediment coming from roads and making their way into bodies of water.

“It was estimated that erosion from the 95 miles of rural, unpaved roads in the Lake Carl Blackwell area averages about 2,600 tons per year,” Turton said. “That works out to about 30 tons per mile.”

A ton of soil is equivalent to about one cubic yard or roughly 10 wheelbarrows worth of material.

The study concentrated on sediment movement from the road surface and was conducted by Turton; Dan Storm, OSU Professor of Environment and Natural Resource Engineering; and Brandon Neal, then an undergraduate student in the Department of Biosystems and Agricultural Engineering.

“The OSU study did not sit on a shelf,” Turton said. “Not only did it convey important information, it allowed state water quality agencies to vividly see the effect erosion potentially was having on rural roads, which in turn led them to fund further investigations about practices and techniques that county governments might use to reduce erosion problems.”

Turton is pleased that interest in and support for the current Stillwater Creek erosion control study has been widespread.

“Most of the monetary support has come from Clean Water Act, Section 319, funds from the Environmental Protection Agency, Region 6, out of Dallas,” Turton said. “The Oklahoma Conservation Commission is involved as well, as is the OSU Division of Agricultural Sciences and Natural Resources.”

And while Turton is the principal investigator, Doug Wright and Mike Hinkston of the Local Technology Assistance Program — part of the Center for Local Government Technology — also are playing major roles.

“The OSU study did not sit on a shelf,” Turton said. “‘Not only did it convey important information, it allowed state water quality agencies to vividly see the effect erosion potentially was having on rural roads, which in turn led them to fund further investigations about practices and techniques that county governments might use to reduce erosion problems.’

Turton is pleased that interest in and support for the current Stillwater Creek erosion control study has been widespread.

“State officials have identified the water quality in Stillwater Creek as being impaired by sediment, and a major source of sediment is erosion of rural, unpaved roads,” said Don Turton, Oklahoma State University Associate Professor of Forest Hydrology.

Turton is the lead investigator on a project seeking to evaluate erosion control practices used on rural, unpaved roads in the Stillwater Creek watershed. The eventual goal is to demonstrate techniques that can be employed by county road crews to reduce erosion and improve road conditions.

“This project has a head start on others of its kind because we actually have data from an earlier OSU study,” Turton said.

Across the country, many people are concerned about sediment movement from rural, unpaved roads, even though, in truth, there are few data available about quantities of sediment coming from roads and making their way into bodies of water.

“It was estimated that erosion from the 95 miles of rural, unpaved roads in the Lake Carl Blackwell area averages about 2,600 tons per year,” Turton said. “That works out to about 30 tons per mile.”

A ton of soil is equivalent to about one cubic yard or roughly 10 wheelbarrows worth of material.

The study concentrated on sediment movement from the road surface and was conducted by Turton; Dan Storm, OSU Professor of Environment and Natural Resource Engineering; and Brandon Neal, then an undergraduate student in the Department of Biosystems and Agricultural Engineering.

“The OSU study did not sit on a shelf,” Turton said. “Not only did it convey important information, it allowed state water quality agencies to vividly see the effect erosion potentially was having on rural roads, which in turn led them to fund further investigations about practices and techniques that county governments might use to reduce erosion problems.”

Turton is pleased that interest in and support for the current Stillwater Creek erosion control study has been widespread.

“Most of the monetary support has come from Clean Water Act, Section 319, funds from the Environmental Protection Agency, Region 6, out of Dallas,” Turton said. “The Oklahoma Conservation Commission is involved as well, as is the OSU Division of Agricultural Sciences and Natural Resources.”

And while Turton is the principal investigator, Doug Wright and Mike Hinkston of the Local Technology Assistance Program — part of the Center for Local Government Technology — also are playing major roles.

When the Division came up with the money and asked whether or not we wanted to take part, we replied ‘yes’ in record time,” Wright said. “One of the main reasons we at LTAP wanted to become involved is that we teach classes for county commissioners and their employees.”

The demonstration site can be used for future education of county commissioners, road crews, and the general public.

“Road maintenance is always a ‘hot topic’ with county residents and local government leaders,” Turton said. “If we can show that improving roads helps protect water quality, communities may make rural road improvement a higher priority in terms of funding and public support.”

Preliminary measurements from the current study show Turton’s previous study might have indicated erosion rates that were too low. An erosion rate of 40 tons to 60 tons per mile on rural, unpaved roads in the Stillwater Creek watershed may be a more accurate assessment.

“That’s quite a bit of sediment moving down the road,” Turton said.
A matter of perception

By Donald Stotts

For Kase, Misty, and Joe, it was a case of mom doing her thing — traveling, meeting with people, writing, more traveling, more meetings, and still more writing. For Carol Vallee Crouch, aka “mom,” it was the fulfillment of a dream — earning her doctoral degree from Oklahoma State University while investigating a subject drawn from her heart and her personal history as a Native American.

For Oklahoma, it was an all-too-rare exploration of the perceptions and concerns about environmental issues held by the state’s Native American tribes.

“A need exists to assess the effectiveness of initiatives created to ensure a quality environment for tribal communities, especially at the grass roots level,” said Crouch, USDA Natural Resources Conservation Service Soil Conservationist.

