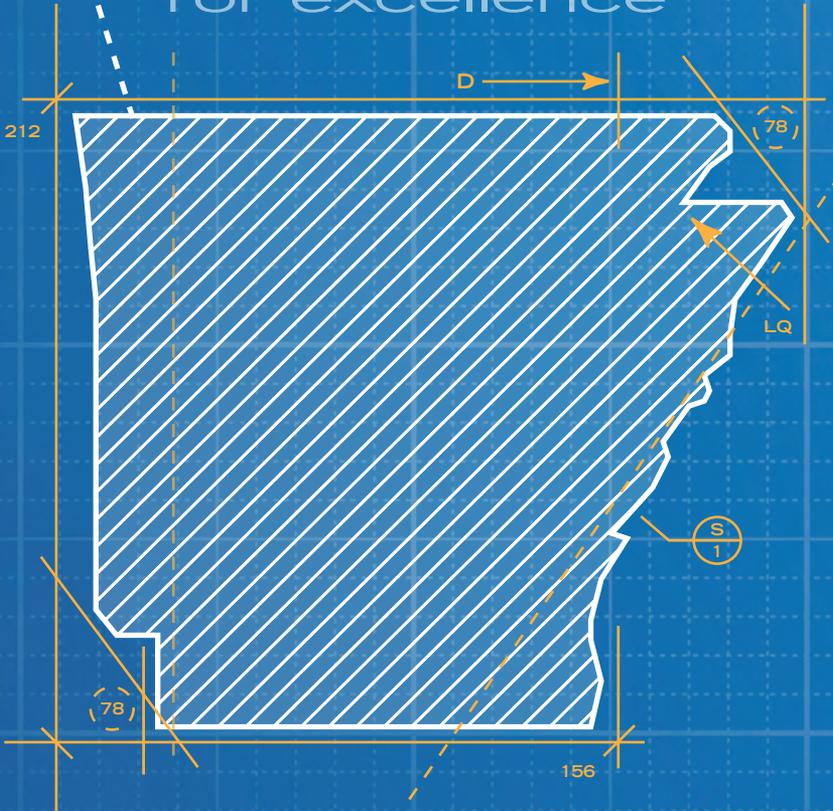




DIVISION OF AGRICULTURE
RESEARCH & EXTENSION
University of Arkansas System

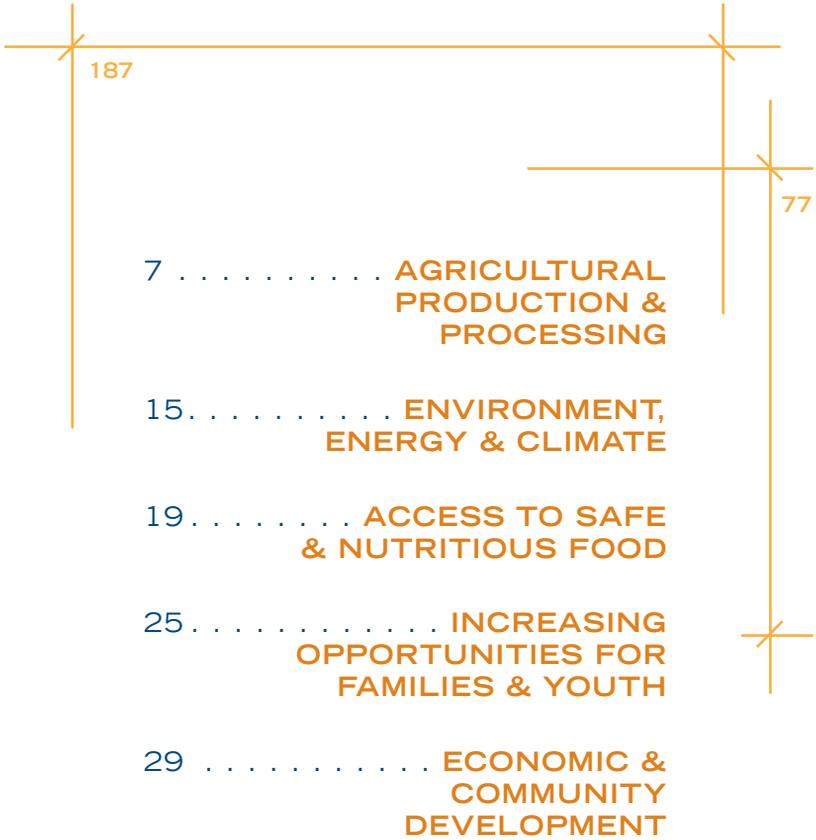
BLUEPRINT
for excellence



STRATEGIC PLAN

2011-2016

REPORT OF
Accomplishments



STRATEGIC PLAN

2011-2016

REPORT of accomplishments

BUILDING on the blueprint...

Six years ago, we asked our friends, neighbors and colleagues in Arkansas to tell us what they saw as the most pressing issues facing our state.

We then convened our researchers, educators and extension faculty and staff, asking them to put their creativity and expertise to work to address these issues. The result was our **2011-2015 strategic plan, “Blueprint for excellence.”** For five years, it informed and guided our work.

In the pages to follow, you’ll see how we not only addressed the issues you brought to us, but also went beyond in the areas of agricultural production and processing, environment, energy and climate, economic

and community development,
access to safe food and nutrition,
and increasing opportunities for
families and youth.



