

## FY 2020 Annual Report of Accomplishments and Results

Arkansas

University of Arkansas System Division of Agriculture

### I. Report Overview

The NIFA reviewer will refer to the executive summary submitted in your FY 2020 Plan of Work located in the Institutional Profile. Use this space to provide updates if needed.

#### 1. Executive Summary (Optional)

University of Arkansas System Division of Agriculture (Division of Agriculture) faculty, staff and facilities are located on five university campuses, four regional Research and Extension Centers, six Research Stations, three Extension Centers, and in 75 counties. A fifth regional Research and Extension Center is currently under construction. Unlike most states today, the UA Division of Agriculture remains committed to this statewide infrastructure with a presence in all 75 Arkansas counties. This ensures researchers and Extension educators are readily available to address the science and business of agriculture and the broader needs of families and the communities we serve.

Consistent with the land grant mission, the Division of Agriculture research and Extension faculty have a long history of providing leadership in the development and dissemination of innovative practices and emerging technology. Division researchers conduct basic and applied research for Arkansas producers, businesses, communities, and families. Division of Agriculture Extension educators and researchers deliver research-based education. Division of Agriculture educators employ diverse educational methods statewide, including educational classes, landowner visits, individual consultations, demonstrations, and field days/tours/camps. County agents and specialists strive to provide the best science-based recommendations available. Despite the challenge faced in 2020 with the COVID-19 pandemic, the Division of Agriculture continued to provide data, independent of financial or philosophical interests, in a way that kept both Arkansans and Division of Agriculture employees safe and healthy.

The first six months of the FY2020 program year were conducted with face-to-face events, classes, and meetings. On March 16, 2020, all Division of Agriculture programming and research shifted due to the COVID-19 pandemic. Despite the changes made throughout the year, the Division of Agriculture Extension educators reached Arkansans over 18 million times, which is an increase of 23.9% over FY2019. The addition of education and research related to COVID-19 generated the increase in contacts throughout the program year. When removed, the Division of Agriculture

Extension professionals were able to maintain contact levels for the five critical issue areas within .5% of the FY2019 program year contact figures.

During 2020, the Division delivered Extension educational programming for Arkansas clientele 24/7/365 through web-based instruction at the Extension online course website <http://courses.uada.edu>. Family and consumer science and agriculture and natural resource online Extension education was delivered to and completed by 7,969 participants in FY2020 through 69 course offerings. This reflected an increase of 52.6% in participants over the FY2019 program year.

Housed within the University of Arkansas System Division of Agriculture, the National Agricultural Law Center (NALC) serves as the nation's leading source of non-partisan agricultural and food law research and information in partnership with the USDA Agricultural Research Service and National Agricultural Library. NALC leads the Agricultural & Food Law Consortium, a first-of-its-kind four-university partnership designed to expand and enhance the delivery of objective and relevant agricultural and food law research and information to the nation's agricultural community. In 2020, NALC delivered timely and responsive distance education webinars on emerging issues including: industrial hemp production, nuisance farms, meat processing laws, herbicide Dicamba, and COVID-19 (see Impacts #1 and #2). The National Center for Agricultural Law is not only an integrated effort between Research and Extension, but it is multistate in both the intended audience and contributors to the Center's efforts. NALC maintains a formal partnership with the National Association of State Departments of Agriculture (NASDA), and works closely with other state, regional, and national organizations.

The focus of work conducted by the Division of Agriculture continues to be guided annually by grassroots, community-based input from a diverse range of Arkansas citizens, mainly through the use of County Extension Councils and other local advisory groups. The Division of Agriculture formally engaged a large pool of stakeholders (including individual clientele, producers, schools, partner agencies and organizations, state government officials, community leaders, underserved groups, and legislators) in the design and development of the 2017-2023 Strategic Plan. Based on broad stakeholder feedback, the Division identified five emphasis areas to focus our efforts:

- Agricultural and Forestry Production and Processing;
- Access to Safe and Nutritious Food;
- Strengthening Arkansas Families;
- Building Communities & Strengthening Economies; and
- Natural Resource Conservation and Management.

These five emphasis areas help to provide guidance for Division research and Extension programs and help to support integrated research/extension efforts in these areas. These emphasis areas will serve as the University of Arkansas System Division of Agriculture's Critical Issues for the purpose of Hatch and Smith-Lever 3(b) and 3(c) NIFA reporting.

### **2020 Arkansas Extension and Research Critical Issue Impact Highlights**

#### **Agricultural and Forestry Production and Processing**

The University of Arkansas System Division of Agriculture (UADA) conducted research and educational programs to promote sustainable and efficient agricultural and forestry production and processing. UADA has continued work related to decision support software for both crop and livestock producers in the state of Arkansas. So far, UADA has developed and supports seven tools for use by producers (see Impact #3).

In the area of row crops, the Division of Agriculture continued their Soybean Research Verification Program for the thirty-sixth growing season and conducted on-farm demonstrations of research-based recommendations on over twenty commercial fields in nineteen Arkansas counties. Soybean research also included managing potassium levels to maximize profitability. As a result of the research, two tools have been developed to help producers maximize soybean yield and profitability; the profit-maximizing potassium rate estimation tool and the dynamic critical tissue potassium concentration thresholds (see Impact #4). Arkansas is the leading producer of rice in the United States and generated over \$1.06 billion in cash receipts in 2019. UADA researchers explored factors influencing Florpyrauxifen-benzyl injury in rice. Through the research conducted, various Extension recommendations and publications were revised to provide rice producers the most up-to-date and accurate information (see Impact #5). In response to the COVID-19 pandemic, UADA Agribusiness and Ag Economics staff provided information and engaged producers and stakeholders to assist in navigating the Coronavirus Food Assistance Program (CFAP). UADA assisted 223 stakeholders through largely virtual efforts in FY2020 (see Impact #6).

Water resources are becoming a larger issue with each passing year and Arkansas is no exception. Extension educational efforts on Irrigation Water Management (IWM) practices continued in FY2020 and included collaborative efforts with other county, state, and national agencies. Demonstrations of various irrigation technology and tools, development of irrigation field designs, and many field visits/consultations were employed to improve the sustainability and efficiency of producers' irrigation efforts. Through Extension education efforts, the Division of Agriculture reached pesticide applicators 10,040 times through in-person and online applicator trainings, as well as a number of demonstrations

and testing. In recent years, non-GMO varieties have created issues with pests that Extension had not faced in years. The Southwestern Corn Borer is a devastating pest to non-Bt corn, and the Division of Agriculture has implemented a multi-faceted approach to their control. Monitoring programs have allowed Extension to assist producers in making more accurate application decisions, which has saved producers millions of dollars. The Division of Agriculture has continued efforts to help producers make other decisions in pesticide and herbicide application and crop variety selection with continued success.

Horticulture efforts in Arkansas focused on assisting producers in expanding production seasons. The Division of Agriculture has continued to develop new primocane-fruiting blackberry cultivars, including UADA's twentieth variety 'Ponca.' This variety not only has excellent flavor, but with its unique shortened-internode architecture, it offers an opportunity for expanded production for a range of markets (see Impact #7). To support blackberry producers across the state, in 2019 the Division of Agriculture faculty secured funding and began the process of creating the Arkansas Blackberry Growers Association (ABGA). In February 2020, ABGA held their second winter meeting, providing producers with valuable information from regional experts. UADA researchers partnered with other states and a USDA-ARS lab to continue a multi-year study comparing diagnostic protocols for berry viruses. Through their research, multiple point testing regimes were proposed to increase the probability of detecting berry viruses (see Impact #8).

Livestock and animal products account for sixty-two percent of Arkansas' agricultural cash receipts. Activities to advance the livestock industry in Arkansas includes research, on-farm demonstrations, producer meetings, and educational material development. Focus areas include grazing efficiency and forage management, health and disease, alternative finishing systems, and management effects on carcass quality.

The poultry industry is very strong in Arkansas, contributing over \$4 billion in cash receipts to the state of Arkansas and ranking second nationally in broiler production. UADA researchers have continued studies to understand and improve poultry meat quality. In 2020, research was conducted to create a predictive model for detecting woody breast defects. This process was granted a patent in 2020 (see Impact #9). To assist producers in lowering input costs and increase efficiency, UADA researchers examined a misting system that can cool the poultry houses more effectively while using less water than conventional evaporative cooling pads (see Impact #10). With the continued outbreaks of Low Pathogenic AI and Highly Pathogenic AI, the Division of Agriculture has continued efforts to educate producers and small flock owners on proper biosecurity steps to ensure these outbreaks do not occur in Arkansas. Extension efforts in 2020 targeted many audiences, including commercial producers, hobby owners, 4-H and FFA members, and the general public.

In the area of swine production, UADA researchers explored how reformulating swine feed with amino acid supplements could mitigate greenhouse gas emission from swine production, while still meeting nutritional requirements. Researchers found replacing crude proteins with feed grade amino acids could reduce feed costs while both maintaining animal health and production and reducing the carbon footprint of swine production (see Impact #11).

Farm stress has become another critical area of need for farmers and ranchers nationwide. Through faculty in the Family & Consumer Science Program, UADA continued to offer this program despite the challenges (and increased stress) posed by COVID-19. Although Farm Stress sessions were not presented in the traditional format to more than a handful of participants in 2020, Arkansas' efforts to address this issue were highlighted nationally on NPR's Science Friday as well as in a webinar hosted by Mississippi State University Extension viewed by over 200 professionals across North America. New national collaborations were formed in 2020, including the Southern Region Farm and Ranch Stress Assistance Network (S-FRSAN) and the Southwest Center for Agricultural Health, Injury Prevention, and Education.

#### **Access to Safe and Nutritious Foods**

The University of Arkansas System Division of Agriculture faculty and staff developed, evaluated, and disseminated education programs and curricula, incorporating new research and emphasizing healthy lifestyles to prevent and/or reduce adult and childhood obesity and other diet related diseases. Division of Agriculture faculty conducted novel research to determine the impact of diet and food composition and functional food components on body weight and health. Key programs included Supplemental Nutrition Assistance Program Education (SNAP- Ed) and Expanded Food and Nutrition Education Program (EFNEP) (see Impact #12). In relation to those who benefit from these assistance programs, UADA researchers explored the impact of the COVID-19 pandemic on those who were already food insecure, both from food insecurity and mental health standpoints (see Impact #13).

In response to the high incidence of diabetes and prediabetes in Arkansas, the Division of Agriculture has continued the Diabetes Prevention Program that has had initial positive impacts to the first two cohorts of participants. The Diabetes Prevention Program expanded in the 2020 program year with the agent-initiated effort called "Day to Day with Diabetes." The virtual support group provided clientele with a network of people with similar goals and a way to learn and share resources for health, wellness, nutrition, and fitness (see Impact #14).

UADA researchers continue to work with UA Fayetteville, the University of Arkansas for Medical Sciences (UAMS), and the Arkansas Children's Research Institute examining the link between childhood obesity outcomes and features of the food, social, and built environment. The Arkansas

Children's Research Institute and the UAMS Arkansas Center for Health Improvement (ACHI) provides access to a unique individual-level dataset on obesity outcomes. Access to this data allows research to be conducted at a level of detail and accuracy not possible with national-level datasets.

The Division of Agriculture faculty and staff developed, evaluated, and disseminated education and curricula incorporating research and teaching for food safety and processing. Extension programs included HACCP workshops and meetings, food safety and preservation workshops, Better Process Control School, and ServSafe workshops. UADA Extension staff were able to offer ServSafe workshops in all 75 counties in the 2020 program year (see Impact #15). Other programs conducted included culinary arts training for food industry personnel, online distance education in food safety and manufacturing, and assistance to small food companies and entrepreneurs in the form of services, workshops, and consulting.

In response to the COVID-19 pandemic, UADA researchers utilized various media outlets to inform the general public about how the SARS-CoV-2 virus survives in the environment, especially as it related to food handling, preparation, and consumption. Through these efforts, the public was informed on effective ways to control the spread of the virus (see Impact #16).

Research activities in food safety included work to better understand the ecology of food pathogens, improve food processing systems to minimize food pathogens and to improve detection systems for Listeria, Salmonella, E. Coli and other major food pathogens (see Impact #17).

Research activities in food chemistry and food processing included improving environmental monitoring processes, assessing the health benefits associated with fish, vegetables and other processed foods, comparative studies of protein sources, and improving the sensory and nutritional quality of processed foods. Protein research conducted in 2020 found both whey (animal) and pea (plant) protein sources have comparable nutritional effects on older and younger male populations, but some differences were seen based on age (see Impact #18). UADA researchers examined methods to fortify rice that could withstand cooking, while at the same time reducing the amount of wastewater generated during processing. Through the development of a limited-water soaking method by vacuum packing, researchers were able to successfully produce fortified rice that also produced an 89% reduction in wastewater (see Impact #19)

### **Strengthening Arkansas Families**

The University of Arkansas System Division of Agriculture faculty and staff developed, evaluated, and disseminated education related to strengthening Arkansas families through the Family & Consumer Science and 4-H Youth Development areas.

In the area of Health and Aging, the University of Arkansas System Division of Agriculture provided programs to improve health at every stage of life by educating and engaging Arkansans to address locally relevant health issues. Programs like Extension Get Fit and Walk Across Arkansas helped young and mature Arkansans increase physical activity, improve health, and improve quality of life. The Extension Wellness Ambassador Program trained and engaged community volunteers to address local health issues by implementing projects and conducting health improvement activities. Extension Health and Aging programs worked to help Arkansans of all ages achieve optimal physical, mental, and social health, which can result in significant savings in healthcare and treatment dollars each year. As the issue of mental health becomes a greater focus nationally, the Division of Agriculture Extension has implemented new programs to address these health issues. As mentioned under “Agricultural and Forestry Production and Processing,” Farm Stress and Mental Health First Aid programs have continued to reach people across the state of Arkansas and beyond. UADA Extension has expanded efforts to increase access to healthy foods and provide safe and accessible places for physical activity in recent years through a collaborative effort with the Center for Disease Control in the High Obesity Program (HOP). Efforts in 2020 included community improvements in the Arkansas Delta providing increased access to walking and biking routes (see Impact #20).

In the area of Personal and Family Well-Being, the University of Arkansas System Division of Agriculture offered invaluable resources to parents, couples, and individuals who seek to improve their psychological and relationship health and their overall quality of life. We also offered free, researched-based professional development training to childcare providers and afterschool care workers to help them meet their annual state required training hours, improve their job performance, and improve quality of care given to our youngest citizens. In the 2020, program year, UADA childcare courses, both in person and online, reached over 6,200 individuals, awarding over 25,000 professional development hours. The Division of Agriculture parenting programs offer parents tools to improve relationships with their children and partners.