Crouch spoke at length with tribal leaders, elders, councils, festival committees, powwow directors, and cultural resource and environmental professionals, eventually attaining approval to conduct a survey from all 39 of Oklahoma’s tribes.

“To make the research more manageable, we drew a random sample from the tribes, six small tribes and six large tribes, determined by number of members,” said Mike Smolen, OSU Cooperative Extension Water Quality Coordinator and academic adviser to Crouch. “The tribes we surveyed turned out to be spread fairly evenly across the state.”

The small tribes surveyed were the Caddo, Comanche, Iowa, Otoe-Missouria, Pawnee, and Quapaw tribes. The large tribes surveyed were Cherokee Nation, Cheyenne-Arapaho, Chickasaw Nation, Choctaw Nation, Creek Nation, and Osage Nation.

“Cultural, heritage, spiritual, and other established traditions were upheld with utmost respect and consideration during the research investigation,” Crouch said.

Awareness of environmental education, legislation, programs, justice, and issues was examined, with a focus on identifying differences in the responses of tribal environmental professionals and grass roots tribal members.

“Carol managed to interact with all levels of tribal society,” Smolen said.

The majority of the grass roots respondents were 55 years of age or older and had limited education. Some could not read or write. Some spoke only their native tongue, and so required that Crouch work through an interpreter.

“Carol’s work truly represents landmark research for both OSU and Oklahoma,” Smolen said.

Native American environmental awareness

- Grass roots respondents believe they have not received environmental education to address the issues and concerns they identified as most serious in the study. Virtually all tribal respondents indicated they had received environmental education and training on the issues identified.
- Grass roots respondents believe the level of environmental education with the communities in which they live to be low or none. Often tribal respondents considered it medium.
- It was concluded that grass roots respondents’ awareness of environmental legislation issued or enacted to ensure their quality of life and protect their cultural resources was limited unless the piece of legislation contained the term “Native American” in the title.
- Virtually all respondents do not believe environmental legislation is being sufficiently enforced in their communities or are adequate to protect their cultural resources, values, sacred sites, and tribal lands.
Native American environmental issues/concerns

- Preservation and protection of cultural resources was the most important environmental issue identified, with water pollution a particular area of concern.
- All respondents perceived overall environmental conditions in their communities to be poor or below average.
- Grass roots respondents perceived the major causes for environmental problems in their communities to be related to farming practices and open dumps.

Did you know?

Tribal lands across the United States can be found on the National Priorities List (NPL) of sites that have uncontrolled hazardous wastes. Eight counties in Oklahoma are listed, and all eight have sites located on Native American lands within the boundaries of Oklahoma.

Making sure $H_2O$ is A-OK

By Donald Stotts

It is turning out to be a case of “all’s well that ends well” for the residents of 22 minority communities who rely on “going to the well” for their drinking water.

Water quality professionals with Oklahoma State University’s Division of Agricultural Sciences and Natural Resources are working with residents in Okfuskee and Okmulgee counties to ensure local wells are providing water fit for drinking.

“The purpose of the Drinking Water Education for Under-Served Communities project is to make residents more aware of how to take care of their own drinking water,” said Maifan Silitonga, Project Educator with the OSU Department of Biosystems and Agricultural Engineering.

“We’re focusing on water wells and septic systems since so many residents in largely rural Okfuskee and Okmulgee counties are dependent on wells for their drinking water,” she said. Project Coordinator LaDonna McCowan, OSU Cooperative Extension Water Quality

Did you know?

Tribal lands across the United States can be found on the National Priorities List (NPL) of sites that have uncontrolled hazardous wastes. Eight counties in Oklahoma are listed, and all eight have sites located on Native American lands within the boundaries of Oklahoma.
with that, nor was the cutting of lawns involved. Instead, Green and Estes were trained to use high-tech equipment and develop skills in laboratory procedures and global positioning.

Going global, locally
“Learning how to use GPS equipment to locate and map water wells across the county was fun,” Estes said.

Although some adults at first assumed Estes and Green were simply teenagers playing with the latest in high-tech, handheld computer games, they were instead using GPS (Global Positioning System) units to take specially coded satellite signals that were then processed to compute position, velocity, and time.

If contamination is found, then we need to be able to identify whether the problem is with a single well or if the contamination is more widespread.

Maifan Silitonga
OSU Department of Biosystems and Agricultural Engineering

“A focal point of the program is to be able to retrieve data and tell the location and water quality of every well,” Silitonga said. “If contamination is found, then we need to be able to identify whether the problem is with a single well or if the contamination is more widespread.”

The level of interconnectivity in the environment is a subject Green has been quick to pass on to local residents.

“For me, the best part has been meeting all the people and passing on what I learned during my training at OSU this summer,” Green said.

In addition to the youth movement embodied by Green and Estes, the OSU program has attracted volunteers from the ranks of retired persons with the Retired Educators for Youth Agricultural Programs (REYAP) organization.

Rita Moore, a local para-professional, was hired to help local residents make use of the drinking water education program. She is headquartered at OSU Cooperative Extension's Okfuskee County Extension Office in Okemah.

“Local residents are more at ease inviting Rita into their homes than they might be with somebody from halfway across the state,” McCowan said.
McCowan said, “USDA sees the need. We’re focusing on two counties in Oklahoma. However, water quality concerns exist in every county. In many ways, the project is a practical learning tool showing how state agencies and organizations should approach public education of this type.”