Dr. Mark Cochran
VP for Agriculture

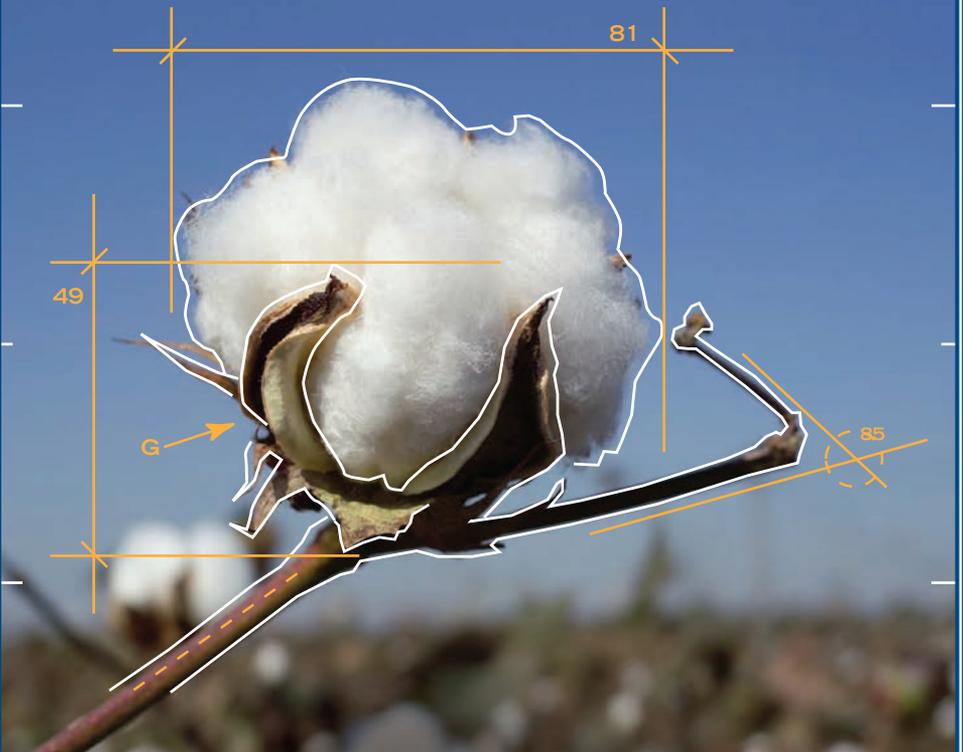
We want you to know that we value your public investment into the science, innovation, teaching and extension conducted by the University of Arkansas System Division of Agriculture faculty and staff. We want you to see that we are making returns on your investment that will pay dividends in the years to come.

Thank you for your support.

A handwritten signature in black ink that reads "Mark J. Cochran". The signature is written in a cursive, flowing style.

Mark J. Cochran
Vice President for Agriculture

The University of Arkansas System Division of Agriculture delivers discoveries straight from the lab to the field to equip the state's agricultural industry with the technology and know-how to lead in the sustainable production of food and fiber. With Division support, agriculture remains the state's leading employer and adds more than \$20 billion to the Arkansas economy.



EMPHASIS AREA

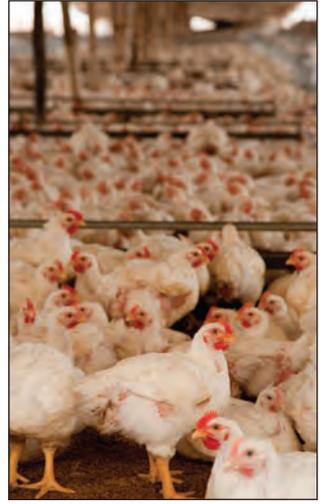
ONE

Agricultural
Production & Processing

Poultry Production

Extensive Division research in metabolic disease physiology, gastrointestinal physiology and immunology has improved broiler livability, resulting in an annual benefit to an Arkansas family poultry farm of more than \$17,000. Development of probiotic products in feed and water has improved poultry health and reduced dependence on antibiotics.

The Division has kept ahead of avian influenza outbreaks, holding training for poultry producers, veterinarians and others on responding and containing outbreaks. Poultry necropsy services also provide quick and sure analysis of deceased birds to determine causes.



Weed Resistance

More than 2.2 million acres of soybean fields were infested with glyphosate-resistant Palmer amaranth in 2012, costing Arkansas farmers an estimated \$200 million in added weed control expenses and lost income from reduced yields. Division scientists have verified the effectiveness of alternative weed control strategies and conducted educational programs to help farmers reduce those costs and losses.

A Division community zero-tolerance management program was implemented to control herbicide-resistant pigweed in corn, cotton and soybean crops. The program has the potential to eliminate the carryover of pigweed seed in four years, reducing expenses for added weed control and preventing yield losses.

New Varieties

Division of Agriculture scientists use advanced genetic tools and traditional crop breeding techniques to develop improved varieties of rice, soybeans, wheat and



Rice breeder Karen Moldenhauer shows cross pollinated plants in the RREC breeding nursery.

cotton for increased yields, high quality and disease and pest resistance. Since the 1930s, the Division has released more than 40 rice varieties and today, 21 percent of Arkansas' rice acres are planted in Division varieties. In 1980, the average rough rice yield in Arkansas was 4,110 pounds per acre compared with 7,515 pounds per acre in 2014. Sixty percent of this increase was due to the Arkansas varieties developed during that period.

Division soybeans, both conventional and transgenic, help improve yield and reduce producer inputs. The Division is also developing specialty soybeans and has an edamame variety that already has sparked a new agricultural industry in Arkansas to meet the demands of a growing U.S. market.



N-STaR gives farmers precise nitrogen fertilizer recommendations for specific fields.

fertilizer needs for specific fields, N-STaR can reduce fertilizer requirements for rice production by an average of 20 pounds of nitrogen per acre on silt loams and up to 45 pounds per acre on clay soils.

More growers are adopting N-STaR on thousands of acres per year. By assuring that no more fertilizer is applied than what is needed, the program is reducing input costs and decreasing the environmental footprint for rice production.

Local Food

Division agricultural economists are leading research and education programs helping to establish sustainable farmers' markets in local communities around Arkansas. These markets feature locally grown produce, much of it grown with fruit and vegetable varieties developed in Division breeding programs.

The Arkansas Food Innovation Center provides facilities, education and support services for the start-up and success of local food processing and marketing companies.

The Division of Agriculture's Center for Agricultural and Rural Sustainability is leading the National Sustainable

Fruit growers also get a boost with a robust fruit breeding program for blackberries, peaches, nectarines, grapes and blueberries. Blackberries from the Division's breeding program are being grown on every continent but Antarctica. Division fruit varieties support commercial growers who ship their produce nationwide and also local "pick-your-own" and farmers' market producers.