In the area of Family Resource Management, the University of Arkansas System Division of Agriculture provided practical, researched-based information to Arkansans to increase financial well-being, equipped adults and youth with the skills needed for financial stability, and explored strategies that can be used to help Arkansans improve personal finance and consumer practices. UADA Extension personal finance education programs reached 11,817 adult and youth consumers (see Impact #21).

In the area of Empowering Youth, the University of Arkansas System Division of Agriculture have worked to expand access to quality 4-H programming in Arkansas. The 4-H program has moved youth towards the future by teaching life skills to prepare youth for adulthood and

helping youth explore career and entrepreneurship possibilities. 4-H programs align with the National 4-H Mission Mandates in providing programs that involve youth in science, technology, engineering and math, encourage healthy living for Arkansas youth, and engage youth in civic engagement and leadership development. UADA Extension staff have worked with 122,323 youth through 4-H programming throughout the year. In the 4-H Mission Mandate area of Science, The Division of Agriculture has conducted various youth programs geared towards teaching youth life skills related to science and encouraging interest in science careers. The Division of Agriculture's 4-H Program has conducted science programs related to engineering through the SeaPerch program and the newly released 4-H Drone program. In 2020, the SeaPerch program had another increase in participants to 162 students, which is an increase of 400% in the last five years. In response to Arkansas reporting one of the highest incidence of injuries due to ATVs and UTVs, the Arkansas 4-H program has continued their ATV safety program with great success. Arkansas youth were reached over 7,400 times in the areas of ATV/UTV safety, shooting sports, and other outdoor skill project areas in 2020. Face to face 4-H events were reimagined in 2020 because of COVID-19. Events, such as the annual Teen Leader Conference, 4-H O-Rama (state competitions), and livestock shows, were moved to a virtual or a limited in person setting to abide by local and state regulations and guidelines. These events were conducted with great success, which assisted 4-H members with having some degree of normalcy in light of a very unnatural time. To keep 4-H members engaged in shooting sports educational opportunities, Arkansas 4-H staff collaborated with Auburn University and Oregon State University to develop and implement a new national 4-H educational event, the 4-H Shooting Sports Quiz Bowl. The new event reached over 400 participants and numerous volunteers, who were able to learn and adopt new ideas and skills within their own state's 4-H program. Through the hours of involvement with the Arkansas 4-H Program, many youth had the opportunity to qualify for the Congressional Award, the highest honor the United States Congress presents to America's civilian youth. The Congressional Award program has gained momentum in 2020, with 13 Arkansas 4-H members from seven counties receiving Congressional Awards (see Impact #22).

Volunteer groups are essential parts to Extension programs. The Arkansas Extension Homemakers Council has continued to extend the reach of Extension programs through their 3,086 members in 320 clubs statewide. These active volunteer leaders serve their clubs and communities in a number of ways and served over 700,000 hours with an estimated dollar value of \$16,616,279. UADA 4-H faculty assisted in forming and conducting the Southern Region Virtual Volunteer Conversations to support volunteers all over the United States in their efforts to continue to serve and work with 4-H youth in the midst of a pandemic (see Impact #23).

### **Building Communities and Strengthening Economies**

The University of Arkansas System Division of Agriculture faculty and staff developed, evaluated, and disseminated education in economic and community development. Efforts were focused in four areas: economic viability and sustainability; entrepreneurship in evolving economies;

leadership and civic engagement; and quality of life and place.

Programs conducted by the Division of Agriculture to support entrepreneurship in evolving economies include the Arkansas Procurement Technical Assistance Center (Arkansas PTAC), CREATE BRIDGES, and the Income Tax Schools. Arkansas PTAC provided support to over nine hundred clients in 2020 through one-on-one counseling sessions or attendance in a training event (see Impact #24). CREATE BRIDGES, rural economic development program, conducted in collaboration with the Southern Rural Development Center, continues to focus on retail, accommodations, tourism and entertainment sectors of rural economies. CREATE BRIDGES have found initial positive impacts on the regions in which the program was implemented, and these impacts have resulted in additional funding and expansion of the program to an additional three states (see Impact #25). Customized technical assistance was also provided in developing and implementing economic development strategies, including entrepreneurial support and business development. In Spring 2020, this support expanded to include creation of timely resources to assist businesses in responding to the ever-changing landscape of state and local guidelines imposed due to the COVID-19 pandemic (see Impact #26). The need for seasonal works did not change during 2020 but the ability for those who traditionally came to Arkansas was severely restructured. Through an initiative led by Congressman Rick Crawford, UADA partnered with the National Guard and Farm Bureau in the creation of the Arkansas Farm Corps program to provide a ready, willing, and able workforce of National Guard and Reserve soldiers, sailors, airmen, marines, and other military veterans in service to American agriculture. Since April 2020, the Farm Corps site had 62 farmers post 324 job openings (see Impact #27).

In community development, the Division of Agriculture has provided stakeholders in-depth analysis of regional socio-economic conditions, opportunities, and strategies for development. Some topics included development capacity, changing economic base, cluster industries, economic and fiscal impact, enhancing retail trade, and retiree in-migration. Assistance in using a 15-year database of county government revenues and expenses has also been provided in 2020, along with demographic and economic changes, to develop strategies for the provision of county services and infrastructure. To help inform this information, UADA Extension staff provided educational materials and outreach efforts to support the 2020 Census (see Impact #28). Through various community development programs, UADA Extension staff have reached community leaders over three thousand times via direct and indirect contacts.

Breakthrough Solutions is a visionary, strategic planning and implementation process for communities or regions that is asset based, community driven, technology enabled and results oriented. In addition to technical assistance, the program features an annual Breakthrough Solutions

Conference and an electronic newsletter (Breakthrough News) to support vibrant, sustainable communities in the 21st century economy. Breakthrough Solutions has had success in a number of Arkansas counties and these successes continue to grow.

Division of Agriculture faculty and county agents have conducted many leadership programs in 2020. In addition to developing, conducting, and evaluating local leadership programs, Extension has continued LeadAR, a two-year statewide adult leadership development program to teach participants about issues impacting Arkansas and develop leadership skills. Class 19 of LeadAR was selected and began their first session of the program in September 2020.

The Division of Agriculture's Public Policy Center (PPC) provided education on local and state ballot issues, worked with state agencies to encourage public involvement on water and other public issues, and helped Arkansans understand and interpret new laws and regulations. In order to reach clientele regardless of location, "Introduction to County Government in Arkansas" was offered online for citizens. During the November 2020 general elections, PPC researched and created state level and local level voter guides and fact sheets to provide citizens non-biased information on issues they would see on their ballots. Results and impact from these efforts will be highlighted in the 2021 Report of Accomplishments report.

UADA economists expanded upon research on the global benefits of public rice breeding programs, such as the program UADA conducts. The research explored the economic impacts of the UADA Rice Breeding program and found it provided growers with an additional \$31 million in revenue annually (see Impact #29). In response to the COVID-19, UADA Extension and research economists began and continue to analyze the effects of the pandemic on the state's agricultural and rural economies. The research results have been disseminated in various venues and reports for use by industry groups, nonprofits, and government entities to inform programs and policies (see Impact #30). Impacts from the pandemic on local food systems was also examined by UADA faculty. Surveys were implemented with Arkansas' farmers market managers and the results informed later educational efforts conducted by UADA to help farmers and farmers market managers navigate the issues posed by the pandemic (see Impact #31).

The Division Center for Agricultural and Rural Sustainability (CARS) lead regional and national research and extension integrated programs. CARS faculty engaged with non-profits, farm commodity groups and industry partners in the comprehensive agricultural sustainability effort, Field-to-Market, with the goal of uniting the supply chain to deliver economically viable and sustainable outcomes for agriculture.

The Southern Risk Management Education Center collaborated with four regional centers and the Digital Center to deliver the national Extension Risk Management Education Program that empowers producers to manage risks. Program goals seek to empower producers to better understand and manage economic risks on their farms and ranches (see Impact #32).

### **Natural Resource Conservation and Management**

The University of Arkansas System Division of Agriculture conducted research and educational programs on the environment to ensure sustainable use of soil, water, and air. Research and educational efforts were targeted at all citizens of Arkansas, but emphasis was placed on agricultural producers, private landowners, youth, homeowners, and land management professionals. Research was conducted on Experiment Stations as well as on private farms through programs such as the Division of Agriculture's Discovery Farms (see Impact #33) and Research Verification Trials. Critical issues addressed included: 1) Meeting competing water needs, 2) Protecting and improving water quality, 3) Protecting and improving soil health, 4) Protecting air quality, 5) Enhancing the ecological services provided by forested lands, riparian zones, and wildlife, 6) Protecting the health of aquaculture and aquatic wildlife, and 7) Environmental Sustainability.

In the area of water needs and quality, the Division of Agriculture research focused on evaluating conservation practices in row crop production that increased crop water use efficiency. Meanwhile, education initiatives focused on disseminating proven water savings techniques such as computerized hole selection for designing furrow irrigation that increases uniformity and reduces tail water losses as well as multiple inlet design for flooding rice, using soil moisture sensors and apps for scheduling irrigation, and using cover crops to improve soil infiltration. Extension efforts included working with row crop producers, livestock producers and homeowners through a myriad of delivery methods, including field days, field visits, meetings, and an online course related to nutrient management.

In FY2020, the Division of Agriculture Extension and researchers continued to support the Arkansas Soil Health Alliance (ASHA), working to educate farmers on practices to improve soil health. Demonstrations were conducted on best practices for preventing erosion and tools available to assist in improving plant nutrient use. Other efforts in the area of soil health and nutrient management being conducted are in the areas of synthetic-P fertilizer use for soybean and corn production. As part of the collaboration with ASHA, as well as with USDA-Natural Resources, UADA has continued to coordinate and host Virtual Field Trips (VFT) to educate a statewide network of participants through a series of no-cost virtual research-based, interactive demonstrations. In 2020, five VFTs were conducted and reached over 2,200 individuals during the live broadcasts.

Best known as “The Natural State,” Arkansas forest and natural resources are critical to the State's economy and to the well-being of its citizens. The Forest Management Program for Extension Forestry encompasses multiple education efforts aimed to further advance the overall health and productivity of forest and timber lands in the State and region. The Division of Agriculture has continued their research and Extension work in this area through the Arkansas Forestry Resource Center (AFRC). AFRC enhances and ensures the sustainability of forest-based natural resources through the interdisciplinary partnership of the Division of Agriculture and UA-Monticello. Research programs in forestry encompassed work in cellulosic nano-technology development, determining the invasion potential of emerald ash borer, enhancing the resiliency of forests to climate change, enhancing bottomland hardwood restoration for carbon sequestration and wildlife conservation, increasing problem-solving efficiency through better communication among natural resource professionals, estimating the economic contributions of forest management to the state's economy, and revealing how wildlife management affects forest health and productivity.

The Division of Agriculture Extension wildlife education program areas are: (1) addressing nuisance wildlife problems, including the Feral Hog Education Program and pesky wildlife around the yard and garden, (2) wildlife habitat management, (3) wildlife enterprises including habitat management for leasing lands for hunting and wildlife viewing, and (4) youth education through the 4-H Wildlife Program. In Arkansas alone, feral hogs inflict an estimated \$19 million in row crop damage annually, according to a 2014 study. In response to this, Arkansas Extension faculty and County Agents have continued to expand the Feral Hog Education Program. In 2020, this included the addition of the “Arkansas Feral Hog Handbook” to the already impactful demonstrations, best practice discussions, and continued research on the impact from feral hogs and various technologies and methods for control. The Division of Agriculture has continued to conduct a survey of ticks and tickborne disease across the state of Arkansas in response to the first confirmed case of Lyme Disease in Arkansas in 2017.

UADA Research and Extension faculty continue making contributions in the focus area of Environmental Sustainability. Specific efforts related to environmental sustainability are being made in alternative residue and water management practice effects of soil properties and crop production, trace gas emissions to the atmosphere from rice production, improving wastewater quality through struvite creation to remove excess phosphorous and nitrogen, and quantification and modification of wastewater treatment systems appropriate for small dairy milk centers. UADA Research and Extension continues to innovate and promote the use of water management and water use efficiency tools. The adoption of these tools and practices have resulted in water savings of over 21 billion gallons of water annually (see Impact #34). Research continues on poultry litter treatment to help poultry producers grow their production by minimizing the nutrient issues associated with poultry litter, to prevent pollution to surface and ground water resources due to nutrient leaching and runoff from land and soil receiving poultry litter application, and to help poultry producers transition to sustainable production practices. A part of the Arkansas Discovery Farm effort has been

an investigation and quantification of the sustainability of cotton production. There continues to be an Extension effort to provide a nutrient management planner, nutrient applicator, and mortality management education. A particular area of growth is the development of online educational courses to provide required certification training for nutrient planners and applicators. A separate but overlapping component is the providing and maintenance of the nutrient management plan development tool that is used by most of the state's certified nutrient planners.

## II. Merit and Scientific Peer Review Processes

The NIFA reviewer will refer to your 2020 Plan of Work. Use this space to provide updates as needed or activities that you would like to bring to NIFA’s attention.

Process	Updates ONLY
1. The <u>Merit Review Process</u>	<ul style="list-style-type: none"> <li>The University of Arkansas System Division of Agriculture has continued the process outlined in the 2020 Plan of Work.</li> </ul>
2. The <u>Scientific Peer Review Process</u>	<ul style="list-style-type: none"> <li>The University of Arkansas System Division of Agriculture has continued the process outlined in the 2020 Plan of Work.</li> </ul>

## Stakeholder Input

The NIFA reviewer will refer to your 2020 Plan of Work. Use this space to provide updates as needed or activities that you would like to bring to NIFA’s attention.

Stakeholder Input Aspects	Updates ONLY
1. <b>Actions taken to seek stakeholder input that encouraged their participation with a brief explanation</b>	<ul style="list-style-type: none"> <li>The University of Arkansas System Division of Agriculture has continued the process outlined in the 2020 Plan of Work.</li> </ul>
2. <b>Methods to identify individuals and groups and brief explanation.</b>	<ul style="list-style-type: none"> <li>The University of Arkansas System Division of Agriculture has continued the process outlined in the 2020 Plan of Work.</li> </ul>
3. <b>Methods for collecting stakeholder input and brief explanation.</b>	<ul style="list-style-type: none"> <li>The University of Arkansas System Division of Agriculture has continued the process outlined in the 2020 Plan of Work.</li> </ul>
4. <b>A Statement of how the input will be considered and brief explanation of what you learned from your stakeholders.</b>	<ul style="list-style-type: none"> <li>The University of Arkansas System Division of Agriculture has continued the process outlined in the 2020 Plan of Work.</li> </ul>

### III. Critical Issues Table of Contents

No.	Critical Issues in order of appearance in Table V. Activities and Accomplishments
1.	Agricultural and Forestry Production and Processing
2.	Access to Safe and Nutritious Food
3.	Strengthening Arkansas Families
4.	Building Communities and Strengthening Economies
5.	Natural Resource Conservation and Management

### V. Activities and Accomplishments

Please provide information for activities that represent the best work of your institution(s). In your outcome or impact statement, please include the following elements (in any order): 1) the issue and its significance (e.g. who cares and why); 2) a brief description of key activities undertaken to achieve the goals and objectives; 3) changes in knowledge, behavior, or condition resulting from the project or program’s activities; 4) who benefited and how. Please weave supporting data into the narrative.