McCowan said it is a lesson that must be firmly imprinted in the minds of local, state, and national institutions.

“Most states have access to sufficient technology,” McCowan said. “The tipping point to having success is getting a sustainable group of volunteers who are excited about the program and who enthusiastically work toward making things happen.”

“Normally, this would cost them $15 per test. However, OSU pays the fee for meeting participants.”

In addition, each participant is provided a worksheet to assist in identifying causes of pollution on his or her property, which in turn helps determine the most cost-effective solutions.

A high-water mark

It was a blistering hot summer day — the mercury exceeding 100 degrees Fahrenheit coupled with a heat index that added another 10 degrees to the temperature — when Okfuskee County Extension Director Ron Vick took the water quality team out to meet a local farmer and tour his property, getting a firsthand look at the condition of area wells.

“We were positively melting and spent half the time huddling under shade trees,” Silitonga said. “Yet here was this 80-year-old farmer who was extremely excited that we had come out to look at his wells and help him solve his problems. If we ever had a doubt about being on the right track, it ended then and there.”

Nor does the USDA Cooperative States Research, Education, and Extension Service (CSREES) seem to have any doubt. The OSU Drinking Water Education for Under-Served Communities project received CSREES funding for three years.

“This is the second grant we’ve gotten from CSREES,” McCowan said. “USDA sees the need. We’re focusing on two counties in Oklahoma. However, water quality concerns exist in every county. In many ways, the project is a practical learning tool showing how state agencies and organizations should approach public education of this type.”

McCowan said it is a lesson that must be firmly imprinted in the minds of local, state, and national institutions.

“Most states have access to sufficient technology,” McCowan said. “The tipping point to having success is getting a sustainable group of volunteers who are excited about the program and who enthusiastically work toward making things happen.”
By Allison Richard

Oklahoma cattle producers and food professionals have come to think of the annual Beef Quality Summit as the ABCs of beef production, with a special emphasis on understanding the beef business in its entirety.

Three days of seminars and demonstrations give participants an awareness of beef grading and application of grades, evaluation of live market cattle, the harvest process, beef carcass fabrication, ways to add value to beef, and beef product development.

The Oklahoma Beef Council sponsors the summit using checkoff dollars paid by producers, a move supported by Oklahoma Agriculture Secretary Terry Peach.

“It’s another example of how they are supporting the industry,” Peach said, “and it’s to Oklahoma State University’s credit that the University participates in the program.”

Sessions are led by OSU faculty and staff, Oklahoma Beef Council associates, and other industry leaders.

Behind the scenes

Jake Nelson, Meat-Processing Manager for the Oklahoma Food and Agricultural Products Research and Technology Center at Oklahoma State University (FAPC) said it typically requires about one week’s worth of time to prepare the FAPC plant for a summit.

“There is much work required to prepare for 60 to 70 rookie meat cutters to come here and completely fabricate 14 sides of beef,” he said.

Nelson and his student workers also harvest animals prior to the summit. The carcasses are used during the summit so participants can learn how to fabricate boneless cuts of meat.

Nelson and his student workers review the cuts of meat trimmed by the participants and make adjustments if necessary. The cuts are then packaged, boxed, inventoried, and subsequently sold to a wholesale or retail shop.

“At the end of one day, we have slaughtered four animals, packaged and boxed approximately 1,300 pounds of meat, and dirtied and cleaned numerous rooms and hallways,” Nelson said.

The summit is a networking opportunity for cattle producers, retailers, and those in the food service venues, said Misty Henson, Director of Food Service and Retail for the Oklahoma Beef Council.

“A producer can see what retailers go through and retailers can see the problems faced by beef producers,” said Henson.

From near and far

To date, the summit has proven to have the recipe for success. People come from across Oklahoma and other states to attend the three-day event.

“A friend told me to participate in the summit,” said Bernadean Lilly, a Stillwater resident. “I’m thinking about getting into a small cattle operation for personal use.”

Ohio resident R. B. Kinney attended the summit because of the quality program and people at OSU.

“I’m very familiar with Oklahoma and OSU,” Kinney said. “Take away the people, the program, and the facility and it’s just any other university. But I know the quality that is here.”
Outstanding teacher

David Buchanan
Department of Animal Science

By Katie Reim

Generations of Oklahoma State University students have spoken, and the judgment is overwhelming: David Buchanan, Professor of Animal Science, is someone who possesses a genuine commitment to providing the best possible advice and instruction to anyone willing to learn.

Buchanan has received many teaching and advising awards over the years. Recent honors range from the President’s OSU Faculty Service Award in 2001 to the 2002 American Society of Animal Science Outstanding Teaching Award. He was recently awarded the Teacher Fellow Award from the National Agricultural College Teachers of America.

For Buchanan, awards are nice, but the biggest reward is for his students to have learned something in class and want to talk about it — in class, in his office, in the hallway, just about anywhere and everywhere.

“I remember early in my career,” he said, “a student came to me after class and said he understood that my wife and I had a son with Down’s syndrome. The student remarked that he had a sister with Down’s, except he didn’t know this until it was talked about in class. He knew that she had difficulties, but it wasn’t until he came to class that he actually recognized the cause.”