N-STaR/Fertility

The Division of Agriculture developed N-STaR, the Nitrogen Soil Test for Rice, the first successful method for measuring nitrogen that is available for rice production on loam and clay soils. By determining precise nitrogen



Strawberry Initiative, a two-phased, 12-state project funded by the Walmart Foundation to implement organic and other sustainable production systems that make locally-grown strawberries available to consumers.

Profitability and Sustainability

Division scientists are developing technology and management systems aimed at improving profits for agricultural producers while maintaining sustainable production with minimal impact on the environment. Technologies include improved rice, soybeans, wheat and cotton varieties with higher yields and quality and cost-saving traits like pest and disease resistance and drought tolerance. In addition, the Arkansas Crop Verification Programs provide producers with unbiased information they need to choose the most reliably profitable crop varieties for their fields.

Research has also led to cost-saving management strategies like new seeding rates for cotton, using variable-rate planters based on soil texture. New recommendations for timing of irrigation in cotton have maximized yields while cutting costs up to \$80 per acre.

Row Crop Verification

The Division of Agriculture invented the Row Crop Verification Program in the 1980s at the request of farmers who wanted to field-test technology to determine how profitable it might be. The soybean verification program, begun in 1983, helped Arkansas growers increase yields from 26 bushels per acre in 1995 to a record 45 bushels per acre in 2012.

Best Practices

In Arkansas, best practices developed from the verification program and other Division of Agriculture recommendations are in place on a significant portion of the state's row crops. In cotton, 53 percent of Arkansas acres are grown using the Division of Agriculture's DD60 program for pesticide application and irrigation termination and the COTMAN crop management software. In rice, more than a third of the state's 1.3 million acres planted in 2015 were grown with Division recommendations. More than 90 percent of the state's soybean, corn, sorghum and winter wheat acres are grown with Division best practices and 100 percent of the state's peanut acres are grown with Division recommendations.



Arkansas' corn research verification program participants Herb Ginn (left), Lawrence Co. extension staff chair, and producer Walter Rice.





The emerald ash borer has been the focus of an intense education program to help limit its spread.

Invasive Species

Division of Agriculture scientists have led the war against invasive insects such as sugarcane aphid on grain sorghum, the kudzu bug on soybeans and the emerald ash borer on forest land. In 2014, the sugarcane aphid was first noted in the state in June and rapidly spread through sorghum fields in more than 20 counties. Response and education by Division scientists prevented major losses to the crop which had expanded to more than 500,000 acres in 2015. Division experts prepped producers for kudzu bugs, which can damage soybeans. We provided education in terms of early warnings that they would get to Arkansas and we worked with producers on how to ID and manage them. Division entomologists have been working with state agencies to scout for emerald ash borer at trap sites across the state.

Nanoscale Research

Forestry researchers and agricultural engineers within the Division of Agriculture will be working at the nano- and micro- levels as part of the statewide Center for Advanced Surface Engineering. Over the next five years, the team will be investigating the use of cellulose in multifunctional nanoscale surfaces for developing novel products for use in filtration, packaging and wound care applications. Their research will be conducted through a \$20 million grant from the National Science Foundation to Arkansas Economic Development Commission's Division of Science and Technology.

Beef Production

Ranchers use the 300 Day Grazing Program to improve use of grown forages and reduce dependence on fertilizer and supplemental feed. The Natural Resources Conservation Service used these results to revise Environmental Quality Incentive programs and develop the Prescribed Grazing cost share practice.

Over a three-year demonstration period, total direct savings to Arkansas producers was \$191,727. In 2014, 37 demonstrations were conducted on farms in 18 counties. Simple changes in fall forages saved \$2.50



to \$3.60 per day on feed costs over a 75- to 80-day feeding period and cut feed costs by 50 percent to 67 percent. Also, producers who used single strand electric fence wire to strip-feed hay saved more than \$200 in hay value during the feeding period.

Economics — Farm Bill Policy Education

Division of Agriculture research and extension, working in cooperation with USDA Farm Service Agency program specialists, conducted 189 Farm Bill education presentations to 2,588 Arkansas producers. The presentations covered more than 300 options for participation in the agriculture programs, including crop base and yield reallocation decisions and program selections that will be locked in for the life of the Farm Bill.

The education team's efforts resulted in the enrollment of 92 percent of all farms with crop bases in Arkansas in the Agricultural Risk Coverage/Price Loss Coverage programs.

Integrated Pest Management

The Division of Agriculture's experienced team of scientists and educators has assisted thousands of homeowners, growers and producers in managing the ever-changing array of insect pests, diseases and weeds.

In 2012, Arkansas had its first confirmed spotted winged drosophila, a fly that has caused millions of dollars in damage to fruit crops in other states. Division faculty embarked on an intensive education program to help growers identify the insect and manage it to reduce its economic threat.

Division entomologists developed and led a major multi-state effort to understand the potential impact of neonicotinoid seed treatment insecticides on honeybees and other pollinating insects. This work also resulted in development and implementation of "Bee-Aware" programs in Arkansas, Mississippi and Tennessee to educate growers and beekeepers about protecting hives from errant pesticide applications.

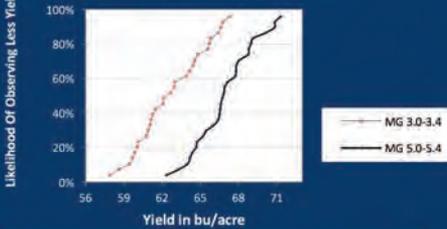
Other IPM scouting and timely pest control strategies saved cotton, soybean, rice and corn growers millions of dollars in unneeded applications while protecting yield and quality.