No.	Project or Program Title	Outcome/Impact Statement	Critical Issue Name (Primary bolded)
1.	<b>Producing Industrial Hemp: Laws &amp; Regulations - National Ag Law Center (Integrated &amp; Multistate)</b>	<p><b>The problem</b> Many states enacted industrial hemp laws since the passage of the 2014 Farm Bill. Although these laws have similarities across the U.S., each state has noticeably different content in the specific details of the laws. Additionally, because the 2018 Farm Bill amended the requirements to grow industrial hemp, it is expected that states with existing regulations will adapt their laws to comply with the 2018 Farm Bill language.</p> <p><b>The work</b> Although the similarities exist across the U.S., there are important differences between each state’s industrial hemp laws. To address this,</p>	<p><b>Agricultural and Forestry Production and Processing</b> Access to Safe and Nutritious Food Natural Resource Conservation and Management</p>

		<p>legal researchers at the National Agricultural Law Center have created a 50-state compilation of industrial hemp laws across the U.S. This publication provides the complete statute for each state, as well as typical provisions within the industrial hemp laws of each state. Categorizing the laws by common provisions makes it easier for users to compare the various state laws. Research fellows spent nearly 400 hours creating this hemp law compilation by combing through each of the 50 states' law codes and checking the references against outside sources. The research fellows update the compilation twice a year, a task that takes 40 to 50 hours for each update.</p> <p><b>The results</b></p> <p>The center's compilation of hemp laws was viewed 1,660 times by 1,035 different people from February 2020 to February 2021. The most frequent inquiries about this topic came from state agriculture departments and legislators, policymakers and others connected to lawmaking at the state level.</p> <p><b>The value</b></p> <p>The resource has proved invaluable for states navigating the new legal landscape created by both the 2014 and 2018 Farm Bill for hemp, as well as efforts to legalize of recreational cannabis. The National Agricultural Law Center's hemp law compilation has proven to be a well-used reference by state governments and others for structuring law and policy by providing context and examples.</p> <p><b>Research contact:</b> Rusty Rumley, Sr. Staff Attorney, <a href="mailto:rrumley@uark.edu">rrumley@uark.edu</a></p> <p>This project was supported by the National Agricultural Library, Agricultural Research Service, U.S. Department of Agriculture.</p>	
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<p>2.</p>	<p><b>National Agricultural Law Center creates state-by-state compilation of meat processing laws (Multistate)</b></p>	<p><b>The problem</b></p> <p>When opening a meat slaughter and processing facility, there can be a multitude of requirements ranging from waste disposal to labeling, and these requirements often vary from place to place. Processing livestock is governed on a national level, and the U.S. Department of Agriculture Food Safety Inspection Service, or USDA-FSIS, has primary oversight. However, this authority may be delegated to a state agency, as long as the state requirements are “at least equal to” those enforced by USDA-FSIS. Whether overseen by the federal or state government, each facility that slaughters and processes livestock must meet requirements regarding sanitation, building requirements and more. However, these requirements can vary from state to state, and depending on the type of facility. In order to manage risk appropriately, it is important to obtain correct information before finalizing plans for a new facility. The advent of the COVID-19 pandemic created major disruptions in the meat supply, including at the processing level. This disruption and subsequent meat shortages at the consumer level helped drive additional renewed interest in meat processing at local levels as some turned to customer processors as a potential means to offset supply disruptions.</p> <p><b>The work</b></p> <p>Legal researchers at the National Agricultural Law Center have created a multifaceted resource for those interested in opening a meat slaughtering and processing facility. “Meat Processing Laws in the United States,” compiled by NALC Senior Staff Attorney Beth Rumley, provides interested parties with contact information to offices of appropriate authorities on a state-by-state basis. Relevant statutes in those states that have a meat inspection program in place are also provided.</p> <p><b>The results</b></p>	<p><b>Access to Safe and Nutritious Food</b></p> <p>Agricultural and Forestry Production and Processing</p>
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<p>3.</p>	<p><b>Decision Support Software</b></p>	<p><b>The Problem</b></p> <p>Arkansas farmers face numerous decisions at the beginning of each production year and as they do longer range planning when making investments in new equipment, land or buildings. These include such things as what to plant and where, as well as such management practices as scheduling irrigation, weed control, pest control, and other activities necessary to produce a successful crop in the current year, and often with carryover effects for the next. The success of a farm season depends on making good decisions for crop management beginning before planting and continuing through harvest. Animal agriculture is even more complicated by the fact that a decision on genetics, forage species selection and calving season, for example, lead to results for many years to come. These decisions require consideration of many different inputs</p>	<p><b>Agricultural and Forestry Production and Processing</b></p>

		<p>including anticipated weather patterns, expected crop prices and production history of the fields being planted. These inputs and other considerations amount to complex decision-making calculations that must be balanced against market trends and conditions.</p> <p><b>The Work</b>  Michael Popp, professor of agricultural economics and agribusiness, has conducted extensive research on farm management practices and implications for returns, risks and the environment. Combining his work with that of University of Arkansas System Division of Agriculture crop and animal researchers and extension specialists, USDA-ARS researchers, and scientists from other institutions around the country, Popp has developed a series of decision-making tools that help agricultural producers customize management choices to their fields and pastures.</p> <p>Seven decision-making tools so far include:</p> <ul style="list-style-type: none"> <li>• SOYMAP, for soybean maturity analysis and planning</li> <li>• FORCAP, for forage and cattle planning</li> <li>• ENCAP, for energy crop analysis and planning</li> <li>• SOYRISK, risk analysis based on maturity group and planting date</li> <li>• PAM, for Palmer Amaranth management</li> <li>• TGA, to analyze potential savings for using GPS guided auto-steer tractors</li> <li>• PRC, a potash rate calculator based on potassium yield response for rice and soybeans</li> </ul> <p>The tools are available free for download from the Arkansas Agricultural Experiment Station website and can be run independently on farmers' devices.</p> <p><b>The Results</b></p>	
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<p>4.</p>	<p><b>Managing Potassium and Maximizing Profitability in Arkansas Soybeans</b></p>	<p><b>The Problem</b>                  Soybean is one of Arkansas’ largest commodities. In 2018, 3.24 million acres of soybean were harvested. With about three million acres of soybean planted every year, Arkansas soybean producers need tools to maximize the production potential and profitability of their crops. Potassium deficiency is the primary limitation affecting soybean profitability. Producers must carefully manage potassium levels in their soil by knowing when, where and how much fertilizer to apply. Soybean yield</p>	<p>Agricultural and Forestry Production and Processing</p>

		<p>and profitability suffer when potassium levels are too low, but producers have few tools to guide potassium management decisions. Current potassium fertilizer recommendations are based solely on soil test results, which may not provide the precision required to maximize profitability. To date, there has been little data to support in-season correction of potential potassium deficiencies.</p> <p>Arkansas soybean producers need better and more targeted tools to help make informed decisions about potassium fertilizer inputs.</p> <p><b>The Work</b></p> <p>Over a period of about 20 years, soil fertility researchers with the Arkansas Agricultural Experiment Station conducted a series of experimental trials to evaluate the response of soybean to potassium fertilizer rates. This data was correlated and calibrated with soil test data, allowing researchers to make more targeted estimates about when and where potassium deficiency might occur. Where potassium deficiency occurs, there is a risk of limiting soybean yield. With the help of agricultural economist Mike Popp, the data from these trials were used to develop a tool that producers can use to estimate profit-maximizing potassium fertilizer application rates based on producer input data.</p> <p>More recently, the soil fertility team began looking at soybean tissue potassium concentrations over a series of growth stages. Previous research has shown that tissue potassium concentration decreases as soybean crops continue to grow. Thus, the timing of sample collection is crucial to interpreting tissue potassium concentrations. This work resulted in the development of dynamic critical potassium concentration thresholds.</p>	
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		<p>potentially increase profits by over \$100 per acre compared to applying no fertilizer, depending on field-specific parameters. This tool can also help producers determine when applying fertilizer may hurt their profits. By using the dynamic critical tissue potassium concentration thresholds, producers could see a net return of about \$25 per acre for a field suffering from hidden hunger and about \$75 per acre for a field suffering from extreme potassium deficiency, assuming typical soybean prices and potassium fertilizer and application costs.</p> <p>As Arkansas producers plant approximately three million acres of soybean each year, every dollar increase in profit per acre can result in significant economic value.</p> <p><b>Funding</b> Arkansas Soybean Promotion Board University of Arkansas System Division of Agriculture</p> <p><b>Contact:</b> Trent Roberts, Associate professor of soil fertility and soil testing</p>	
5.	<p><b>Factors Influencing Florpyrauxifen-benzyl Injury on Rice (Integrated)</b></p>	<p><b>The Problem</b> The commercial launch of florpyrauxifen-benzyl (Loyant) in 2018 by Corteva Agriscience gave Arkansas rice producers hope for a new tool to control barnyardgrass, a common weed pest in Arkansas rice fields, and one that is rapidly developing resistance to most rice herbicides. But producers, consultants, and scientists quickly noticed that the novel herbicide was causing injury to rice, specifically hybrid, long-grain and medium-grain cultivars. The injury observed was inconsistent, with no discernable cause. Environmental conditions and cultivar tolerance were believed to be major contributors to the inconsistency of the rice injury caused by the herbicide. Florpyrauxifen-benzyl is an effective option for</p>	<p><b>Agricultural and Forestry Production and Processing</b></p>

		<p>control of rice flat sedge and other sedges in rice. A recent survey indicates that sedges rank second to barnyardgrass as the most troublesome weed of rice. Additionally, Palmer amaranth is among the five most troublesome weeds of furrow-irrigated row rice, and row rice acreage is expected to continue increasing in the coming years. For these reasons, it is likely that florpyrauxifen-benzyl will remain a component of weed control programs in Arkansas, especially row rice where applications can be made using ground equipment.</p> <p><b>The Work</b></p> <p>Experiments were conducted at the Rice Research and Extension Center near Stuttgart, Arkansas, and in greenhouses and growth chambers at the Milo J. Shult Agricultural Research and Extension Center in Fayetteville, Arkansas, to determine the effects of cultivar, rate of application, light intensity, soil moisture, and pre-exposure to quinclorac on the magnitude of rice injury caused by florpyrauxifen-benzyl.</p> <p>Five cultivars were tested in the field (three hybrid long-grain cultivars, one inbred long-grain cultivar, and one medium grain cultivar) to determine their tolerance to 1x, 2x, and sequential 1x applications of florpyrauxifen-benzyl. One of the more florpyrauxifen-benzyl-susceptible cultivars was then used to determine the impact of the above-mentioned factors on injury to rice.</p> <p><b>The Results</b></p> <p>These experiments indicate that two applications of florpyrauxifen-benzyl are more injurious than one application, leading to recommendations that producers should use other herbicides in a program with florpyrauxifen-benzyl for weed control in rice. Pre-exposure to quinclorac applied at planting or postemergence applications of quinclorac prior to applying</p>	
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		<p>florpyrauxifen-benzyl generally increased the degree of injury caused by the later herbicide. Florpyrauxifen-benzyl also caused less injury in a high-light intensity environment than under low-light conditions, meaning that applications on cloudy or during overcast periods could result in more injury.</p> <p>Hybrid cultivars exhibited more injury from florpyrauxifen-benzyl than did most in-bred cultivars, except for the long-grain, in-bred cultivar Diamond. Soils that were saturated at application tended to lead to greater rice injury caused by florpyrauxifen-benzyl.</p> <p>Based on the research conducted, recommendations for Loyant herbicide use have been updated in the MP44 Extension publication. In addition several blogs were written, including for the Arkansas Row Crops Blog, and included in rice production Extension guides and newsletters.</p> <p><b>The Value</b></p> <p>Rice is one of the most important agronomic crops grown in Arkansas and the state is the leading producer of rice in the United States. Rice brought in \$1.06 billion in cash receipts for Arkansas rice growers in 2019, according to the USDA Economic Research Service’s 2021 Farm Income and Wealth Statistics.</p> <p>Findings from this research ensure the safe use of florpyrauxifen-benzyl in rice, allowing growers to effectively use the herbicide for control of many problematic weeds common to Arkansas rice fields. Florpyrauxifen-benzyl is an effective option for control of rice flat sedge and other sedges in rice. Assuming a 5 percent yield loss (8 bu/acre) on 5 percent of the 400,000 acres treated annually with florpyrauxifen-benzyl, total losses from the herbicide in the state would be 160,000 bushels. At this yield loss estimate, alleviating the risk for injury through knowledge gained from research to</p>	
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		<p>date is likely to save Arkansas farmers approximately \$890,000 annually at current rice prices.</p> <p>Resources:  <a href="https://arkansascrops.uada.edu/posts/crops/rice/loyant-rice.aspx">https://arkansascrops.uada.edu/posts/crops/rice/loyant-rice.aspx</a>  <a href="https://www.uada.edu/publications/pdf/mp44/mp44.pdf">https://www.uada.edu/publications/pdf/mp44/mp44.pdf</a></p> <p><b>Contact:</b> Jason K. Norsworthy, <a href="mailto:jnorswor@uark.edu">jnorswor@uark.edu</a></p>	
<p>6.</p>	<p><b>Helping Arkansas' Ag Producers Navigate the Coronavirus Food Assistance Program (CFAP)</b></p>	<p><b>Situation:</b>                  COVID-19-related market disruptions weighed heavily on commodity markets during the first half of 2020. As the pandemic was expected to depress demand, grain and cotton prices fell sharply in the second quarter of the calendar year. Corn, soybean, wheat and cotton futures fell 24%, 15%, 21% and 33% respectively from January 2020 to April 2020.</p> <p>At the onset of the crisis, food supply chains were disrupted as many countries imposed restrictions on the movement of goods and people across and within borders. Globally, grain and cotton inventories have been adequate and markets prices thus remained subdued for most commodities. The closure of restaurants and other food outlets removed a key market for many ag commodities, which produced a temporary glut or in the case of cotton triggered upstream cuts in usage due to reduced consumer retail spending as unemployment levels spiked.</p> <p><b>Response:</b>                  At the onset and during the pandemic, Agribusiness and Ag Economics (AEAB) staff provided information and engaged producers and stakeholders</p>	<p><b>Agricultural and Forestry Production and Processing</b>                  Access to Safe &amp; Nutritious Foods                  Building Communities and Strengthening Economies</p>