Buchanan credits such moments for reminding him that teachers can shape people’s lives. It was a lesson he first learned as the son of a college professor.

“I saw what my father did when I was growing up,” he said. “It has definitely contributed to my joining the teaching profession.”

Buchanan has carried on the “family business” for nearly 25 years.

“Dave is a tremendous asset to both the University and national academic community,” said Don Wagner, Head of the OSU Department of Animal Science. “OSU is a better university because of his many significant contributions, helpful attitude, and dedication.”

Wagner said Buchanan has inordinate patience and compassion for students and knows how to inspire self confidence in those who may need encouragement.

Not only does Buchanan showcase his talents in the classroom, he maintains a high presence around campus and the state. He has served as an adviser for many OSU student clubs and regularly conducts pre-college youth quiz bowl contests at state fairs and national livestock contests.

“Teaching has been everything I expected and much, much more,” Buchanan said.
By Trisha Gedon

Helping students learn and giving them the skills they need to be successful are just a couple of the goals Wade Brorsen has for the graduate level classes he teaches at Oklahoma State University.

Brorsen, a Regents Professor in the Department of Agricultural Economics, teaches advanced econometrics and advanced production, both of which are doctorate-level courses. He also teaches research methodology, which is a master’s level course.

Originally from Perry, Oklahoma, Brorsen earned his bachelor’s and master’s degrees in agricultural economics from OSU and his doctoral degree from Texas A&M University. He also earned a master’s in statistics from the University of Wisconsin.

His teaching style involves a lot of homework, as well as a term paper that accounts for a large part of the class. Brorsen uses real-world examples from his own research to help ensure homework assignments are interesting.

“While the material I teach is difficult, lectures are kept simple,” Brorsen said. “Memorized material is easily forgotten. My courses involve active learning.”

His testing approach is not “a cookbook” approach. Most test questions are at the application level of Bloom’s Taxonomy, which means that students must take what they have learned and apply it to a new situation. Students who are used to being able to memorize often struggle at first. However, most adapt and end up liking it.

Brorsen was 25 years of age when he began his teaching career at Purdue University in 1983. Most of the graduate students were older than him. Despite the age differences, they would often come by his office to talk.

“I try to get to class early so I have time to visit with my students before class starts,” Brorsen said. “This makes a more positive atmosphere and makes them more comfortable in terms of asking questions. My goal is for students to learn. This is a tool I use to help achieve that goal.”

Making his lectures highly interactive with frequent questions is another approach Brorsen uses to help his students discover more things on their own.

James Trapp, Head of the Department of Agricultural Economics, said Brorsen has a positive working relationship with students. “Wade believes not only in teaching his students research skills, but in motivating and helping their development.”
them put those skills to use,” Trapp said. “This leaves no doubt in their minds that they have learned what they need to in order to have a successful research career.”

Brons en recently was presented a national Outstanding Graduate Teaching Award by the American Agricultural Economics Association. He also received The Phoenix Award (for outstanding graduate teaching at OSU) from the OSU Graduate and Professional Student Government Association.

“Although still in mid-career, Wade’s contributions represent substantially more than most agricultural economists are able to achieve in a lifetime of work,” said Dee Von Bailey, Utah State University Professor of Economics.

One-fourth of Brorsen’s published research target such diverse areas as water quality, the Conservation Reserve Program, pesticide productivity, electricity demand, measuring school productivity, and military labor — all topics of great importance to Oklahoma.

“Wade’s goal is to be published in six refereed journals a year, more than many economists manage in a decade of work.” said Clem Ward, OSU Cooperative Extension Livestock Marketing Specialist.

Brorsen currently serves as an editor for his profession’s leading journal, the American Journal of Agricultural Economics, and is a past editor of the second most prestigious professional journal, the Journal of Agricultural and Resource Economics.

His literary accomplishments also provide direct benefits to agricultural economics graduate students, helping them become published authors in their own right, not to mention more polished researchers in the process.

“The econometrics and quantitative analytical training Wade has given to students has opened the door to lucrative opportunities for our graduates with nontraditional employers, such as American Express and Toyota, as well as more traditional positions with landgrant universities and USDA,” Ward said.

Lydia Zepeda of the University of Wisconsin’s School of Human Ecology said Brorsen’s most important contribution may not be his own prestigious and lengthy research record, but the positive effect he has had on the development of other people’s careers.

“I know Wade has had a huge impact on the careers of young faculty and other professionals because I was one of them,” Zepeda said. “He provided the most useful mentoring of my career.”

Brons en participates heavily in helping students obtain employment. He often edits résumés and students’ other written work. He also attends seminars presented by students who are preparing for job interviews.

“I have an open-door policy for my students,” Brorsen said. “As a thesis adviser, I give students freedom, but I also give them a lot of help at critical points. It seems to be a successful approach, as all of my students have produced research that was published in refereed journals.”

Brorsen’s research indicates that once the school population reaches about 900 students, the cost per student tends to flatten out. In addition, students in smaller schools on average tend to get lower test scores in terms of student learning. However, once adjustments are made for “sociodemographics,” his research finds that the reverse is true.

“I found that the smaller schools are actually doing a better job of teaching,” Brorsen said.