MIDSOUTH SOYBEAN GENOTYPE SELECTION DECISION TOOL

Yield Comparisons

Simulated Yields for Marianna, AR planted between May 23 - 31

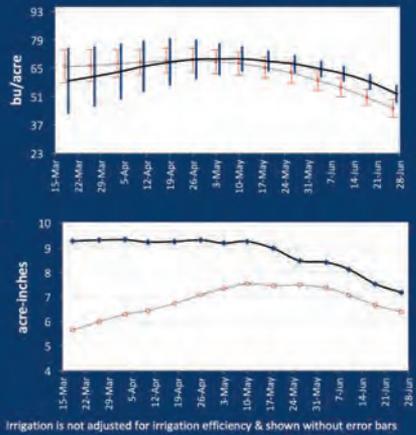


Flatter lines in the graph above indicate a choice with a greater range in yields. Lines further to the right have a greater chance of higher yields. Steeper lines further to the right are therefore preferred to flatter lines near the left vertical axis.

Note: Early frost leads to zero yield and can show up near the -1 yield point on the horizontal axis.

Yield Potential and Irrigation by Planting Date

Avg. & 95% Confidence Interval (excl. early frost years)



Irrigation is not adjusted for irrigation efficiency & shown without error bars



SoyMAP helps soybean growers choose the maturity group that promises the best economic returns on their investment.

Diagnostics and Decision Aids

The Division of Agriculture provides analyses that assist producers and other stakeholders in making informed production decisions. On average each year, the Soil Testing Lab conducts more than 170,000 soil and plant analyses while diagnostics labs conduct close to 30,000 other plant health, animal health, manure, forage, research and soil analyses annually.

The Division also develops decision-making tools that can help farmers with the myriad choices they face every season. The latest of these, SoyMAP, is an Excel-based tool that allows producers to choose the soybean maturity group most likely to give them highest yields and returns on their input investments according to their growing region and available crop markets.

Public Appreciation and Understanding

The University of Arkansas System Division of Agriculture touches the lives of nearly every Arkansas resident. Arkansas youth are developing leadership, career and life skills in 4-H programs in every corner of the state.

Nelson Crow, left, of Dumas, Arkansas, poses with Brad Koen, BASF innovation specialist, after Crow's field yielded more than 100 bushels per acre of soybeans, a first for Arkansas.



Photo by Brad Koen, Innovation Specialist-BASF

Programs like the Soybean Challenge are pushing growers and Division scientists alike to find the technology and management practices that lead to record-setting crop yields. In 2013, Arkansas soybean farmers finally broke the 100-bushel-per-acre barrier in yields.

The annual Arkansas Rice Expo in Stuttgart gives rice producers and processors face-to-face contact with Division scientists who are developing improved varieties, new technology and production practices and post-harvest methods. The Expo also introduces Arkansas residents of all walks of life to the important roles that agriculture in general and rice industries in particular play in the state.

Forestry Analysis and Certification

Forestry is the leading employer in south Arkansas, accounting for more than 24,700 jobs, and provides \$3.2 billion in value added for the state's economy. Forestry products include pulp and paper, solid wood products and furniture. The Division of Agriculture provides research, extension,



professional certifications and industry analysis support through its Arkansas Forest Resources Center. AFRC provides statewide analysis of forestry trends in employment, value-added and wages, along with economic impact analysis. The center also provides analysis of timber product trends and prices for landowners. AFRC helped in the development of certifications for private and industry timber lands, as well as the people who work them. These certifications help open new markets to Arkansas wood products.

Division of Agriculture research and extension programs are developing new technologies and methods for making more efficient use of Arkansas' natural resources and protecting them for future generations. Advanced management practices protect water quantity and quality, promote sustainable agricultural production, safeguard natural habitats for wildlife and improve the quality of life for all Arkansans.



EMPHASIS AREA



Helping farmers use computerized tools to improve irrigation.

Irrigation Management

Division efforts to develop and disseminate more efficient irrigation methods included encouraging

use of soil moisture meters and evapotranspiration gauges to schedule irrigation. Faculty and staff also teach use of computerized hole selection for designing polypipe furrow irrigation and advanced delivery methods such as multiple inlet rice irrigation and surge valve use.

We found that producers who use computerized hole selection saw a 20 percent reduction in water use. When they also used surge valves, farmers saw another 20 percent reduction in water use. In rice, multiple inlet flooding resulted in a 21 percent reduction in water use.

A Lee County demonstration of computerized hole selection in soybeans resulted in a 33 percent reduction in water usage compared to the control field. This equates to 6.49 million gallons of water savings on just 38 acres, plus \$805 in energy savings (\$21.18/ac).

Energy

The Division of Agriculture performed 30 energy audits on broiler farms, an effort geared toward research in energy efficiency that also was educational for producers. Between the audits and a newsletter created for them, 76 individuals said they increased their knowledge about poultry farm energy management.

As a result of the broiler energy audits, researchers are investigating more energy-efficient lighting in broiler houses, such as replacing incandescent bulbs with LEDs.



Energy audits on broiler farmers are helping save energy and money.

Water Quality

The Division is addressing the issue of water quality on a number of fronts. The Discovery Farms project monitors nutrient and sediment runoff, as well as water use and soil health on six working farms, with an eye to developing best management practices that work in real-world settings. The Division's work at the corn and cotton farm of Steve Stevens was honored at the 2016 Mid-South Farm and Gin Show. The work done on Discovery Farms is part of the Division's efforts to assess any Arkansas contributions to the hypoxic zone in the Gulf of Mexico.

Ann Mills, USDA Under Secretary for the Environment and Natural Resources, toured the Discovery Farms with the Hypoxia Task Force and wrote: "The farmers who we met the previous day provided great examples of how good agricultural stewardship can have a dramatic impact on clean water in addition to helping Arkansas' farms prosper. They made a strong case that the farmers in the Arkansas Delta are part of the solution."

The Division is also conducting a five-year research program on nutrient management in the Buffalo River Watershed at C&H Hog Farm, in fulfillment of a legislative mandate. It is one of the most intensely sampled watersheds in the U.S. and each quarter, the Big Creek Research and Extension Team's

report is made public online and submitted to the governor and the Arkansas Department of Environmental Quality.