		<p>through phone and other innovative means (i.e. Skype and Zoom) using social distancing guidelines. As USDA quickly rolled out two rounds of ad hoc assistance such as the Coronavirus Food Assistance Program (CFAP), clientele needed analyses of these programs in order to make informed signup decisions and thus lessen COVID-19's financial impacts on their operations. AEAB faculty also provided technical advice and support to clientele as USDA developed new processes for online applications and electronic signatures.</p> <p><b>Impact:</b>          USDA delivered two rounds of the Coronavirus Food Assistance Program (CFAP), which provided financial assistance to many types of agricultural producers to offset some of the revenue losses and increased marketing costs associated with the COVID-19 pandemic. The deadline to apply for almost all commodities was December 11, 2020. The cumulative total from the two rounds of funding have provided nearly \$315 million in assistance to Arkansas' ag producers. From the first round of CFAP, Arkansas row crop and livestock producers received a total of \$140,364,982. USDA approved 18,533 CFAP 1 applications in Arkansas. In September 2020, a second round of CFAP funding was announced. As signup for "CFAP2" ended December 11, 2020, cumulative payments as of December 13<sup>th</sup> were \$174,712,117 from 25,478 applications.</p> <p>Provisions of these <i>ad hoc</i> assistance programs were of particular interest to both ag producers and agricultural lenders given the ongoing weather and commodity market challenges seen during much of the 2020 crop year as well as the last two crop years. Largely by way of "virtual" means, Division of Agriculture specialists provided direct assistance to 223 producers, agricultural lenders, professional farm managers, congressional</p>	
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		<p>staffers and others around the state on the details and procedures of USDA’s Coronavirus Food Assistance Program.</p> <p>AEAB provided a steady flow of information to producers and stakeholders through weekly monitoring of USDA news releases and reports from the Farm Service Agency. Twelve reports were published on the economic impact of COVID-19 on row crop markets. These are located on the University of Arkansas Cooperative Extension Service’s COVID-19 resources website under <a href="#">“Economics Impacts”</a> . The site has had over 1,288 unique page views this year. One research report was published and is available at <a href="https://agcomm.uark.edu/agnews/publications/1002_Impact_COVID-19_Ark_Field_Crop_Farms_2020.pdf">https://agcomm.uark.edu/agnews/publications/1002_Impact_COVID-19_Ark_Field_Crop_Farms_2020.pdf</a> Five articles covering CFAP1 and CFAP2 USDA program resources and signup deadlines were posted on the <i>Arkansas Row Crops</i> blog.</p> <p><b>Contact:</b> Scott Stiles <a href="mailto:sstiles@uada.edu">sstiles@uada.edu</a></p>	
7.	<p><b>Ponca Blackberry has Potential to Change the Blackberry Fresh Market</b></p>	<p><b>The Problem</b></p> <p>Blackberry production and consumption continues to increase in the United States. Blackberries are enjoyed by many and are routinely consumed also for antioxidant and other beneficial health effects. There is substantial competition in the fruit and more specifically berry category in commercial markets, and consumers have increasing choices. Good flavor and consistency of quality are increasingly required by consumers. The University of Arkansas Division of Agriculture has been breeding blackberries for over 50 years, and flavor developments have been achieved that have enhanced the enjoyment of blackberry consumption.</p> <p><b>The Work</b></p>	<p><b>Agricultural and Forestry Production and Processing</b></p>

		<p>The University of Arkansas has conducted fruit breeding since 1964 and a substantial effort has been in blackberries. Many traits have been improved, including thornless canes, large fruit size, broad adaptation, shipping quality and primocane fruiting. In the last 20 years, an increased focus on flavor has been underway.</p> <p><b>The Results</b></p> <p>‘Ponca’, a floricanne-fruiting, thornless cultivar, is the 20<sup>th</sup> blackberry released from the Division of Agriculture’s fruit breeding program and is the most outstanding release from the effort in terms of flavor and berry-to-berry consistency. Its dependably sweet, low-acid berries grab the attention of all that get to taste the fruit of this new cultivar.</p> <p>Sweetness or tartness is the first thing consumers notice when they bite into a blackberry. But, as one chews, other fruity flavors begin to emerge. Those are the aromatic qualities the program has developed, which led to such excellent flavor in Ponca. This variety also ranked highest by a significant margin in taste tests conducted by the Division of Agriculture’s Department of Food Science. Ponca’s healthy plants, with unique shortened-internode architecture, offer an opportunity for expanded production for a range of markets.</p> <p><b>The Value</b></p> <p>Specialty crop production, which includes blackberries, has become increasingly important to U.S. citizens and growers due to a number of factors. From a grower standpoint, potential profits can exceed that of traditional row crops for a number of reasons, including diversity of markets and consumer enjoyment and demand for the crop. Flavor has</p>	
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		<p>increased in importance in consumer choice, so improvement of any crop that is directly consumed must have flavor to expand grower profit and consumer enjoyment.</p> <p>As these cultivars are more widely planted, the potential to expand consumption will be in place, expanding the fresh-market blackberry industry. The other recent cultivars from the breeding program, ‘Osage’ and ‘Caddo’, round out an exciting group of high-flavor blackberries.</p> <p><b>Contact:</b> John Clark, Distinguished Professor, Horticulture  <a href="mailto:jrclark@uark.edu">jrclark@uark.edu</a></p>	
<p>8.</p>	<p><b>High Throughput Sequencing for Virus Detection in Berries</b></p>	<p><b>The Problem</b></p> <p>Virus-free, or “clean plants,” are the cornerstone for sustainable production of all clonally propagated crops. Virus-infected plants yield less and become unproductive affecting farm profitability. Some impacts of virus-infected plants include a \$50 million loss in California’s 2002 and 2003 strawberry seasons and \$25 million loss from strawberries in Florida and the Mid-South in 2012-2013. In blackberry, “dirty” plants can become unproductive in less than 5 years versus a 20-year average lifespan for high-quality, clean material.</p> <p><b>The Work</b></p> <p>A multi-year study among labs in the National Clean Plant Network (NCPN) for Berries compared diagnostic protocols for berry viruses. Tzanetakis’ lab in Arkansas and a USDA-ARS lab in Corvallis, Oregon compared high throughput sequencing (HTS) protocols with standard laboratory technologies (SLTs).</p> <p>HTS is a scientific method that allows researchers to quickly sequence massive numbers of organism samples. This process allows rapid identification of viruses and other things. The SLTs in this study included</p>	<p>Agricultural and Forestry                  Production and                  Processing</p>

		<p>enzyme-linked immunosorbent assay (ELISA) and polymerase chain reaction (PCR).</p> <p>HTS can identify new viruses, something SLTs cannot do. The researchers found six new viruses in the 30 or so plants used in the study. The most important thing the researchers discovered is that viruses can be undetectable during some seasons.</p> <p><b>The Results</b></p> <p>Because viruses can be undetectable in some seasons, Tzanetakis and his collaborators proposed a four timepoint/two season testing regimes. Breeding material should be tested in spring and fall of two consecutive seasons as some viruses remain undetectable at one or more time points in either season.</p> <p><b>The Value</b></p> <p>HTS has several advantages over SLTs, the greatest of which is the aptitude to detect new viruses. Improved virus detection for the nursery industry can result in fewer infected plants in the field. Clean plants, in turn, protect farms and help them become more profitable.</p> <p><b>Funding Sources</b></p> <p>University of Arkansas System Division of Agriculture          USDA-APHIS through NCPN          Contact: Ioannis E. Tzanetakis, Professor of Plant Virology and Director of the Arkansas Clean Plant Center for Berries <a href="mailto:itzaneta@uark.edu">itzaneta@uark.edu</a></p>	
9.	<b>Poultry Meat Toughness</b>	<p><b>The Problem</b></p> <p>The American poultry industry has risen to the challenge of meeting consumer demand for more and bigger chicken meat, especially for breast meat. But that success has come at a cost as meat defects like woody breast that result in tough meat become more common. Mark Cooper,</p>	<p><b>Agricultural and Forestry Production and Processing</b>          Access to Safe &amp; Nutritious Foods</p>

		<p>managing director of global genetics for Cobb-Vantress said such defects cost the poultry industry millions of dollars in lost yield from condemned and downgraded products. Cooper added that negative consumer experience with tough, defective meat products can drive customers to other companies or products, having further impacts on consumer satisfaction and industry revenues.</p> <p><b>The Work</b></p> <p>Casey Owens Hanning, the Novus International Professor of poultry science at the Arkansas Agricultural Experiment Station, the research arm of the University of Arkansas System Division of Agriculture, has been conducting research to understand and improve poultry meat quality for 21 years. In particular, she has been investigating the biological and genetic influences that lead to woody breast and other meat defects.</p> <p>She collaborates with colleagues in the Division’s Center of Excellence for Poultry Science to identify and understand the biological and genetic factors that contribute to meat quality defects and to find genetic markers that may help chicken breeders identify potential breeding interventions to improve muscle development. She has also discovered that environmental and stress conditions during production may exacerbate meat defects. Meanwhile, Hanning focuses on designing tools that can help the poultry industry measure and assess meat quality and to detect new problems.</p> <p><b>The Results</b></p> <p>Hanning developed predictive models for detecting woody breast in broiler carcasses using image analysis of carcass features associated with the condition. That process earned a patent in 2020.</p>	
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<p>10.</p>	<p><b>Empowering the US broiler industry for transformation and sustainability: Cooling broilers efficiently</b></p>	<p><b>The problem</b></p> <p>Warmer global temperatures and higher populations are rendering water availability a growing concern. Under these conditions, feeding the global population will require greater animal production efficiency. Hot weather, fast growth and a shift to larger bird production renders broilers susceptible to suboptimal health, muscular-skeletal disorders, and increased mortality, representing large inefficiencies in water and feed consumption.</p>	<p><b>Agricultural and Forestry Production and Processing</b> Natural Resource Conservation and Management</p>

		<p><b>The work</b>                  The grant-funded “Empowering the U.S. Broiler Industry for Transformation and Sustainability” addresses several facets of water efficiency including improving water use needed for cooling poultry houses during hot weather. Researchers examined a misting system that can cool the poultry houses more effectively while using significantly less water than conventional evaporative cooling pads.</p> <p><b>The results</b>                  The misting system used 60-70 percent less water than evaporative cooling pads during summer months in commercial broiler houses. It has been tested with no adverse effect on broiler growth performance.                  Over the summer of 2020, a cool cell house for five flocks used an average of 32,000 gallons of water for cooling per flock compared to 5,200 gallons of water for the house with the surface wetting sprinkler system. In addition, the grower earnings were 4.42 cents/pound and 4.17 cents/pound for the sprinkler and cool cell houses, respectively. Importantly, relative humidity levels in the house with the sprinkling system were lower than in the conventional house with evaporative cooling pads.                  This is important because birds pant to cool themselves; the higher the relative humidity in the house, the more difficult it is for broilers to maintain body temperature. There was a significant reduction in late mortality losses during the last week of the grow out in the house with 10/15 per day on the sprinkling system compared to 40/50 per day in the house with conventional cooling pad.</p> <p><b>The value</b>                  A typical broiler house will have 20,000 birds at the start of the growing period. At least 19,000 birds of these will be harvested at 5.5 pounds. A typical grower will have five houses on a farm. Using values presented above for gallons of water saved, increased payment, the water savings on that farm would be</p>	
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		<p>670,000 gallons and the grower would receive an additional \$6,500 settlement from the integrator.</p> <p>At that rate, a typical broiler complex in the U.S. processing 1 million birds per week would see a water savings of 26.8 million gallons during hot weather months. The additional revenue generated for the poultry growers for that complex would be over \$261,000. The improvement in on-the-farm water efficiency would help poultry companies reach goals in sustainability that is becoming of greater importance to the clients and stockholders.</p> <p><b>UADA Contacts:</b>  <u>Dr. Yi Liang</u>, (Co-Investigator, <a href="mailto:yliang@uark.edu">yliang@uark.edu</a>); Dr. W. G. Bottje (Project Director, <a href="mailto:wbottje@uark.edu">wbottje@uark.edu</a>) and Dr. S. Dridi (Co-Project Director, <a href="mailto:dridi@uark.edu">dridi@uark.edu</a>)</p>	
<p><b>11.</b></p>	<p><b>Reducing Carbon Footprint of Swine Production</b></p>	<p><b>The Problem</b>          Nitrogen compounds derived from excess amino acids in crude protein ingredients in swine feed end up in the manure and urine, from which they contribute significantly to the carbon footprint of animal agriculture. Those excreted nitrogen compounds can be oxidized by soil and air, and some of it is released into the atmosphere as nitrous oxide.          Nitrous oxide has a greenhouse gas effect that is 298 times that of carbon dioxide. It has the next largest impact on global warming after CO<sub>2</sub> and methane.</p> <p>Amino acids are essential for proper tissue development in animals. A number of these are particularly critical, including lysine, valine, isoleucine and histidine, among others. They are called “limiting amino acids” because insufficient concentrations of them can impair growth performance. They are present in naturally occurring concentrations in</p>	<p>Agricultural and Forestry          Production and Processing          Natural Resource Conservation and Management</p>

		<p>crude protein sources, including corn and soybean meal. But they are not balanced for swine and other animals. When crude proteins are mixed in feed to provide sufficient lysine, for example, they will also add excessive amounts of other amino acids. Those excesses are converted to nitrogen by the animal’s metabolism and excreted in urine and manure.</p> <p><b>The Work</b>          Charles Maxwell, professor of swine nutrition and management for the Arkansas Agricultural Experiment Station, the research arm of the University of Arkansas System Division of Agriculture, and research associate Tsung Cheng Tsai devised experiments to evaluate whether reformulating swine feed with amino acid supplements could mitigate greenhouse gas emission from swine production systems and still meet the nutrition requirements of nursery and grow-finish diets.          The trick, Maxwell said, is to replace as much of the crude protein as possible with supplements of limiting amino acids without disrupting the total nutritional needs of the pigs.          Maxwell and Tsai designed five experiments — two nursery studies and three grow-finish studies — in an attempt to define the practical limits for replacement of crude proteins in swine diets with feed grade amino acids without impairing growth performance or carcass composition. The experiments were carried out at the Division of Agriculture wean-to-finish swine facilities at the Savoy Research Complex in Washington County.</p> <p><b>The Results</b>          The goal of the experiments was to develop high inclusion of amino acids in diets that would achieve the same gain and efficiency as feeding protein-based diets. That goal was achieved with the seven top limiting amino acids. The experiments demonstrated that replacing crude proteins in hog diets with feed grade amino acids can reduce the carbon footprint of swine production. During these studies,</p>	
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		<p>Maxwell and Tsai were able to find successful ratios for replacing crude proteins with feed grade amino acids at multiple stages of pig growth from nursery through finishing.</p> <p>The prices of commercially available amino acid supplements are relatively low, helping to reduce feed costs while maintaining animal health and production.</p> <p><b>The Value</b></p> <p>Hogs and pigs add nearly \$51.9 million to Arkansas’ agricultural economy, according to the 2020 Arkansas Agricultural Profile (<a href="https://bit.ly/AAES-2020PocketFacts">https://bit.ly/AAES-2020PocketFacts</a>), published by the Division of Agriculture. Maxwell and Tsai’s research demonstrated that substituting commercial amino acid supplements for crude amino acid sources saved money on feed costs at all stages of pig development while reducing excreted nitrogen and maintaining animal health and production.</p> <p><b>Contact:</b> Charles Maxwell, Professor of Swine Nutrition and Management <a href="mailto:cmaxwell@uark.edu">cmaxwell@uark.edu</a></p>	
<p><b>12.</b></p>	<p><b>Nutrition Education through the Expanded Food and Nutrition Program</b></p>	<p><b>The Problem</b></p> <p>At the start of 2020, 17.3 percent of Arkansans were at risk of not knowing where to get their next meal, and 23.6 percent of children were considered food insecure. As a result of the COVID-19 pandemic, even more families experienced food insecurity due to job loss and reduced income.</p> <p><b>The Work</b></p> <p>The Expanded Food and Nutrition Program, EFNEP, provides free food and nutrition education for limited-resource audiences in 18 counties in Arkansas. It teaches families with children in the home skills to overcome food insecurity challenges while promoting a healthful lifestyle, using evidence-based, interactive lessons from the Eating Smart, Being Active and Kids in the Kitchen curricula. Education focuses on four core areas: diet quality and physical activity, food resource management, food safety, and food security.</p>	<p><b>Access to Safe and Nutritious Food</b></p>