Not only is student learning a concern, but the effects of consolidation can be devastating for some of the smaller rural communities in Oklahoma.

“My research showed if you consolidate schools you will save money, but you wouldn’t really help the students,” Brorsen said.

By Trish Gedon

The efficient use of educational funds has been a popular research topic since the late 1950s. In an effort to save money, it has frequently been proposed to consolidate rural school districts. But what is the overall cost?

Oklahoma State University Regents Professor Wade Brorsen did some research to help shed light on this controversial topic.

“There are two effects that you need to look at when considering the consolidation of Oklahoma’s more than 500 school districts,” Brorsen said. “The first is money, and the second is the effect on student learning. Some previous studies have focused on the average cost function of each district, but they ignore the effects of consolidation on school quality.”

While smaller school districts spend more money per student, Brorsen’s research indicates that once the school population reaches about 900 students, the cost per student tends to flatten out. In addition, students in smaller schools on average tend to get lower test scores in terms of student learning. However, once adjustments are made for “sociodemographics,” his research finds that the reverse is true.

“I found that the smaller schools are actually doing a better job of teaching,” Brorsen said.

Not only is student learning a concern, but the effects of consolidation can be devastating for some of the smaller rural communities in Oklahoma.

“My research showed if you consolidate schools you will save money, but you wouldn’t really help the students,” Brorsen said.
The process of making bread might seem simple enough, but cut through the crust and the complexity of achieving quality bread becomes readily apparent.

Patricia Rayas, Cereal Chemist for the Oklahoma Food and Agricultural Products Research and Technology Center at Oklahoma State University (FAPC), has been researching different areas of wheat proteins and its influence on bread quality for the past four years.

"The proteins are probably the single most important factor that determines quality in terms of bread baking," said Rayas.

Rayas works with wheat breeder Brett Carver, OSU Professor of Plant and Soil Sciences, in developing varieties that will produce quality flour and end products.

"She helps us make decisions as to which candidate varieties are worthy of release to the public and which ones are not," said Carver.

Mark Hodges, Executive Director of the Oklahoma Wheat Commission, has relied on Rayas and FAPC specialists to provide technical assistance in identifying the functionality of wheat produced in Oklahoma.

"FAPC is and will continue to be an integral part of our marketing and market development activities," said Hodges.

Hodges is quick to point out that many basic questions about wheat quality remain unanswered, questions that Oklahoma’s wheat industry needs to have answered.

As a result, Rayas is researching the physical properties of proteins and interaction between proteins and starch, as well as identifying proteins produced by wheat during grain development and specific subunits of gluten proteins.

Physical properties of proteins

When talking about wheat quality, millers and bakers often emphasize different parameters than do wheat producers and grain elevator managers.

In addition, there is no single definition of wheat “quality,” in part due to the number of products made from wheat flour.

“Flour has to meet consumer needs and be consistent in quality to be termed quality flour,” said Rayas. “Wheat varies from year to year. This is probably the most
important challenge for the baking industry because variation causes inconsistent performance in flour.”

There are a number of tests not routinely used in the United States that are commonly employed by U.S. wheat export customers. However, all use a baking evaluation, which is considered the ultimate test for performance.

Dough extensibility is important in the determination of the quality of bread flour.

In yeasted bread, gluten proteins directly influence the dough height and retention of gas during fermentation, as well as the desirable crumb structure and volume of the final product.

“The long-term goal is to understand the role of each glutenin and gliadin subunit of gluten proteins and determine their contribution to dough extensibility and baking properties,” said Rayas.

Identifying proteins

During seed development, there is a shift from a state of cell division to a state of grain filling. Some of the most important factors in determining the final protein content and quality of seeds in grain filling are timing, duration, and rate of grain filling.

“End-product diversity is increasing on a daily basis,” said Rayas. “This demands a greater attention to wheat quality during processing.”

Unfortunately, environmental variation during growth and its effects on biochemical processes of the production of proteins are not well explored.

Proteins are the first product of gene activity and are critical in understanding the gene-function relationship, as well as the effect of growth and storage protein on processing quality.

Interaction between proteins and starch

To research the interaction between proteins and starch, Rayas and her collaborating researchers used wheat varieties with different properties.

“Overall, quite different binding constants were found in the samples,” said Rayas.

The data suggest that some of the glutenin proteins appeared to interact more with starch, which functions as a stabilizer in a baked loaf of bread.

Gluten protein subunits

The bread-making potential of each wheat line or cultivar is related to the presence of gluten proteins known as glutenins.

Glutenins account for 10 percent to 20 percent of the total prolamin protein and approximately 5 percent to 15 percent of total flour protein, and have a major effect on bread-making quality.

“Our results indicate that precise identification of superior allelic variants (one of two or more alternative forms of a gene occupying the same position on matching chromosomes) in hard winter wheat breeding lines can be achieved,” said Rayas.

“This represents a significant advancement in the selection of breeding lines with desirable end-user properties applied to the OSU Wheat Improvement Program.”

Patricia Rayas, FAPC Cereal Chemist (left), and Fadi Al-Jorf, doctoral student (right), examine an acrylamide gel of glutenin protein subunits of hard white winter wheat breeding lines from OSU’s breeding program. (Photo by Mandy Gross)
Oklahoma State University researchers in the Division of Agricultural Sciences and Natural Resources made available not one but two new wheat varieties to state producers in 2004, Endurance and Deliver.