Researchers with the Division also compared 59 best management practices, or BMPs, in terms of net returns and risk reduction for hay producers with an emphasis on cost-effective means to reducing phosphorus runoff. Results showed that decision makers will be reluctant to adopt BMPs that reduce their net returns regardless of the water quality benefits. Farmers should compare net return risks and environmental benefits of implementing BMPs to reduce total phosphorus runoff to select BMPs with the lowest negative economic impact in their hay production operations.



Water quality research in real time in real world conditions.

Wildlife Management

Feral hogs used to be a problem confined largely to southern Arkansas, but recently, they've expanded north toward the Missouri border. They are blamed for millions of dollars in damage to row crops, pastures, forests and residential yards. Four regional workshops attended by 221 landowners were conducted in



The Division of Agriculture is working to find control methods for feral hogs, which are blamed for millions of dollars in damage to farmland.

FY15. An educational display was staffed at 13 events resulting in an estimated 3,616 viewers. Eight county Extension agents conducted nine demonstrations of trail camera surveillance techniques, and four county agents implemented seven field demonstrations of corral trapping on private lands. There were more than 3,100 views at uaex.edu/feralhogs, with visitors spending more than 7.5 minutes at the site. A feral hog Facebook post had a reach of 49,507, the most of any post on the page.

In Arkansas, 97,000 people spend nearly \$90 million a year on in-state waterfowl hunting. The Division of Agriculture's migratory bird research is key to managing the populations for environmental and recreational purposes. Doug Osborne's work in tracking migrating mallards has turned conventional banding practice on its head. Instead of banding in breeding grounds, Osborne and his team band the mallards in their wintering areas, a practice he says will increase understanding of mallard survival and, in turn,



Understanding water quality issues is a first step to improving water quality.

provide better information for setting harvest rates. Osborne is also testing mallards for exposure to mercury and so far has found nothing alarming.

Nonpoint Source Pollution

The Division's Public Policy Center has engaged in public education and encouraged engagement on nonpoint

source pollution in watersheds in partnership with the Arkansas Natural Resources Commission. The Water Quality Stakeholder Forums attracted 219 attendees. Afterward, more than 80 percent reported knowing more about local water issues and activities to improve water quality. In 2015, the PPC staff held public meetings in key watersheds and held educational sessions to help media members better understand water quality issues they might cover and help water quality professionals to tell their stories in a compelling way.

Wetland Restoration

Division of Agriculture forestry researchers have studied how to better restore the 7 million acres of Arkansas wetlands lost in the last 200 years and how to protect the soil, water and wildlife on the state's remaining



2.7 million wetland acres. This project focuses on three primary issues related to restoring forests and ecosystems services on retired agriculture lands:

- Developing alternative competition control measures for establishing hardwood forests,
- Quantifying how changes in species composition affects the dynamics in carbon sequestration following riparian forest establishment and
- Determining amounts of carbon sequestration with bioenergy crop establishment.

Methane Emissions

Division scientists are investigating how soil conditions and agricultural practices affect methane emissions from rice fields that can add to greenhouse gases. Their research has discovered that gas emissions are lower from rice fields in clay soils than those in silt loams. Also, methane emissions can be



Graduate student Chris Rogers collects samples in a field study to measure methane emissions from rice fields on the Rice Research and Extension Center near Stuttgart.

reduced by planting hybrid rice varieties instead of conventional varieties and by rotating rice with soybeans instead of following rice with rice.

Fertilizer choice can also affect methane emissions. Organic fertilizers showed higher emissions than non-organic fertilizers. Current research is examining the impact of irrigation management practices on methane emissions from rice fields.

The research demonstrates how crop management decisions can contribute to lowering greenhouse gas emissions.

The availability of safe and nutritious food is vital to families and individuals in all communities. The Division of Agriculture works to promote healthy diets through research and public education efforts that target obesity and encourage better consumer habits. It seeks to enhance food safety through research and to teach best practices to commercial operations.



EMPHASIS AREA

THREE

Access to Safe
& Nutritious Food

The Division has nutrition education programs that reach the most vulnerable families.



At 21.2 percent, Arkansas has the second-highest rate of households lacking access to enough nutritious food to support an active, healthy lifestyle. Sixty-nine percent of the state's adults are overweight or obese, 11.5 percent have diabetes and 39 percent have high blood pressure. During the past five years, Division of Agriculture faculty and staff are helping Arkansans achieve healthier diets, have access to nutritious food and manage financial challenges. The Supplemental Nutrition Assistance Program-Education, or SNAP-Ed, and the Expanded Food and Nutrition Education Program, EFNEP, reach thousands of Arkansas' most vulnerable families. SNAP-Ed and EFNEP had more than 250,000 direct education contacts through more than 20,000 education sessions. In 2014 alone, the rate of EFNEP adult graduates who ran out of food at month's end was halved and 87 percent of SNAP-Ed participants reported making one or more positive dietary change.

Certifications

With more than 128,000 people hospitalized each year with foodborne illnesses, food safety is an issue at home and in commercial kitchens. In 2014, the Division of Agriculture, through the ServSafe certificate program, trained 471 food service managers giving them the tools to teach food safety practices to their employees. Seventy-three percent scored 75 percent or higher on a comprehensive exam. Over the course of five years, more than 1,700 food retail workers earned ServSafe certifications.



The Research Chefs Association offers the leading program for certifying the knowledge, skills and experience of Culinology®, a blending of culinary arts and food science. Certified Culinary Scientists provide the food industry with valuable product. These RCA-certified professionals

Extension food scientist John Marcy, left, demonstrates the proper way to cut up a chicken during a culinary arts class offered by the Division of Agriculture that qualifies food scientists for a national exam they must pass to be recognized as certified culinary scientists.



The Division of Ag helps food processors meet federal guidelines.

guide innovation in this dynamic industry, offering unique credentials and powerful, value-added skills. Division of Agriculture faculty have developed culinary programs leading to CCS certification, addressing the needs of the poultry industry in Arkansas. In the past five years, 25 Arkansas food industry professionals have achieved CCS credentials. Since the program began, 38 percent of all Certified Culinary

Scientists were taught culinary skills through the University of Arkansas System Division of Agriculture programs.