		<p>Adults are taught in small groups or individually by trained EFNEP educators. The majority of participants complete the EFNEP curriculum in fewer than nine sessions. The EFNEP youth program focuses on providing food and nutrition education to contribute to personal development of youth from families with low incomes. Youth classes are available year round.</p> <p><b>The Results</b></p> <p>In program year 2020 as a result of the EFNEP in Arkansas, the following improvements were recorded:</p> <ul style="list-style-type: none"> <li>• 9,990 adults, youth, and families were reached</li> <li>• 89 percent of adults and 82 percent of youth reported adopting healthier nutrition practices</li> <li>• 73 percent of adults and 55 percent of youth noted improvement in physical activity practices</li> <li>• Food cost savings as a result of participating in the classes was \$41.70 monthly savings per family.</li> </ul> <p>Both large and small families put food resource management techniques they learned into practice. They purchased food items on sale, used shopping lists, and reduced food waste by freezing leftover food and re-inventing leftovers for a new dish.</p> <p>EFNEP educators reported many individual successes with their clients. In one EFNEP class, 56 percent of participants reporting cooking more at home each week, 100 percent reporting comparing prices and making shopping lists, and many reported an increased awareness of community resources.</p> <p>A mother of a youth graduate said her child “has been inspired to cook in the kitchen more, experimenting with recipes and involves his little brother in trying</p>	
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		<p>new foods.”</p> <p>Another adult graduate said, "I changed my eating habits and lost some weight, started walking more, and I have been able to get off of some medication!"</p> <p><b>The Value</b> EFNEP teaches families how to effectively use their resources to provide nutritional meals while also encouraging families to pursue healthful lifestyles.</p> <p><b>Program Contact:</b> Dr. Laura Hendrix, <a href="mailto:lhendrix@uada.edu">lhendrix@uada.edu</a></p>	
<p><b>13.</b></p>	<p><b>Food Insecurity Amid Covid-19</b></p>	<p><b>Issue:</b> The COVID-19 pandemic has created unprecedented challenges for low-income families at risk of food insecurity in addition to the great overall distress on public health and the economy. Measures to curb the spread; i.e., quarantine, isolation, and shut down of schools and public places, have disrupted normal activities and have caused mental health problems in many people. Early evidence showed that depression was more than 3-fold higher during COVID-19 compared with before the pandemic in the US. Given this concern, the World Health Organization warned against COVID-related mental health consequences such as loneliness, insomnia, depression, anxiety, and even suicidal behavior.</p> <p>This study has two major goals. The first is to understand how federal food assistance programs (SNAP, WIC, and school food programs), and the temporary economic assistance programs (unemployment benefits and stimulus payments) have helped alleviate food insecurity among low-income individuals during the pandemic. The second is to explore the</p>	<p><b>Access to Safe and Nutritious Food</b></p>

		<p>association between food insecurity and mental health outcomes among low-income Americans during the COVID-19 pandemic.</p> <p><b>Action:</b>                  We conducted a nationwide survey among low-income Americans from June 29, 2020 to July 21, 2020. The survey screened for food insecurity and mental health during the first three months of the pandemic. It also measured participation in nutrition and economic assistance programs.</p> <p><b>Findings and Impact:</b>                  Economic hardship brought on by the COVID-19 pandemic has increased food insecurity. This study explores how food and economic assistance programs are associated with food insecurity during very difficult times and how food insecurity is associated with mental health during the pandemic. Our findings suggest that those who lost jobs due to the pandemic had the highest level of food insecurity. There is a negative association between food insecurity and SNAP benefit expansion among groups with higher levels of income stability. Those who took advantage of school meals before the outbreak are more likely to have experienced food insecurity after the pandemic-related school closures. However, short-term solutions such as alternative meal delivery or pickup programs did not significantly decrease the likelihood of food insecurity except among the lowest-income respondents. There is evidence that the Pandemic EBT could be more effective at reducing food insecurity among households with children.</p>	
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		<p>Our results also show that food insecurity is associated with a 257% higher risk of anxiety and a 253% higher risk of depression. Losing a job during the pandemic is associated with a 32% increase in risk for anxiety and a 27% increase in risk for depression. Hence, food insecurity caused by the pandemic is associated with increased risk of mental illness. The relative risk of mental illness from being food insecure is almost three-fold that of losing a job during the pandemic.</p> <p>This work has been submitted to two scholarly journals.</p> <p><b>Contacts:</b> Di Fang, Michael Thomsen, Rodolfo M. Nayga, Jr., Department of Agricultural Economics and Agribusiness, University of Arkansas Division of Agriculture.</p>	
<p>14.</p>	<p><b>Day to Day with Diabetes Virtual Support Group</b></p>	<p><b>The Problem</b> Nearly 15 percent of Arkansans — about 360,000 people — have diabetes, and another 36.4 percent of the state’s adult population have prediabetes. The associated costs are \$3.1 billion annually. Studies prove that modest weight loss (5 percent of body weight) and regular physical activity (at least 150 minutes weekly) can prevent or delay diabetes in more than 50 percent of adults. When COVID appeared in Arkansas, agents were unable to deliver programming via traditional face-to-face meetings, but they knew the need for continued education existed.</p> <p><b>The Work</b></p>	<p><b>Access to Safe and Nutritious Food</b></p>

		<p>Family and consumer science agents in Pope and Yell counties saw great need in their counties for diabetes education. They wanted to provide a place where people could find encouragement along their health journey while also remaining socially distanced. They piloted a 12-week virtual support group for people living with diabetes or caring for someone with diabetes. The program began in August with 69 virtual members. The agents hosted weekly virtual meetings via Facebook and Zoom. They also posted healthy recipes and resources for health, wellness, nutrition, and fitness throughout the week. The format allowed members to be active in the group as much as they wanted to be. Some members watched the meetings live while others watched recordings at a later time.</p> <p>The feedback was so positive at the end of the pilot program that the agents decided to host a fall support group leading up to the holidays. The second group had 140 members. Both sessions were free and open to the public.</p> <p>The virtual support groups drew some of its materials from exciting Extension diabetes educational materials. Extension offers year-round diabetes prevention education as well as a four-week Living with Diabetes education curriculum through its Family and Consumer Sciences Division.</p> <p><b>The Results</b></p> <p>In response to self-improvement, 100 percent of survey respondents stated they had adopted one or more healthy food practice. Several more extension agents have since started Day-to-Day programs in their counties.</p>	
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		<p>The Cooperative Extension Service Diabetes Prevention Program (DPP) maintains preliminary CDC recognition status after 24 months of data submission. Three cohorts have completed the program, and the first agent-led cohort began in August in White County. Of the 26 participants who have completed the year-long program, 74 percent have had weight loss and 38 percent have had weight loss of 5-7 percent of their starting body weight. All have increased physical activity levels over starting levels with most reaching 150 minutes per week or more. Twenty-one FCS county agents are certified Lifestyle Coaches for the DPP.</p> <p><b>The Value</b> The Day to Day with Diabetes Virtual Support Group offered a place for people with diabetes to connect with others with similar health goals and to share strategies that work for them. It also introduced new people to Extension.</p> <p><b>About the Agents</b> Rachel Chaney is a family and consumer science agent in Yell County. Pamela Luker is a family and consumer science agent in Pope County.</p>	
<p>15.</p>	<p><b>ServSafe: Working to ensure food safety in all 75 Arkansas counties</b></p>	<p>In the United States, it is estimated that 48 million Americans get sick, 128,000 are hospitalized, and 3,000 die from foodborne illnesses each year. Food safety is an important health issue in Arkansas as well—one which the University of Arkansas System Division of Agriculture Cooperative Extension Service takes seriously. Arkansas’s ServSafe program provides professional training to Extension’s County Agents who learn both basic and advanced concepts related to food service, food safety, regulatory science, and preparation and handling of food. Using the</p>	<p><b>Access to Safe and Nutritious Foods</b></p>

		<p>most up-to-date food safety science, County Extension Agents are then able to train others to ensure our state’s food supply safety. The ServSafe Certified Food Protection Manager certification program has continued to expand throughout the state. An additional 15 agents were certified or re-certified during 2020, growing the number of counties with active, certified ServSafe agents to 42 counties. This increase in the number of counties with certified agents allowed for well over 50 ServSafe classes and exams to be taught and administered throughout the state in 2020 to hundreds of Arkansans. Due to the new Arkansas Department of Health rule requiring that at least one managerial staff member of each foodservice establishment (including childcare facilities, schools, and restaurants) has a Certified Food Protection Manager certification, the ServSafe program continues to serve an important role in ensuring food safety in homes, childcare facilities, restaurants, schools, and other foodservice establishments.</p> <p>Specialist Contact: Dr. Bryan Mader <a href="mailto:bmader@uada.edu">bmader@uada.edu</a></p>	
<p><b>16.</b></p>	<p><b>Providing expertise on infectious disease transmission to audiences across the U.S. (Integrated &amp; Multistate)</b></p>	<p><b>Relevance</b>                  When the U.S. effectively shut down in mid-March 2020, the general public had questions regarding how SARS-CoV-2, the virus causing COVID-19, survives in the environment, especially as it relates to food handling, preparation, and consumption. To answer these questions, news media outlets reach out to experts across the country to help answer them. In addition, professional organizations and societies were in need of content to provide to their membership as well.</p> <p><b>Response</b>                  University of Arkansas System Division of Agriculture researcher, Dr. Kristen Gibson, an expert in environmental virology and the transmission of infectious diseases via food, water, and contaminated surfaces, was</p>	<p><b>Access to Safe and Nutritious Food</b></p>

		<p>contacted by various news media outlets to comment on the transmission of COVID-19 within specific transmission scenarios including indirect contact transmission (i.e., how does the virus spread if not from person-to-person?) In response to media requests, Dr. Gibson was conducted interviews over email, phone, and video conferencing software. During the first month of COVID-19, she responded to nine media requests from Seattle, WA to New York City, NY with 8 resulting in citable content (see "Resources"). These media outlets included traditional newspapers with online platforms (New York Post and Seattle Times), online only news and information platforms (Heavy.com), science news magazines (Discover Magazine), online only tv network shows (Eat This with Yara), and talk radio (Radio.com; I'm Listening, Stay Connected). During these various interviews, Dr. Gibson addressed why handwashing is so effective in breaking the chain of transmission for SARS-CoV-2. she also discussed her own, science-based approach to keeping herself and her family safe during COVID-19 with respect to food take-out or delivery and grocery shopping. Last, she discussed potential surfaces that could be contaminated with SARS-CoV-2, the likelihood of becoming infected from these surfaces, and how to clean and disinfect these surfaces. Most of the information being communicated was based on her own research area and knowledge of indirect transmission of viruses, and the differences between viruses that cause gastroenteritis (i.e., the viruses that she studies) and those that cause respiratory tract infections. The goal when communicating was to provide scientific evidence-based answers to the questions in a clear, non-technical way to allow the lay audience of each media outlet to get the information they needed. In addition to media requests, Dr. Gibson was asked by the Association of Food and Drug Officials (AFDO) to present a training/educational webinar for their Professional Development Series</p>	
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		<p>offered during COVID-19. This webinar aimed to address some of the similarities in the prevention and control of highly transmissible viruses such as human norovirus (an enteric virus) and SARS-CoV-2 (a respiratory virus). During this webinar, she provided a compare and contrast approach to these two viruses and then presented some of her past, peer-reviewed research on handwashing efficacy and cleaning cloths as examples of how to control the spread of highly transmissible viruses.</p> <p><b>Results</b></p> <p>As indicated in the "Response" section, upon reading or watching any of the resulting outreach materials, the audience of each media outlet and professional organization would have gained an understanding of the transmission of SARS-CoV-2 and effective ways to control the spread both via person-to-person and through indirect contact scenarios. Overall, based on the data available, interviews were viewed or shared 86,677 times, and the professional develop webinar was attended by more than 300 persons and viewed an additional 239 times on YouTube.</p> <p><b>Resource Links:</b></p> <p><a href="https://www.youtube.com/watch?v=cGuyDYhdSBU&amp;feature=youtu.be">https://www.youtube.com/watch?v=cGuyDYhdSBU&amp;feature=youtu.be</a>  <a href="https://nypost.com/2020/03/24/how-to-safely-order-takeout-and-delivery-food-during-coronavirus-lockdown/">https://nypost.com/2020/03/24/how-to-safely-order-takeout-and-delivery-food-during-coronavirus-lockdown/</a>  <a href="https://heavy.com/news/2020/03/can-you-get-coronavirus-from-cell-phone-headphones/">https://heavy.com/news/2020/03/can-you-get-coronavirus-from-cell-phone-headphones/</a>  <a href="https://www.discovermagazine.com/health/soap-duration-and-water-temperature-what-matters-and-what-doesnt-when-it">https://www.discovermagazine.com/health/soap-duration-and-water-temperature-what-matters-and-what-doesnt-when-it</a></p>	
<p>17.</p>	<p><b>Portable Biosensors for In-field Detection of Pathogenic Bacteria in Food</b></p>	<p><b>Issue</b></p> <p>Contaminated food, mainly by pathogenic microorganisms, is estimated to cause 76 million illnesses, 325,000 serious illnesses resulting in hospitalization, and 5,000 deaths in the US each year. USDA/ERS estimates</p>	<p>Access to Safe and Nutritious Foods</p>