“Endurance showed remarkably broad adaptation throughout the Great Plains, where it placed second across the entire region and in the two highest-ranked positions at five of the 23 locations in the 2003 Southern Regional Performance Nursery,” said Brett Carver, OSU Wheat Genetics Chair.

The variety is most competitive in areas challenged by intensive and extended grazing through the fall and winter seasons, high soil acidity and aluminum toxicity, and limited rainfall.

Deliver is highly competitive for yield performance, primarily in north central Oklahoma but also in western portions of the state.


Both Endurance and Deliver are hard red winter wheat varieties. Specific performance information on these and other OSU wheat varieties is available at http://www.wit.okstate.edu/newvarieties/index.html via the Internet.

Wheat improvement research in Oklahoma is driven by an interdisciplinary team of Division scientists charged with developing highly adapted winter wheat cultivars with marketable grain quality.

Program support is administered by the Division’s Oklahoma Agricultural Experiment Station system. Funding is provided through a partnership between the Experiment Station, Oklahoma Wheat Commission, and Oklahoma Wheat Research Foundation.
One McCool fellow

By Jennifer Adsit

It has been 43 years since Donald K. McCool graduated from Oklahoma State University with a doctoral degree in agricultural engineering, but he is still leaving a mark as one of the University’s cool fellows.

McCool received one of the preeminent honors in his profession this past fall when he was named a Fellow of the American Society of Agricultural Engineers (ASAE).

“It is an honor and privilege, and also humbling,” McCool said.

Only about 2 percent of active ASAE members have achieved the grade of Fellow. Among the criteria for consideration is the demonstration of unusual professional distinction, along with outstanding qualifications and experience in the field of agricultural engineering.

McCool has gained national and international recognition in the areas of erosion prediction and control in the formulation of pollution abatement methods.

The OSU alumnus currently serves as Supervisory Agricultural Engineer and Research Leader for the USDA-Agricultural Research Service Pacific West Area, Biological Engineering Department at Washington State University.

McCool said his greatest achievement as an OSU student was designing and supervising the construction of a major outdoor hydraulic experiment that was successful in operation and formed the basis for his doctoral project.

“It was not rocket science,” he said, “but an extremely painstaking construction of concrete, earth, sod, gates, and control elements. Everything worked. It was amazing.”

His doctoral adviser at OSU, Jim Garton, and Bill Ree, his 10-year supervisor at the Outdoor Hydraulics Laboratory at Lake Carl Blackwell, are among those mentors he lists as having a major influence on his life and career.

“Supporters can come in many forms,” he said. “Sometimes they are recognized only in retrospect. I never really thanked Bill Ree for all his guidance and direction.”

One of McCool’s three sons graduated from OSU with a degree in architecture. The 2003 graduate is now employed with a firm in Fairbanks, Alaska. McCool plans to drive there next summer, even though the distance between Pullman, Washington, and Fairbanks (2,400 miles) is just slightly further the distance between Pullman and Stillwater, Oklahoma (2,100 miles).

No matter the distance, McCool remains fond of the fact that he was once part of the Orange and Black.

Oklahoma State University’s Biosystems and Agricultural Engineering 1/4 Scale Tractor Team took top honors at the 2004 International Design Competition sponsored by the American Society of Agricultural Engineers, earning first place overall out of more than 25 teams from the United States and Canada.

The OSU students also placed first in the categories of pull performance and serviceability. They took third place with their written report, third place in the Web design category, and fourth place with their presentation. The team also earned a first place tie for sportsmanship, an award voted on by all of the teams in the competition. The team was presented the Campbell Scientific Award as well, which recognizes the best electronics application in the design of a tractor.
One way to describe Janet Cole is as a multi-talented faculty member in the Department of Horticulture and Landscape Architecture at Oklahoma State University.

Her many talents as an educator and researcher, in addition to wearing a variety of hats within the department, are contributing factors to her recently being named the Outstanding Undergraduate Educator by the American Society of Horticultural Science.

Janet Cole
Department of Horticulture and Landscape Architecture

By Trisha Gedon

You can always count on Janet Cole to excel in whatever she does.

Dale Maronek
OSU Department of Horticulture and Landscape Architecture

“This award is given in recognition for work with students, including formal and informal activities,” Cole said. “To me, this award means that I’ve had a positive effect on my students.”

Cole, Professor of Ornamental Horticulture, has been at OSU for 16 years. In addition to her research appointment, she teaches three subjects, including plant propagation, nursery production and management, and arboriculture. She also is one of the coaches of the OSU Horticulture Judging Team, serves as co-adviser to the Associated Landscape Contractors of America organization, and oversees the OSU Landscape Contracting Program.

“I try to make the laboratory portion of my classes very much hands-on,” she said. “In my plant propagation class, the students get to keep some of what they propagate. What I personally find most fun, though, is seeing students grasp a concept and have the ‘light bulb’ come on.”

Dale Maronek, Head of the Department of Horticulture and Landscape Architecture, said Cole provides vital leadership to a variety of programs.