To help Arkansas-based food companies meet federal regulations, the Division of Agriculture conducts the FDA and USDA mandated Better Process Control School for low-acid and acidified foods. BPCS in Arkansas has certified more than 3,000 food processing employees since 1973. In the past five years, more than 700 employees from the food manufacturing sector in Arkansas received this certification. BPCS helps food processing companies remain nationally competitive and ensure the safety of thermally processed foods.

Research on Obesity

Research by the University of Arkansas System Division of Agriculture has shown that access to nutritious food through the federal Fresh Fruit and Vegetable program in schools helped cut childhood obesity rates from 20 percent to 17 percent. The study also showed how economical



that health improvement was: just \$50-\$75 a year per student compared to \$280-\$339 per student per year for methods included in a 2011 study.

Dietary Discoveries

Division of Agriculture researchers have made key dietary discoveries over the last five years, including:

- Brown rice-based products have positive effects on blood glucose, insulin response and satiety hormones and may help diabetics achieve better health.
- Eating a protein-based breakfast increases metabolism, the amount of calories burnt, and reduces hunger and sweet cravings more than a carbohydrate-based breakfast. Consuming a high protein breakfast could lead to weight loss in overweight and obese adult and children.
- High proteins diets were found to improve glycemic regulation and post-meal glucose and insulin response in type 2 diabetics.



Jamie Baum, assistant professor of food science, conducts research on the impact of breakfast choices on obesity.

Food Safety Education

In addition to ServSafe, which teaches food safety in the restaurant industry, SNAP-Ed, EFNEP and the 4-H youth development programs teach best practices for safely storing and thawing food. Hand washing is another significant practice, since a large body of literature suggests that those who wash their hands after using the restroom are in the minority of the population. In the last three years, more than 17,000 youth received hand-washing training through SNAP-Ed, EFNEP and 4-H.

Food Innovations

Division of Agriculture discoveries that have been patented over the past five years include:

- Production of conjugated linoleic acid-rich soybean. Studies show that can confer human health benefits in reducing the clinical indicators of obesity-related diseases, improving immune function and promoting weight loss in obese persons.
- Process of extracting beneficial compounds from berry pomace to enhance nutritional value of fruit-based foods.

Researchers developed something that tastes like fried, but far fewer calories.



- Development and licensing of a food coating system for baked products that imparts the traits of fried food, but with a lower fat content. This allows production of fried-like foods such as breaded poultry with a 60 percent fat reduction.
- Process of extracting beneficial compounds from rice bran to use as nutraceuticals in value-added foods, which has been licensed.
- Development of a healthy frozen dessert made from soybeans.

Other significant research findings included:

- Methods of purifying rice bran extracts for use as radio-protective substances for cancer patients or nuclear accident victims.
- Development of processes to enhance the use of soybean and sorghum for the aquatic feed industry.

Arkansas is the nation's leading rice producer and Division of Agriculture researchers in the Rice Processing Program have, in the last five years:

- Taken a new look at rice drying, applying glass transition principles, to minimize kernel breakage
- Quantified the effects of high nighttime air temperatures on rice milling quality
- Researched aspects of milled rice appearance and quality to enable a better understanding of international markets and their consumers.

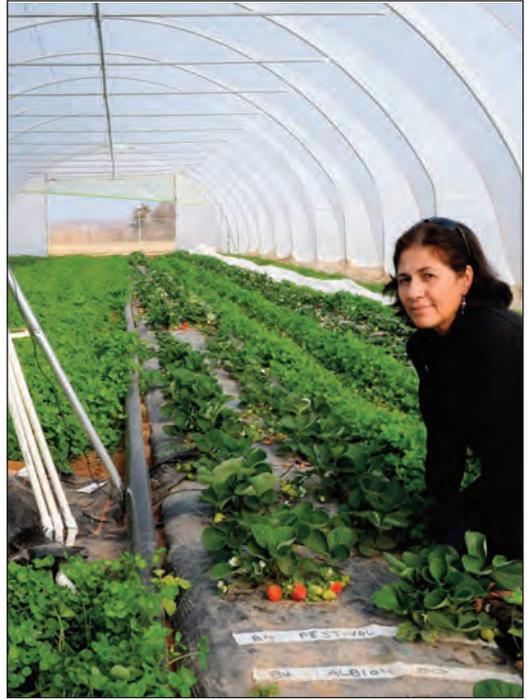
Masters student Shantae Wilson and Dr. Griffis Atungula use a microwave to improve drying quality of rice.



Local Food Movement

The Division of Agriculture is involved in several facets of the local food movement: Division faculty are helping farmers market their produce through MarketMaker and have been closely involved with farmers' markets throughout the state, providing key insights to cultural practices, food safety and marketing of specialty crops.

Division faculty are also researching new ways to expand growing seasons such as high tunnel and hydroponic work done through the National Strawberry Sustainability Initiative. The Division also helps food entrepreneurs develop and bring their products to market through the Arkansas Food Innovation Center. Since its inception in 2013, the Food Innovation Center has helped 50 food entrepreneurs, as well as a number of nonprofit organizations such as school systems and hunger relief groups. The center has helped launch more than 75 products into the marketplace, and more than 50 of these products are being manufactured at the center.



Fruit and nut specialist Elena Garcia shows off strawberry plants fruiting in late December in high tunnels of plastic sheeting over a metal frame. The plants will flower and fruit as long as temperatures are between 40° and 85° F.

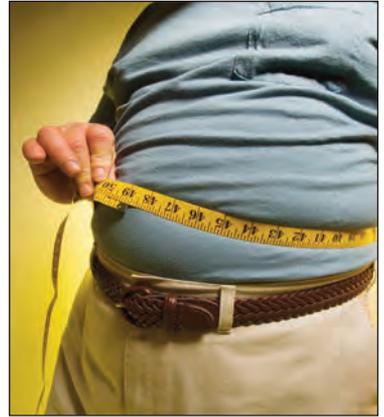
The physical and financial well being of families and the development of youth are essential to building prosperity. The Division of Agriculture is responding to the state's needs by promoting exercise and fitness programs as well as educating families in financial management. The Division sponsors programs that train child care professionals and administers 4 H clubs that in recent years have served hundreds of thousands of youth across the state.