		<p>the medical costs and productivity losses associated with E. coli O157, Salmonella, Listeria monocytogenes and Campylobacter alone amount to at least \$6.9 billion annually. Current methods for the detection of foodborne pathogens rely upon culture plating, PCR and ELISA. However, these methods are time consuming, expensive, and require trained operators with laboratory facilities. Therefore, rapid methods are needed to detect foodborne pathogens in-field or on-site in agricultural and food supply systems.</p> <p><b>Action</b></p> <p>The objective of this project is to develop portable, automated, nanomaterials-based biosensors for rapid detection of foodborne bacterial pathogens in poultry. The biosensor system consists of a magnetic bioseparator for separation of target bacteria from a poultry sample, a 3D-printed detection chamber for holding and mixing a sample, and a fluorescent detector for measuring the signal generated by the presence of target bacteria. Magnetic nanobeads are immobilized with specific antibodies or aptamers to capture target bacterial cells and then separate the cells from a food sample. Quantum dots are coated with specific antibodies or aptamers to attach to the bacterial cells captured on the magnetic nanobeads. After the nanobead-cell-quantum dot complexes are isolated, the intensity of fluorescence emitted by the excited quantum dots is proportional to the concentration of target bacteria. The portable, automatic biosensor system has been designed, fabricated, and evaluated for screening of Salmonella in samples from poultry on farm, processed chicken carcasses in plants and poultry products in the market. The biosensor can provide the necessary specificity (strain level), sensitivity (10-100 cfu/ml or cfu/g) and time (less than 1 h). The testing data can then be directly transmitted to the network or a cloud platform through a smart</p>	
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		<p>phone without delay. The biosensor can be modified to detect different foodborne pathogens in different food products.</p> <p><b>Impact</b> The poultry industry and federal regulatory agencies could adopt this novel biosensing method in food inspection and quality control to ensure food safety. Society could benefit from this technology in terms of reducing foodborne diseases and related medical costs. Applications of the portable biosensors would also enable the poultry industry to benefit economically in terms of prevention of product recalls due to microbial contamination of poultry products.</p> <p><b>Contact:</b> Yanbin Li, Distinguished Professor, Department of Biological &amp; Agricultural Engineering and the Center of Excellence for Poultry Sciences (<a href="mailto:yanbinli@uark.edu">yanbinli@uark.edu</a>)</p>	
<p>18.</p>	<p><b>Short-term effect of whey compared with pea protein (Research)</b></p>	<p><b>The Problem</b> Diets higher in protein have been reported to improve age-related changes in body composition via increased energy expenditure, shifts in substrate oxidation, and decreased appetite. However, how protein source (e.g., animal compared with plant protein) affects energy expenditure, appetite, and food intake as we people is unknown. The objective of this study was to evaluate the effect of protein source as part of a high-protein breakfast on appetite, food intake, energy expenditure, and fat oxidation in young men compared with older men.</p> <p><b>The Work</b> This study used a randomized, single-blinded crossover design, with a 1-week washout period between testing days. Fifteen younger men (25.2years± 2.8 years) and 15 older men (67.7years± 4.5 years), all healthy</p>	<p><b>Access to Safe and Nutritious Food</b></p>

		<p>adults, participated in the study. Participants fasted prior to arrival and consumed 40 grams of an isocaloric, volume-matched, high-protein test beverage made with either an animal [whey protein] or plant [pea protein] protein isolate source. Markers of appetite and energy expenditure were determined at baseline and over 4 hours after consuming the beverage.</p> <p><b>The Results</b>                  There was a significant effect of time, age, and protein source on appetite. There was no effect of protein source on plasma markers of appetite, food intake, energy expenditure, and substrate oxidation. After controlling for body weight, older men had decreased energy expenditure and lower fat oxidation compared with young men.</p> <p><b>The Value</b>                  This study indicates that a high-protein breakfast containing animal [whey protein] or plant [pea protein] protein isolate exerts comparable effects on appetite, energy expenditure, and 24-hour energy intake in both young and older healthy adult men. This suggests that both sources of protein — animal and plant — provide similar health benefits for both younger men and older men, though there are differences in those benefits based on age.</p> <p><b>Researcher:</b> Jamie Baum, Associate Professor-Nutrition</p>	
<p>19.</p>	<p><b>Developing a Low-Cost Method to Improve Rice Nutrition while Reducing Wastewater</b></p>	<p><b>The Problem</b>                  Rice is a staple food for billions of people around the world. However, micronutrient deficiency disorders are widespread in predominantly rice-consuming locations, especially in South Asia and Africa. Micronutrients like iron, calcium, folic acid and vitamin A play important roles in human</p>	<p><b>Access to Safe and Nutritious Foods</b>                  Natural Resource Conservation and Management</p>

		<p>health. Iron is a key component of blood’s hemoglobin, which carries oxygen around the body. Calcium helps fight osteoporosis, high blood pressure and colon cancer. Inadequate intake of folic acid is associated with risk of giving birth to infants with birth defects. Vitamin A deficiency can weaken the immune system and cause delayed growth in children. Fortifying rice with essential nutrients could help improve health for its consumers. Graduate student Annegret Jannasch, working with food science professor Ya-Jane Wang, investigated a low-cost method to fortify rice by parboiling without changing customer eating habits or requiring extensive technology investments, and with a goal to reduce wastewater impact from parboiling.</p> <p><b>The Work</b></p> <p>Existing fortification technologies, such as dusting the grains with a nutrient powder, adding a waxy coating of nutrients, and extrusion of reconstituted grains, all have significant drawbacks in retaining the added nutrients through cooking. They also lack consumer acceptance because of taste, color or texture.</p> <p>It’s estimated that 15 to 20 percent of the world’s milled rice is consumed as parboiled rice. Therefore, fortification by parboiling could be an excellent tool to deliver micronutrients to a large number of people. However, parboiling has a significant drawback because it uses large amounts of water during the process of soaking the grains, then by steaming, drying and milling. Untreated wastewater disposal can also result in nutrient overload in soil, presenting another serious environmental concern.</p> <p>Jannasch and Wang developed a limited-water soaking method using vacuum packaging. To evaluate the method’s effectiveness, they analyzed</p>	<p>Agricultural and Forestry Production and Processing</p>
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		<p>the fortified rice quality attributes, micronutrient content and wastewater impacts, and compared these results to rice fortified by traditional parboiling with excess water.</p> <p><b>The Results</b>                  The limited-water soaking method by vacuum packaging successfully produced fortified rice with minimal impact on rice quality attributes. Simultaneously fortifying rice with iron, calcium, folic acid and vitamin A was found to increase the content of those nutrients in parboiled rice to a level near the levels prescribed by the U.S. Food and Drug Administration for fortified rice. Additionally, the limited-water soaking method reduced overall water usage in the soaking step by 75 percent, resulting in an 89 percent reduction in wastewater on average and a reduction in the amount of total solids in wastewater by up to 85 percent.</p> <p><b>The Value</b>                  The results of this study validate the limited-water soaking method by vacuum packaging as a way to fortify rice with increased micronutrients and reduce wastewater resulting from traditional parboiling methods. The team is currently working on the scale-up of the process from laboratory to commercial production. Oxfam International, a global organization focusing on alleviating global poverty, is funding a project to scale up this process in Burkina Faso, Africa to help them adapt this fortification process to local parboiled rice production processes. As this method is optimized and incorporated into commercial operations, it has the potential to give more consumers access to rice with enhanced micronutrient content without changing their eating habits. The reduction in water usage and wastewater production projected by this method makes for a more sustainable parboiling process. And commercial operators have the</p>	
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		<p>potential to save money on fresh water input costs and wastewater treatment, while providing added value to their customers.</p> <p><b>Funding</b>                  Arkansas Biosciences Institute                  University of Arkansas System Division of Agriculture</p> <p><b>Contact: Ya-Jane Wang, Professor of Food Science and Annegret Jannasch</b></p>	
<p><b>20.</b></p>	<p><b>ArDROP: Traffic calming pop-up leads to connectivity improvements in Forrest City, Arkansas</b></p>	<p>St. Francis County has the highest adult obesity rate in Arkansas at 43.2%. More than two out of five students in the Forrest City School District are overweight or obese. To combat obesity, the Centers for Disease Control and Prevention (CDC) implemented the High Obesity Program (HOP) to increase access to healthy foods and provide safe and accessible places for physical activity.</p> <p>The traffic calming pop-up converted the parallel-running Oak Ave. and Ash St. to one-way streets, added temporary speed bumps, and created walking and biking lanes and crosswalks on the roads with temporary traffic tape. Temporary signage was also used to direct vehicle and pedestrian traffic. After the event, the schools sent a survey home with students to receive feedback on the pop-up event from parents/guardians.</p> <p>After the event, more than 85% of parents agreed that the changes that were implemented made the area safer to walk or bike to school, and more than one-third of parents stated that if these changes were permanent, they would be more likely to allow their children to walk or bike to school. After the pop-up, ArDROP funded portable speed bumps, flashing speed limit signs, and pedestrian safety signs that will be installed to increase pedestrian safety in the area. The addition of these measures creates more opportunity for children to safely engage in physical activity, via walking and biking.</p>	<p>Strengthening Arkansas Families</p>

		<p>Community members have welcomed these changes. The Mayor of Forrest City, Cedric Williams, affirmed, "This safety corridor will test ways to improve visibility and make the area safer for bicyclists and pedestrians, especially youth that utilize these streets to walk to and from school." Specialist Contact: Dr. Bryan Mader <a href="mailto:bmader@uada.edu">bmader@uada.edu</a></p>	
<p><b>21.</b></p>	<p><b>Financial Education Empowers Arkansans</b></p>	<p><i>"Financial education is key to unlocking the foundations of economic opportunity and powering a strong and resilient economy. Americans must acquire financial skills and knowledge to fully participate in our dynamic economy."</i> According to the U.S. National Strategy for Financial Literacy 2020 by the Financial Literacy Education Commission.</p> <p>UADA Extension personal finance educational programs reached 11,817 adult and youth consumers; with 4,486 completing basic personal finance educational programs via in-person, Zoom, or other virtual methods. Participants who responded to program evaluation surveys reported increasing knowledge (69%) and intention to make at least one, positive money management behavior change (48%). Participants who reported using the knowledge gained to change personal finance practices was 36%.</p> <p>Personal finance simulation programs like <b>Get Real</b>, allow students to experience paying monthly expenses and making ends meet. 2,555 students participated in simulations. They learned how to create a spending plan, balance a checking account, and manage debt.</p> <p>The Cooperative Extension Service extends the reach by training volunteers. <b>Master Money Mentors</b> are volunteers who are trained to deliver education programs, guide consumers to reliable resources, and empower individuals to build financial stability. In 2020, Extension developed 9 training modules and trained 44 Master Money Mentors. This project began in partnership with the Reach to Enrich Fort Smith initiative and has expanded across the state.</p> <p>Personal finance education continues to be offered through a variety of virtual formats. The <b>River Valley Estate Planning</b> program was presented in three sessions via Zoom. The sessions were attended by 71 people. Participants</p>	<p><b>Strengthening Arkansas Families</b></p>

		<p>reported they increased knowledge a lot or quite a lot (74%) and said they definitely will use something they learned (85%). <b>Financial Security</b> webinars for educators reached 913 professionals with 11 webinars. <b>Sip and Save</b> is the title of a program that offers a virtual meet-up with a facilitated group discussion about personal finance topics. <b>Your Money Your Goals</b> was a 6-part series presented via Zoom in partnership with the Department of Community Education at Arkansas Northeastern College. Additionally, Extension educators across the state provided research-based information to consumers through articles, blog posts, Twitter and Facebook – including important COVID19 updates on CARES Act benefits, student loan deferment, and making ends meet in face of income loss. <b>Social media</b> reached 7,274 direct contacts and 108,956 indirect.</p>	
<p>22.</p>	<p><b>Congressional Award encourages Arkansas 4-H youth to develop solid life skills, produces 13 medal winners</b></p>	<p>Arkansas 4-H members are involved in extensive activities related to leadership development, community service and personal growth through work on projects of their choice. Much of their efforts also satisfy requirements for the Congressional Award, the highest honor the United States Congress presents to America's civilian youth. To receive the award, youth must apply for it. Arkansas 4-H has become a partner with the Congressional program and encourages its members to pursue the award.</p> <p><b>The Work</b></p> <p>The Congressional Award, created in 1979, is an individual challenge open to all youth between 13.5 and 24 years old regardless of background, ability, or grade point average.</p> <p>Participants earn bronze, silver, and gold Congressional Award certificates and medals by setting and working toward goals in four areas: voluntary public service, personal development, physical fitness, and expedition/exploration.</p> <p>The highest award — a gold medal — requires 400 hours of public service, 200 hours of personal development, 200 hours of physical fitness, and completion of</p>	<p><b>Strengthening Arkansas Families</b></p>

		<p>a five-day expedition or exploration. Earning a gold medal takes no less than two years of work.</p> <p>Arkansas 4-H encourages its members apply for this prestigious award for the work they do in 4-H. 4-H leaders show club members how their 4-H project work aligns with the Congressional Award requirements. For example, a 4-H member involved with a beef project might meet the Congressional Award’s personal development hours by engaging in a county fair project, participating in the livestock skills team or a beef quiz bowl team, and attending an Arkansas Cattlemen’s Association meeting or Farm Bureau meeting.</p> <p><b>The Results</b></p> <p>The Congressional Award program has gained momentum in 2020, with 13 Arkansas 4-H members from seven counties receiving Congressional Awards. Of these, four youth earned gold medals, three earned silver medals, and six received bronze medals.</p> <p>One gold medal recipient — Joshua Stettmeier of Fayetteville — spent 414 hours collecting and distributing bikes, mentoring children, providing lawncare for elderly neighbors, and delivering food to families facing food insecurity. Collectively, the youth contributed nearly 4,000 hours of community service and spent thousands of hours improving their physical fitness and personal development.</p> <p><b>The Value</b></p> <p>The Congressional Award provides an incentive and an honor for youth who commit themselves to years of goal setting and community engagement. Their respective communities benefit from the hundreds of hours of community service they provide. The recognition reinforces good habits of goal setting, record keeping, perseverance, community engagement and service to others</p>	
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		<p>that set Arkansas youth to be successful adults, engaged citizens, and promising leaders of tomorrow.</p> <p><b>Specialist Contact:</b> Valerie T. Seefeld, 4-H Youth Development Associate, <a href="mailto:vseefeld@uada.edu">vseefeld@uada.edu</a></p>	
<p><b>23.</b></p>	<p><b>Southern Region Virtual Volunteer Conversations (Multistate)</b></p>	<p>Reaching volunteers with quality materials and programs was complicated by restrictions brought upon by the COVID 19 Pandemic, which limited face-to-face interactions with volunteers and 4-H youth. In order to empower our volunteers with tips and tools to continue their work with youth during the pandemic, a series of virtual conferences were hosted by University of Arkansas System Division of Agriculture in cooperation with volunteer specialists from across southeastern United States. These Virtual 4-H Conversations served over 400 volunteers and professionals from 19 states. Initial surveys (82 respondents) from early in the quarantine indicated that 57% of the volunteers from across Southeastern United States surveyed were concerned with how to continue meeting with their youth using virtual technologies and finding time to meet with the youth virtually (n=47).</p> <p>To address the need to improve communication, and to empower volunteers to work within the constraints of the pandemic, a series of 4-H Virtual Volunteer Conversations were launched. These conversations were hosted by Arkansas 4-H, with collaboration of State 4-H Volunteer Specialists across the southern region of the United States. The conversations were kept semi-formal to allow for candid conversations with the volunteers participating. A series of informal polls and surveys were scattered during the sessions to keep the volunteers engaged and the conversation moving in a productive direction. Data collected from these polls is still being analyzed and will be presented at the 2021 NECV conference in April of 2021.</p> <p>As a result of the initial 3 virtual conversations, which were attended by over 400 volunteers from across 19 states, continued quarterly zooms have been</p>	<p><b>Strengthening Arkansas Families</b></p>