“You can always count on Janet Cole to excel in whatever she does,” Maronek said. “Once she sets a goal or assumes a responsibility, you can be assured she will do a great job.”

Case in point, Cole was instrumental in securing national ac-
creditation for the OSU Landscape Contracting Program.

“We are one of only five four-year institutions in the United States to hold this distinction,” Maronek said.

In the research aspect of her appointment, much of Cole’s work deals with the improvement of plant quality and the ability to produce a more economical plant. Her current research is focused on disease issues with euonymus, an ornamental ground cover.

The horticulture industry loses a great many plants to anthracnose, a foliar disease that can eventually kill a plant.

“We’re looking at cultural practices that will reduce the symptoms of the disease and give the industry a higher-yielding crop,” Cole said. “We’re also looking at ways to reduce fungicide use, which will save nurseries money.”

When it comes to working with students, Cole definitely gives 100 percent. She and fellow coach Brian Kahn begin working with the OSU Horticulture Judging Team during the fall semester and teach them what to look for in judging vegetables, fruits, nuts, floriculture, and nursery crops. In the spring semester, the students take part in mock contests, designed so that team members will know what it is like to work within a time limit and be able to make quick and accurate decisions regarding their judging choices.

“We compete in a regional competition in February and typically always come home with several awards,” she said.

Awards and rewards, the latter represented by Cole getting to interact and work with students.

“The horticulture students are what make my job easier and so much fun,” she said.
By Trisha Gedon and Katie Reim

Assistant professor, associate professor, full professor, and Regents professor — what is it with all the titles at Oklahoma State University, some Oklahomans have asked? In truth, the “titles” are not titles, but academic ranks, much like in the military.

Ed Miller, Interim Dean and Director, Division of Agricultural Sciences and Natural Resources, said moving through the ranks requires an individual to achieve a high standard of teaching, research, extension/outreach, or some combination appropriate to their academic appointment.

“Moving up in rank requires that individuals fulfill all of the duties of their current rank,” Miller said. “Professors who have made truly outstanding contributions in their discipline on a sustained and continuing basis, usually at the national or international level, may be nominated for the position of Regents professor.”

The rank of Regents professor is the highest honor OSU can bestow on a faculty member. The Regents professor appointment is for four years. The individual may be nominated again at the end of that term and so may be a Regents professor for many years if judged worthy by the College, University, and Board of Regents.

“Regents professors serve as role models for those individuals at earlier stages in their careers and provide national recognition for the University,” said Marlene Strathe, OSU Provost.

Miller said the agriculture faculty has had a number of Regents professors, which is an indication that the Division is highly competitive in teaching, research, and outreach at the national and international levels.

In 2004, OSU awarded the status of Regents professor to three Division faculty members: Bill Raun, Damona Doye, and David Nofziger.
New Regents Professor Bill Raun, a member of the Department of Plant and Soil Sciences, is one of a group of Oklahoma State faculty who could be considered “bounce-back Cowboys,” those who earn one or more of their degrees at OSU, leave for a time, and then return to serve Oklahoma as part of the Orange and Black.

And the onetime student who earned his bachelor’s and master’s degrees at OSU has clearly served with excellence.

“In the 13 years Bill has been at OSU, he has produced a lifetime’s worth of work credentials,” said Jim Stiegler, Department Head for Plant and Soil Sciences. “Some people can literally work a lifetime and not accomplish what Bill has achieved in his time here.”

Raun’s true passion as an OSU faculty member is his research and how it can make a difference in the everyday lives of people around the world.

For nearly 12 years, Raun worked alongside OSU agricultural engineers John Solie and Marvin Stone and OSU soil scientist Gordon Johnson to develop sensor-based technology used for variable-rate application of nitrogen fertilizer.

Marketeted under the name “GreenSeeker,” the technology reads crop plants in order to determine their fertilizer needs. The sprayer unit then automatically applies just the right amount of fertilizer to that specific 2-foot-by-2-foot area.

In October 2001, OSU signed a formal agreement with NTech Industries to commercially build the GreenSeeker technology. Although initially slow to take off in the United States, the technology has been widely accepted abroad.

Raun also teaches a variety of classes, and particularly enjoys working with students because he is “always learning something new” from the experience.

“Teaching is hard work. If you’re really teaching, the class changes every year,” he said. “I learn something every semester. It’s the humbling experiences and not the successes that have helped me most over the years.”

Students of Raun have learned that working with him means they not only get an education but receive liberal doses of on-the-job training as well.

Stiegler said Raun has wonderful contacts, especially with CIMMYT in Mexico — the International Maize and Wheat Improvement Center — where he worked for six years before coming to OSU.

“Bill is a living conduit between OSU and Mexico,” Stiegler said. “Many of his students have worked on research projects with CIMMYT in Mexico City, Mexico; Ciudad Obregon, Mexico; New Delhi, India; and Shijiazhuang, China.”

“Our goal is to deliver improved nitrogen use efficiency for big and small farmers alike around the world,” Raun said. “In corn, rice, and wheat, for example, only a third of the fertilizer gets taken up by the crop. A 1 percent increase in nitrogen-use efficiency in the world would be worth about $500 million. A 20 percent increase would be worth close to $10 billion, provided the technology was adopted worldwide. That is a lot of money in the pockets of farmers.”