EMPHASIS AREA

Improving Health for Arkansans

Arkansas is the least physically active state in the U.S. and has the highest rate of adult obesity. More than 69 percent of adults and about 39 percent of children in Arkansas are overweight or obese. Fewer than half of the state's adults and youth get the recommended amount of daily physical activity. Rural residents lack opportunities to be physically active and have limited access to programs addressing lifestyle behaviors.



Community-based programs focused on improving lifestyle behaviors, including increasing physical activity, have demonstrated the potential to create a return on investment of \$5.60 for every dollar spent within five years, according to a 2008 report from Trust for a Healthier America.

From 2011-2015, more than 169,000 Arkansans participated in physical activity programs, and more than 60,000 students participated in youth healthy living programs, including Yoga for Kids. Results of the Extension Get Fit program reveal that participants improved strength, flexibility and endurance. Ninety-three percent saw increases in physical activity levels, 89 percent saw increases in energy and half reported decreased pain. A 2013 Tufts University study of 4-H's effects on youth development found that 4-H members in the seventh grade were about twice as likely to make healthy choices as their contemporaries.

Strengthening Arkansas Families

Arkansas ranks 47th nationally in a state-by-state study on the well-being of children in the United States. Research shows that providing a high quality education for children before the age of five yields significant long-term



benefits. Individuals who were enrolled in a quality preschool program are less likely to repeat grades, are less likely to get into trouble with the law, are more likely to graduate from high school, have longer marriages and earn as much as \$2,000 more per month than those who did not attend a quality preschool.

The need for quality care for children in Arkansas is greater than ever. To provide the best care possible, Arkansas' child care

professionals are required to get a minimum of 10 hours of verified training per year to maintain their licensure. Best Care (in-person training) and Best Care Connected (online training) provide as many as 15 hours of verified education annually, while Guiding Children Successfully provides as many as 38 hours every four years. Research indicates that for every dollar spent on early childhood intervention programs, there is a

\$2.50-\$4.00 return on investment. The ROI for the child care provider training provided by the Division of Agriculture for 2011-2015 is approximately \$4.2-\$6.7 million.

Arkansans are ranked 48th in financial behavior and No. 49 in financial literacy. Only 37 percent of Arkansans spend less than their household income, and 67 percent don't have any emergency savings. Financial management educational programs across the state were delivered to almost 30,000 individuals.

Program evaluation results indicated that

89 percent of participants increased their knowledge and 53 percent intended to make a positive financial management behavior change based on what they learned. "I learned how to read and interpret a credit card statement and the importance of balancing income and expenses," one participant said.

Youth Development

4-H clubs, activities and events across Arkansas involve young people in hands-on education and service learning opportunities that enhanced their life skills, including decision making, problem solving, critical thinking, communications and healthy lifestyle choices. Across the state, Arkansas has an average of 812 4-H clubs each year. During the past five years, 659,504 Arkansas youth participated in 4-H programs. Adult 4-H volunteers gave more than 1.5 million hours of their time at a value of more than \$35 million.



Rhett Bryant, 17, of Jonesboro, explains and activates a Bluetooth controlled robot built by the Craighead County 4-H robotics team during the second-annual Arkansas STEM Festival.



Participants in the Arkansas 4-H Citizenship Leadership Camp help clean up Little Rock's Boyle Park on June 26, 2014, as part of a service project.

A Tufts University study found that 4-H members in grades 7-12 were nearly four times more likely to make contributions to their communities than their contemporaries, and 4-H members in grades 8-12 were about twice as likely as their counterparts to be civically active.

The 4-H program currently focuses on three initiative areas: healthy living, 4-H science and citizenship leadership. 4-H delivered impact programs in each of these areas, including Yoga for Kids, ATV safety, robotics, shooting sports, Citizenship/Leadership Camp, One Day of Service voter education, and civic engagement activities.

The Tufts study found that 4-H members in grades 10-12 are almost twice as likely to participate in science, engineering and computer technology programs outside of school, and that female 4-H members in particular are two to three times as likely to take part in science programs outside of school when compared to other females of the same age.

In survey responses, participants in 4-H science, engineering and technology programs indicated 91 percent gained interest, engagement and positive attitudes toward science, 87 percent applied science skills and abilities in their daily lives and 50 percent used science to better their communities.

The Division of Agriculture connects with the state's many communities with direct involvement and assistance. Volunteer programs provide people power for community projects. Other programs serve the state's tax professionals, help small businesses doing business with government, analyze small counties' financial systems and promote the improvement of rural infrastructures.



POPULATION 847

EMPHASIS AREA

Consultations with Arkansas Procurement Assistance Center personnel have enabled businesses across the state to secure government contract awards.



Arkansas Procurement Assistance Center

Arkansas businesses have significant opportunities to win government contracts to provide services or products to local, state and federal agencies. The application process can be complex, so the Arkansas Procurement Assistance Center exists to help businesses find opportunities and guide them through the process. An agency of the Cooperative Extension Service with offices in Little Rock and Bentonville, APAC has helped businesses secure nearly 3,400 government contract awards valued at more than \$256 million in the past five years. More than 5,000 jobs across the state have been created or retained through the contracts that APAC has worked to secure.

APAC is operated by the University of Arkansas System Division of Agriculture Cooperative Extension Service under a cooperative agreement from the Department of Defense through a program administered by the Defense Logistics Agency. It offers consulting, counseling, contract assistance and training services.

Income Tax Schools

Taxpayers throughout Arkansas regularly consult professional tax preparers for help. But who trains the preparers? Over the past five years, more than 2,000 of them have come to the Arkansas Income Tax School operated by the Cooperative Extension Service. The school provides two-day sessions at 10 locations across the state each year. Tax preparers receive a general review of tax regulations, ethics and new developments in tax laws. The school meets the guidelines for 16 hours of credit for continuing professional education as set forth by the Arkansas State Board of Public Accountancy and is an approved IRS Continuing Education Provider.