		<p>scheduled with themes of community service, improving communications, virtual training opportunities, and taking PYD into a virtual world. Multiple states have increased state level monthly virtual trainings as a result of these conversations, and participation in virtual training opportunities has increased, with traditional state-level opportunities for training broadening their reach to regional level trainings.</p> <p><b>Specialist Contact:</b> Hope Bragg- Instructor- 4-H Youth Development, <a href="mailto:hbragg@uada.edu">hbragg@uada.edu</a></p>	
<p>24.</p>	<p><b>Arkansas Procurement Technical Assistance Center clients earn contracts, create, retain jobs</b></p>	<p><b>The Problem</b>                  Many small business owners in Arkansas want to expand their client base by securing governmental contracts, but they don't understand the regulations and procedures for submitting bids.</p> <p><b>The Work</b>                  As part of a national network of Procurement Technical Assistance Centers, the Arkansas PTAC helps small businesses compete successfully in the government marketplace. They do this by:</p> <ul style="list-style-type: none"> <li>• Helping businesses pursue and perform under contracts with the Department of Defense, other federal agencies, state and local governments and with government prime contractors</li> <li>• Helping businesses get registered in systems such as the System for Award Management (SAM), identify contract opportunities, understand requirements, and prepare and submit bids.</li> <li>• Providing one-on-one technical assistance.</li> <li>• Connecting small business clients to purchasing officials within the federal, state and local government</li> </ul>	<p><b>Building Communities and Strengthening Economies</b></p>

		<ul style="list-style-type: none"> <li>• Providing training events throughout the year to help business owners learn how to find contract opportunities and how to navigate the through procurement regulations and procedures for submitting bids.</li> </ul> <p>The Arkansas Procurement Technical Assistance Center (PTAC) is funded in part through a cooperative agreement with the Defense Logistics Agency (DLA). PTAC’s services are free.</p> <p><b>The Results</b></p> <p>For the past three years, Arkansas Procurement Technical Assistance Center has seen an increase in the number of clients receiving contracts, the number of contacts awarded, and the collective value of awarded contracts.</p> <p>As a result of PTAC’s work during the federal fiscal year reporting period Oct. 1, 2019 – Sept. 30, 2020:</p> <ul style="list-style-type: none"> <li>• 923 Arkansas clients received one-on-one counseling session or attended an event. This marks an increase from 716 in clients in the 2017-18 fiscal year and 788 clients in the 2018-19 fiscal year.</li> <li>• Arkansas PTAC clients were awarded 1,905 contracts – up from the 1,332 contracts awarded in the 2017-18 fiscal year and 1,054 contracts awarded in the 2018-19 fiscal year.</li> <li>• The collective dollar value of government contracts that Arkansas PTAC clients received was \$189,694,894. This is more than the \$135.8 million in contracts received in the 2017-18 fiscal year and \$165 million in contracts received in the 2018-19 fiscal year.</li> </ul>	
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		<ul style="list-style-type: none"> <li>• 4,031 jobs were created or retained because of the government contracts – up from 2,887 jobs in the 2017-18 fiscal year and 3,516 jobs in the 2018-19 fiscal year.</li> </ul> <p><b>The Value</b> Arkansas businesses benefit from Arkansas PTAC’s knowledge and technical assistance and are able to secure contracts with governmental agencies. These contracts, in turn, stimulate the growth of Arkansas’ economy through job creation and preservation. Also, the center helps public agencies achieve diversity goals through an expanded pool of vendors.</p> <p><a href="https://www.uada.edu/business-communities/arkansas-ptac/default.aspx">https://www.uada.edu/business-communities/arkansas-ptac/default.aspx</a></p> <p>Specialist- Melanie Berman, MPA, mberman@uada.edu</p>	
25.	CREATE BRIDGES (multi-state)	<p>CREATE BRIDGES - Celebrating REtail, Accommodations, Tourism, and Entertainment by Building Rural Innovations and Developing Growth Economies - is an ongoing rural economic development program being piloted in Arkansas, Kentucky, and Oklahoma in collaboration with the Southern Rural Development Center. In Arkansas, the two regions are Ozark Foothills (Sharp, Izard, and Fulton) and 3Cs (Little River, Howard, and Sevier). The program focuses on retail, accommodations, tourism, and entertainment sectors (referred to as CREATE businesses) and is designed to engage business owners, employees, and community members to raise awareness of the importance of these businesses and workers to communities and to identify and address their needs. These sectors were chosen because they are traditionally overlooked in economic and workforce development efforts, yet they are the primary job entry point and comprise approximately 25% of the state’s workforce.</p>	<p><b>Building Communities and Strengthening Economies</b></p>

		<p>During the 2020 program year, the program teams from each state wrapped up data collection gathered through one-on-one and group interviews with CREATE business owners and surveys of workers. In Arkansas, 114 business owners were interviewed, and 100 anonymous responses were received through the employee perspective survey. As a result of data collection and earlier engagement activities, early impacts emerged in Arkansas:</p> <ul style="list-style-type: none"> <li>• Communities in the selected regions have been communicating more frequently on shared activities and events including cross-promotion of food and music festivals.</li> <li>• The Chamber of Commerce in one community with a growing Hispanic business community has begun to provide more multi-lingual opportunities, and in some cases, Spanish-language only opportunities that have traditionally been offered in only English</li> <li>• Two Chambers of Commerce have expanded business retention and expansion efforts to include other types of businesses based on the popularity of the interviews.</li> <li>• A local innovation hub has hosted workshops based on topics that have come up in business retention and expansion interviews.</li> </ul> <p>By March 2020, as teams were planning to engage community leaders in long-term strategy identification and implementation, the COVID-19 pandemic began to affect CREATE businesses immensely. It became clear that CREATE BRIDGES was uniquely centered to provide support and guidance to these businesses as they were forced to scale down, pivot to new services and products, or close down entirely due to healthy safety concerns leaving business owners and their workforce struggling to keep going. In response, the Arkansas team conducted two immediate needs</p>	
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		<p>strategy meetings virtually with attendance from both regions. Strategies identified and implemented were:</p> <ul style="list-style-type: none"> <li>• Hiring regional coordinators to connect with business owners individually and swiftly respond to needs during the pandemic. These three coordinators initiated individual meetings with 112 business owners to discuss their immediate needs, collected information about how their products and services have changed, distributed signage, and connected with them to appropriate state agencies or other resources. Business owners have expressed appreciation for the individual attention and the support the coordinators have provided in helping interpret and implement state pandemic directives.</li> <li>• Standardized retail signage announcing changes in sanitation and services.</li> <li>• Creation of an information hub where state health and safety practices pertaining to these industries can be easily found (<a href="https://uaex.uada.edu/business-communities/strategic-planning/support-resources.aspx">https://uaex.uada.edu/business-communities/strategic-planning/support-resources.aspx</a>).</li> <li>• Sharing best practices of businesses that successfully transitioned or pivoted during the pandemic (<a href="https://uaex.uada.edu/business-communities/strategic-planning/podcast.aspx">https://uaex.uada.edu/business-communities/strategic-planning/podcast.aspx</a>).</li> </ul> <p>In September 2020, state teams transitioned to long-term strategies. In Arkansas, each region held two strategic meetings to identify priorities and determine activities to address priorities. In response to this, the Arkansas team is creating a workforce development curriculum, in partnership with two region community colleges and the state workforce agencies. This curriculum includes focus on customer service, sector-specific technology, marketing, hospitality, and region-specific technology and will launch in</p>	
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		<p>March 2021. For more information about CREATE BRIDGES in Arkansas, visit <a href="https://uaex.uada.edu/createbridges">https://uaex.uada.edu/createbridges</a>).</p> <p>Although the pilot project is ongoing, early successes led to additional funding to expand the program to three additional states (North Carolina, New Mexico, and Illinois) in 2020. For more information about the overall multi-state project, visit <a href="http://srdc.msstate.edu/createbridges">http://srdc.msstate.edu/createbridges</a>.</p>	
<p>26.</p>	<p><b>Assisting small businesses stay afloat during COVID-19</b></p>	<p><b>Relevance</b></p> <p>When COVID-19 hit Arkansas, consumers were encouraged to stay home to avoid catching and spreading the virus. As a result, small businesses had to quickly make decisions on how to adapt. Some found themselves having to close their doors due to lack of patronage while others were mandated to cease traditional operations for the safety of their employees and the public. Some were able to transition to alternative products, delivery services or other changes to their business model in order to stay afloat. As circumstances changed, often on an hourly or daily basis, many business owners and workers struggled to keep up with current directives, guidelines, and resources available to them. In addition, consumers were looking for ways to support their local small businesses.</p> <p><b>Response</b></p> <p>Under the leadership of Community, Professional &amp; Economic Developments Kim Magee, the University of Arkansas System Division of Agriculture launched a multi-pronged approach toward supporting small businesses in Arkansas. This included continuous research on policies, programs and information from state and federal agencies, as well as from nonprofits and other entities working to support businesses. As relevant information was identified, it was packaged for dissemination in multiple ways, such as videos, infographics, social media, blog articles and other web-based content. A new Small Business &amp; Workplace COVID-19</p>	<p><b>Building Communities and Strengthening Economies</b></p>

		<p>Resources webpage was created with nearly daily updates since late March. A toolkit with resources for county extension agents to share was also created with support provided by Magee for agents answering clientele questions. Education was geared toward small businesses of all types, as well as targeting the general public with ways they could support small businesses.</p> <p><b>Results</b></p> <p>As of June 19, social media efforts related to small businesses on Community, Professional &amp; Economic Developments Facebook, Twitter and Instagram accounts had 151,856 views. While not solely the result of posts related to small businesses since other content is posted as well, the number of followers of our @UACommunityDevelopment Facebook page has grown nearly 50 percent from 914 followers to 1,350 since March 15. Tweets on @uaex_CommDev are averaging 350 impressions a day for the same period. The Small Business &amp; Workplace COVID-19 Resources webpage was viewed by 538 unique visitors, and our internal site with resources for county extension agents had 65 unique visitors. A week-long Supporting Small Business Bingo contest on Facebook highlighting ways the public can support small businesses resulted in reported actions by the public to support 57 small businesses.</p> <p><b>Resources</b></p> <p><a href="https://www.uaex.edu/business-communities/business-entrepreneurship/covid-19-resources.aspx">https://www.uaex.edu/business-communities/business-entrepreneurship/covid-19-resources.aspx</a></p> <p><b>Contact:</b> Kim Magee, kmagee@uada.edu</p>	
<p><b>27.</b></p>	<p><b>Arkansas Farm Corps</b></p>	<p>When COVID-19 restricted travel across state and international lines, there was a labor shortage for tasks normally completed by seasonal workers from other countries. This shortage prompted the creation of the Arkansas Farm Corps program, which mirrors other state-level versions across the</p>	<p><b>Building Communities and Strengthening Economies</b></p>

		<p>country. Farm Corps is an initiative led by Congressman Rick Crawford, in partnership with the National Guard and Farm Bureau. The mission of the Arkansas Farm Corps program is to provide a ready, willing, and able workforce of National Guard and Reserve soldiers, sailors, airmen, marines, and other military veterans in service to American agriculture. To assist farmers and service members looking for employment, a job posting site was established. The University of Arkansas System Division of Agriculture was well positioned and enlisted to get the site up and running quickly and efficiently. First, an online survey was developed and shared by program partners to farmers across the state through text, social media, email, and websites. The survey collected farmer needs including county they reside in, the number of workers needed on their farm, the time-frame for workers needed on their farm, what type of work skill needed, and any additional comments, needs, or concerns.</p> <p>Using data submitted through the survey, a list of job postings was published on the University of Arkansas System Division of Agriculture’s website (<a href="https://uaex.uada.edu/life-skills-wellness/health/covid19/Arkansas_Farm-Corps.aspx">https://uaex.uada.edu/life-skills-wellness/health/covid19/Arkansas_Farm-Corps.aspx</a>) where those seeking jobs could search. The site was updated daily starting in April through September, then updated only as new job postings were submitted through the survey, or when farmers reached out to request that postings be taken down because they’d been filled.</p> <p>Project partners helped spread the word to military veterans looking for work. Since April 2020, the Farm Corps site had 62 farmers post 324 job openings through the Farm Corps website. The Farm Corps page was the fifth most visited page of Division of Agriculture COVID-19 pages. Forty job listings currently remain.</p>	<p>Agricultural and Forestry Production and Processing</p>
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<p><b>28.</b></p>	<p><b>Arkansas 2020 Census Education and Outreach</b></p>	<p>The decennial Census provides a snapshot of our nation-- who we are, where we live and so much more. This once in lifetime count provides information used to make a wide variety of funding and policy decisions on the national, state, and community levels. Data gathered by the census determines how \$9 billion dollars in federal funding is dispersed across the state to support programs integral to rural development.</p> <p>According to a brief put out by The Center on Poverty and Inequality, Hard-to-Count (HTC) groups and areas are those at particular risk of being missed in the census. Seventy-nine percent of the HTC counties in the 2010 Census were in rural areas. Rural America is also home to many people who are considered harder to enumerate for other reasons. People of color, those with low incomes, and other hard-to-count populations living in rural areas may be at increased risk of being undercounted due to the digital divide. Residences in the most rural and remote regions, as well as hidden residences, are also more difficult to enumerate.</p> <p>In preparation of the 2020 Census, Extension staff, in collaboration with U.S. Census Bureau staff and other partners, worked to plan, coordinate, and execute the 2020 Census educational and outreach program aimed at educating Extension professionals and the public about the importance of completing the 2020 Census.</p> <p>The Arkansas 2020 Census Toolkit included social media content, newsletter articles, presentation slides, a display board, fact sheets and FAQs, train-the-trainer materials for use with volunteer groups, and COVID-19 related information that agents and others could use in local programming. In addition to the toolkit, multiple webinars were held for agents and the public, a 2020 Census website was created, and dozens of social media and blog posts were released. The Census team also coordinated and launched two initiatives aimed at bolstering county</p>	<p><b>Building Communities and Strengthening Economies</b></p>
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		<p>participation. The 2020 Response Rate Challenge encouraged county agents to post their county response rate using an original social media graphic on a weekly basis. The 2020 Census Video Challenge encouraged county agents to interview local government officials, 4-Hers and other community stakeholders about the importance of completing the 2020 Census in an attempt to establish trust among skeptical groups.</p> <p>Despite pandemic-related restrictions that severely limited in-person activities, county and state Extension staff reported 914 direct contacts through demonstrations, educational classes, meetings, one-on-one consultations, and staffed displays. They also reported 8,535 indirect contacts through email, mail, phone, newsletters, and other outreach. Many county agents partnered with libraries, schools, and other stakeholders to provide information about 2020 Census mobile support sites for community members without broadband access. There were also several county agents who provided 2020 Census information at community locations/events such as food pick up sites. At least 10 county agents utilized 1:1 support to identify hard-to-count populations within their counties and customized content and outreach strategies to reach them directly. Because of the pandemic, social media accounted for the broadest reach with 13,705 direct social media contacts and 108,492 indirect social media contacts. Thirty-seven county agents participated in 2020 Census Response Rate Challenge.</p>	
<p>29.</p>	<p><b>Global benefits of public rice breeding programs</b></p>	<p><b>The problem</b>                  Food insecurity is as worldwide issue. Publicly funded programs aimed at breeding staple grains such as rice can help not only commodity producers by increasing yields, but also make food more affordable and plentiful for population around the world that suffer from food insecurity.</p> <p><b>The work</b></p>	<p><b>Building Communities and Strengthening Economies</b>                  Access to Safe and Nutritious Foods</p>