In the 13 years Bill has been at OSU, he has produced a lifetime’s worth of work credentials.

Jim Stiegler
OSU Department of Plant and Soil Sciences
If newly minted Regents Professor Damona Doye, OSU Cooperative Extension Farm Management Specialist, were paid by the mile, then the amount would be worthy of a lucrative game show prize, and then some.

Doye has crisscrossed the state and region many times, helping farmers and ranchers tackle concerns and issues related to their operational successes and livelihoods — encompassing a wide array of production, financial, and decision-making aspects, and using every type of appropriate media imaginable in the effort.

“It’s very rewarding to have the feeling that I have made a difference in people’s decisions for their operations,” Doye said.

Doye has published articles in refereed journals and written numerous OSU Cooperative Extension fact sheets and current reports, articles for conference proceedings, and more than 40 sets of instructions on the use of Quicken software as it relates to agricultural enterprises.

One of the programs Doye works with is IFMAPS, a free program to Oklahoma farmers and ranchers for confidential assistance in farm business planning.

“IFMAPS works with people who are considering an expansion or new enterprise, as well as those who are analyzing the potential for a new farm business,” Doye said. “Families receive one-on-one assistance with a trained specialist to develop financial statements and evaluate alternative plans.”

A unique feature of Doye’s leadership in the Department of Agricultural Economics is her ability to link ongoing department research efforts to off-campus area specialists and OSU Cooperative Extension county educators across the state.

“Damona’s national reputation in the agricultural economics profession is well recognized,” said Jim Trapp, Department Head of Agricultural Economics. “During the last 10 years, she has risen through the ranks of her national peers to hold top leadership positions in her profession.”

Doye has received national and regional awards for her Extension programs and has held the position of President of the American Agricultural Economics Extension Section. Doye has also served on numerous national and regional committees.

The Department of Agricultural Economics has been “home” to Doye for a great many years, both as a student and professional. Like Bill Raun, Doye is also a “bounce-back” Cowboy. She earned her bachelor’s and master’s degrees from OSU, left to earn her doctoral degree at Iowa State University, and then returned to Stillwater in June 1986 to rejoin the Orange and Black as a faculty member.

Given Doye’s myriad accomplishments, programs, and responsibilities, some consider it a miracle that she has any time left for other pursuits, and yet — despite all odds — she somehow manages to balance work with an equally active non-work schedule.

“I’m an avid traveler, quilter, gardener, and OSU sports fan,” Doye said. “I enjoy basketball and baseball and follow the teams throughout the year, plus I’m an active member of the Stillwater Exchange Club and my church.”
Humility is a trait easily observed in David Nofziger, a member of the Department of Plant and Soil Sciences. But get the Regents professor talking about his research and his eyes come alive, sparkling with passion and pride as the conversation shifts to the practical usability of his work.

“The most rewarding part is seeing the software I develop being used by people in real-world applications,” Nofziger said.

Nofziger is involved in developing decision-support systems, to enable non-specialists to take advantage of the latest science in making assessments.

“I have software being used by the Environmental Protection Agency, as well as several state departments, to help them make decisions about risks with pesticides leaching into groundwater,” he said. “We also have tools for farmers to use to select pesticides that will control weeds, while minimizing the risk to groundwater quality degradation.”

Nofziger said the senior level course he teaches is made up of graduate and undergraduate students and focuses on predicting the effect of surface-applied chemicals on groundwater quality.

“We effectively cover all the topics that are covered in a soil physics course, but the students learn how we can apply these concepts to a real problem,” Nofziger said. “This approach provides motivation for learning concepts because students see how they are used to solve a problem.”

The Regents professor also teams with Mark Gregory, a member of the Department of Plant and Soil Sciences, to teach a graduate course on spatial and non-spatial database management.

“This class was developed to emphasize the relational database component of managing the attribute data for Geographic Information Systems,” Nofziger said. “I mainly try to help students understand relational database design and use, since we have to deal with large quantities of data. I am confident database management skills will be very useful in the careers of our graduates.”

Nofziger has been at OSU for nearly 30 years and has been an active member of the Soil Science Society of America and American Society of Agronomy.

“We are able to attract some of the world’s top international students, those who are usually interested in helping their countries, in part because of David Nofziger’s presence, prestige, knowledge, and information he has up on the Internet,” said Jim Stiegler, Head of Plant and Soil Sciences Department.

“It’s a great thing for an acknowledgement of this type to go to a faculty member like David Nofziger,” Stiegler said. “Dave is not the type to claim credit, even if recognition is deserved.”

Nofziger admitted to being a bit in awe of being named a Regents professor, but, in typical fashion, could not help but spread the credit to others.

“I think everyone dreams of being recognized in their profession,” Nofziger said, “but many of the awards that I have received over the years reflect the good work of my very talented partners.”

Everyone dreams of being recognized in their profession, but many of the awards that I have received over the years reflect the good work of my partners.

David Nofziger
OSU Department of Plant and Soil Sciences

Agriculture at OSU  51
Educators and researchers with Oklahoma State University’s Division of Agricultural Sciences and Natural Resources fulfill often unique roles in nourishing the hearts, minds, and bodies of the state’s most valuable resource — its people. Discover some of the ways how in this issue of Agriculture at OSU magazine.