Leadership and Community Involvement

If a community needs many hands to take on a task, there's a good chance that the volunteers pitching in were organized by the Cooperative Extension Service. Throughout Arkansas, these volunteers donate unpaid hours to staff



Master Gardeners lead the way in volunteering time at major events and venues throughout Arkansas.

events and to meet local needs. The largest among them, Extension Homemakers Clubs, provided more than 478,000 hours of volunteer service in 2010-11, such as making crocheted caps to be used for babies to wear during brain wave testing, that would have cost more than \$10 million as paid labor for services.

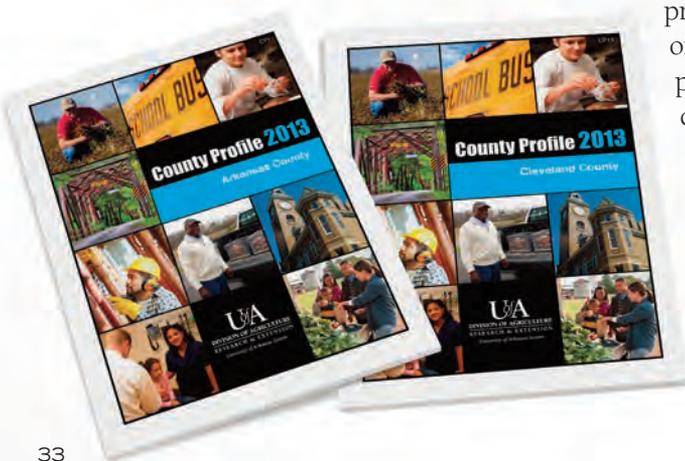
Volunteer efforts around the state also include the 3,000 Master Gardeners whose more than 181,000 hours of service include coordinating and assisting in activities at venues such as the annual Arkansas Flower and Garden Show, Garvan Woodland Gardens, the Botanical Garden of the Ozarks, the South Arkansas Arboretum and more than 20 county and regional horticultural fairs. LeadAR participants – more than 450 since the program began – have

undertaken more than 175 community service projects such as creation of a high school leadership program, establishment of an elementary school science center and a development of a free income tax assistance program

Trends Affecting County Governments

Officials of county governments with declining tax bases and revenues find they have limited resources to fund services that meet their citizens' needs. Local government finance services from the Cooperative Extension Service

provide to public officials data that profiles their home counties. The annual updates include an analysis of each county's revenue, expenditures and tax capacity, and alternative options for providing services.



To help the counties plan and manage their finances, the program also has trained county extension agents on how to work with their local leaders to improve their fiscal environment. An online educational program is available to the local officials in collaboration with their extension agents and through the Arkansas Association of Counties.

Rural Infrastructure and Delta Technology Education Center

Rural communities of Arkansas face challenges that make it difficult to maintain or expand the infrastructures that support their roads, public utilities and telecommunications. The Breakthrough Solutions program of the Cooperative Extension Service meets these communities where they are and looks for ways to take the assets they have to the next level. The advancements that Breakthrough Solutions seeks are designed to help local people make sense of a rapidly changing world and create breakthroughs that can move them forward, sometimes in dramatic ways.

Recent success stories include the program's work with the Delta Technology Education Center in Dumas to help it achieve its goals. These efforts resulted in the center's use for health projects, small business development and creative economy training while marketing the center as a launching pad for career development and developing an atmosphere to foster entrepreneurship. In Harrison, Breakthrough Solutions teamed with community leaders to revitalize the city's core area by first completing and then implementing a strategic plan. Harrison was Breakthrough Solutions' pilot community project. Civic groups in Clinton worked with the Breakthrough Solutions team to implement a program for revitalizing its downtown and other communities in Van Buren County.



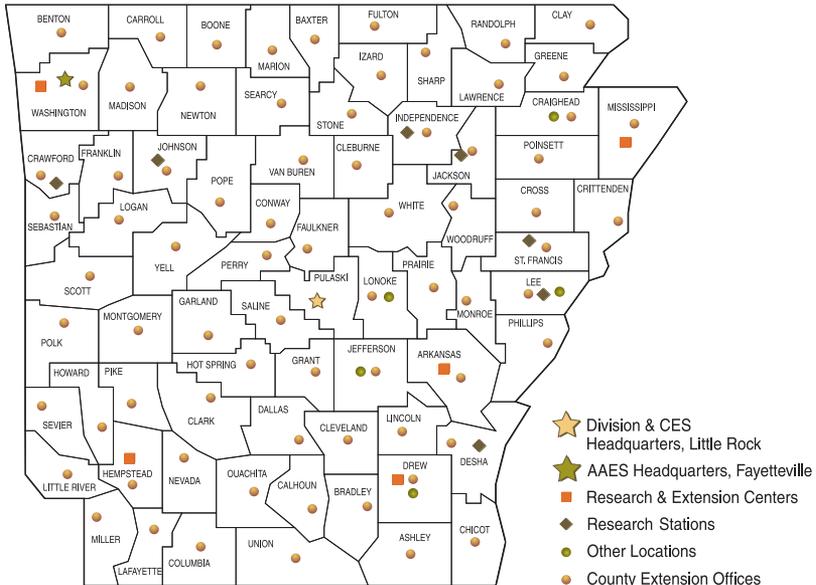
Grassroot community issues are addressed by collaboration between citizens and the Breakthrough Solutions team.

Arkansas is our campus.

The University of Arkansas System Division of Agriculture is unique among all educational entities in our state. Composed of the Cooperative Extension Service and the Arkansas Agricultural Experiment Station, **it is the only higher ed institution with a presence in all 75 counties.** We have research and extension centers across the state, studying issues critical to Arkansas crop, forestry and livestock agriculture, as well as helping Arkansans achieve a better quality of life.

To learn more about us, visit:

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