		<p>Researchers with the University of Arkansas System Division of Agriculture investigated the social and economic impacts of the Arkansas rice breeding program. Dr. Lanier Nalley was the corresponding author of “Estimating the Benefits of Public Plant Breeding Programs,” published in the <i>Journal of Agricultural Economics</i> and co-authored by Drs. Karen Moldenhauer, rice breeder for the Division of Agriculture, and Alvaro Durand-Morat, assistant professor in agricultural economics and agribusiness.</p> <p>The study looks specifically at increases in revenue, total exports and the global welfare effects derived from the Division of Agriculture’s rice breeding program, based on data from 1983-2016.</p> <p><b>The results</b></p> <p>The study found that the genetic gains provided by the rice breeding program increased both the yield and quality of rice crops, providing growers with an additional \$31 million in revenue annually. It was also found to have increased rice exports by about 53,000 metric tons annually and lowered food costs in low-income countries.</p> <p><b>The value</b></p> <p>Efforts to increase rice yields have helped to feed larger numbers of people in low-income countries, where much of the population spends a majority of its disposable income on food. Through higher global grain stocks and competition, overall food prices have decreased in many of these areas</p> <p><b>Contact:</b> Lanier Nalley. Professor, Department of Agricultural Economics and Agribusiness. <a href="mailto:lnalley@uark.edu">lnalley@uark.edu</a></p>	<p>Agricultural and Forestry Production and Processing</p>
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<p><b>30.</b></p>	<p><b>Economic Impacts of COVID-19 (Integrated)</b></p>	<p>The COVID-19 virus pandemic has led to unprecedented interruptions in economic activity around the world. Disruptions such as availability of labor, changes in consumer behavior and spending, governmental restrictions and relief programs, and many other pandemic-related effects have had major impacts on agricultural and non-agricultural businesses, consumers, local governments, and other entities.</p> <p>As early as April 2020, Extension and research economists with the University of Arkansas System Division of Agriculture began and continue to analyze the effects of the pandemic on the state's agricultural and rural economies. Many of these studies were done in collaboration with faculty from other states. Areas of focus include economic factors and impacts on:</p> <ul style="list-style-type: none"> <li>• Food and agricultural markets, including specialty crops</li> <li>• Meat and dairy production, markets, and industry</li> <li>• Row crop production, markets, and industry</li> <li>• Timber industry</li> <li>• Employment</li> <li>• Consumer behavior</li> <li>• Coronavirus Food Assistance Program Payments</li> <li>• Net farm income</li> <li>• Gross domestic product</li> <li>• Local government</li> <li>• Tourism</li> </ul> <p>This information was communicated to stakeholders and the public through media interviews, webinars, and reports available on our website (<a href="https://uaex.uada.edu/life-skills-wellness/health/covid19/COVID-Economic_Impacts_in_Arkansas.aspx">https://uaex.uada.edu/life-skills-wellness/health/covid19/COVID-Economic_Impacts_in_Arkansas.aspx</a>). Analytics show that the economic impacts webpage had 1,086 unique pageviews between April 1 and September 30, 2020. Agricultural and non-agricultural businesses have</p>	<p><b>Building Communities and Strengthening Economies</b></p>
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		<p>used this information to make production, marketing, and financial planning decisions. Industry groups, nonprofits, and government entities relied on this information to inform programs and policies to help Arkansas businesses, consumers, and workers. Local governments used this information to understand needs of their communities during the pandemic and plan for its impacts on their ability to provide services. This information was also used to inform other education efforts offered by the University of Arkansas System Division of Agriculture to help Arkansans cope and adapt to the pandemic.</p> <p><b>Specialist Contact:</b> Dr. John Anderson, <a href="mailto:jda042@uada.edu">jda042@uada.edu</a></p>	
<p>31.</p>	<p><b>COVID-19 IMPACTS ON LOCAL FOOD SYSTEMS</b></p>	<p><b>ISSUE</b></p> <p>Arkansas follows the national trend of increasing interest and support for local food systems. Farmers are increasingly seeking out direct to consumer options to diversify their business revenue streams and grow their markets. According to 2017 Census of Agriculture, Arkansas has 1,509 farmers selling products directly to consumers with a \$9.2 million value of products sold. These figures represent an increase of 8.4 percent in number of farms and an increase of 44.7 percent in market value of products. The 2020 COVID-19 pandemic seriously threatened the existence and viability of these growing markets because of uncertainty and anxiety among consumers. The myriad of issues included food safety, social distancing regulatory guidelines, economic slowdown, market openings and/or availability, labor disruptions and changing consumer perceptions.</p> <p><b>ACTION</b></p> <p>UA System Division of Agriculture faculty worked to promote tools and resources to aid farmers markets and direct marketing farmers in promoting recommendations on how to respond as well as raise awareness of changing consumer perceptions on local food. Faculty led</p>	<p><b>Building Communities and Strengthening Economies</b></p>

		<p>integrated efforts throughout the year that included 1) a survey of Arkansas’ farmers market managers, 2) a webinar to discuss COVID impacts on local food systems including promoting survey results, 3) promoting online marketing options for farmers including <a href="#">MarketMaker</a>, an online platform provided by UA Division of Agriculture.</p> <p>Through collaboration with the Arkansas Farmers Market Association, an online convenience survey was administered to market managers across the state in late March/early April to examine market initial responses as well as promoting that the markets were considered “essential” as it relates to COVID. The survey results were posted online, Microsoft Word - Farmers Market Survey Results April 2020_2 (uada.edu) in April, and shared via a webinar, Local Foods Open Space Community Discussion (uada.edu), held May 11 as well as a UA Cooperative Extension Service press release was launched on May 18th and August 5th (National Farmers Market Week).</p> <p><b>IMPACT</b></p> <p>Across the state, over twenty (22) local state newspapers carried stories in May detailing how the state’s “Farmers Markets in getting back to business”. The survey revealed that 69% of the state’s markets planned to open and detailed some of the adjustments being made to promote vendor and customer safety as well as services. Articles were carried in the statewide paper, two magazines, radio and internet interview. Articles raised awareness of market openings for both vendors and more importantly consumers. As markets began to close in late summer, efforts provided another round of promotional efforts promoting Arkansas markets and direct sales opportunities during National Farmers Market Week in early August. Anecdotal responses reveal that markets had an</p>	
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		<p>okay year financially given the disruptions. However, direct marketing farmers have reported experiencing a solid sales year.</p> <p><b>CONTACTS</b>                  Ron Rainey, Department of Agricultural Economics and Agribusiness,  <a href="mailto:rrainey@uada.edu">rrainey@uada.edu</a></p>	
<p>32.</p>	<p><b>Southern Risk Management Education Center (Multistate)</b></p>	<p><b>ISSUE</b>                  The financial health of the U.S. farm sector has been closely watched as the global pandemic continues, world markets fluctuate caused by regional economic activity, production impacts, and climate variability. According to USDA’s Economic Research Service, 2020 net cash farm income is forecast at \$115.2 billion which is an increase of 4.5 percent relative to 2019. However, cash receipts from commodity sales are expected to decrease 3.3 percent for the year. A significant portion of the increase in net farm income is related to direct government payments which are forecast to increase \$14.7 billion (up nearly 66 percent in 2020. Successfully managing the myriad of farm business risks that farmers and ranchers face continues to be a primary need for these businesses to remain viable.</p> <p><b>ACTION</b>                  UA System Division of Agriculture through the Southern Risk Management Education Center empowers producers to manage risk on their operations throughout the southeast region. Through a collection of capacity enhancing efforts—competitive educational grants, online risk management workshops, online resources, etc.—SRMEC aids in the development of decision tools and technical assistance resources to help farmers enhance their understanding and improve their risk mitigating strategies. SRMEC actively managed forty-seven (47) grant funded projects collectively totaling more than \$2 million that targeted producers</p>	<p><b>Building Communities and Strengthening Economies</b>                  Agricultural and Forestry Production and Processing</p>

		<p>throughout the region’s 13 states and two territories. Additionally, SRMEC led efforts to promote online multi-state webinars delivered across the region to serve clientele during the pandemic. The Center developed a webinar link, <a href="https://uada.edu">SRMEC Webinars (uada.edu)</a>, on its website to promote the collaborative regional resources.</p> <p><b>IMPACT</b></p> <p>As part of the Extension Risk Management Education Program, SRMEC uses the program nomenclature that classifies risks across five distinct areas—production, marketing, financial, human and legal in terms of agricultural management. We focus on impacts as changes in project participant knowledge and behavior at the individual producer level. Producer actions are measured by understand, analyze, develop, decide, and implement. Therefore, individual participants can report multiple actions from a specific risk management topic—objective.</p> <p>To date, our projects reported reaching 5,531 individual producers across the region. These producers through evaluation processes reported 32,943 unique producer actions achieved by participating in the trainings. The proportion of producer actions across reported areas were: 52% - understand, 21% - analyze, 11.4% - develop, 7.5% - decide and 9% - implement. Importantly, almost one out of every six (16.5%) reported producer actions indicate a change in participant behavior as they made a decision on a business strategy and/or begin implementing a change to enhance management of the risks their operation faces.</p> <p><b>CONTACTS</b></p> <p>Ron Rainey, Department of Agricultural Economics and Agribusiness 501-671-2175 <a href="mailto:rrainey@uada.edu">rrainey@uada.edu</a></p>	
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<p><b>33.</b></p>	<p><b>Discovery Farms - Learning about Soil and Water Conservation (Integrated)</b></p>	<p><b>Issue</b>                  Natural resource concerns associated with agriculture continue to prompt a combination of voluntary, regulatory and judiciary actions in Arkansas. Livestock agriculture faces scrutiny amid concerns of nutrient losses to waterbodies from land application of manures while row crop agriculture in Arkansas is under increasing pressure to reduce any nutrient and sediment inputs to help minimize the hypoxia in the Gulf of Mexico. In Eastern Arkansas, there is increasing concern about the sustainability of groundwater to meet future irrigation demand for row crops and the expansion of poultry production in Northeastern Arkansas.</p> <p><b>Action</b>                  In response, the University of Arkansas System Division of Agriculture is conducting research and delivering educational programs such as the Arkansas Discovery Farm program, nutrient management training, soil and water conservation, soil health and watershed stewardship to help agricultural producers voluntarily address natural resource concerns. The Arkansas Discovery Farm Program utilizes edge-of-field monitoring of both the quantity and quality of inflow (precipitation and irrigation) and outflow (runoff) from fields on real, working farms. Data is being collected to quantify nutrient and sediment losses to determine off-farm environmental impacts and to address long-term sustainability and profitability. There are currently twelve Discovery Farms strategically placed across the State to represent the predominant livestock and row crop enterprises. Discovery Farms are utilized to promote stewardship through our website, at field days and tours and through oral presentations throughout the State at various events. Our Discovery Farmers are using the data to make management changes to ensure better protection of the environment while increasing profitability by increasing</p>	<p><b>Natural Resource Conservation and Management</b>                  Agricultural and Forestry Production and Processing</p>
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		<p>efficiency and adopting soil and water conservation practices. Discovery farmers are being utilized to educate others by making presentations using their data at state, regional and national levels. The University of Arkansas System Division of Agriculture continues to provide nutrient management certification training to plan writers and nutrient applicators on behalf of the state per ANRC Title XXII. We also worked with conservation partners to revise the Arkansas P-Index for pastures as well as nutrient management standard 590. We have transferred our training curriculum to an on-line educational platform. We continue to provide education to agricultural producers on soil and water conservation by evaluating and demonstrating conservation practices and promoting USDA-ARS financial assistance programs such as EQIP and the Mississippi River Healthy River Basin (MRBI) initiative. Three of our Discovery Farms provide the edge-of-field monitoring for MRBI project areas. Conservation outreach is achieved via a website, <a href="http://watersustainability.wordpress.com">watersustainability.wordpress.com</a>, fact sheets, oral presentations, field demonstrations, field days and tours. We are actively conducting on-farm soil health research and educational programs including the development of a soil health database using key indicators and conducting soil health demonstrations in twenty Counties where we are comparing the effects of cover crops on increasing soil infiltration and water storage using soil moisture sensors at various depths in the cash crops.</p> <p><b>Impact</b></p> <p>The Arkansas Discovery Farm is only in its 10<sup>th</sup> year of on-farm data collection, yet is garnering national interest and is being financially supported at nearly \$2 million by 15 different sources, which indicates universal appeal. One important aspect is the ownership being taken by the stakeholders and farmers who guide and direct this program. The</p>	
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		<p>the natural resources we are trying to protect or the economic value to landowners who are having to make changes to accommodate new regulations or court-issued decrees. As we move forward and create more awareness and transfer more soil and water conservation technology, we do know that we are aiding in prevention of degrading water quality, which collectively is much less costly than having to make remediation and restoration efforts.</p> <p><b>Contact</b>                  Mike Daniels, Professor, Department of Crop, Soil, and Environmental Sciences, <a href="mailto:mdaniels@uada.edu">mdaniels@uada.edu</a></p>	
<p>34.</p>	<p><b>Water Management and Water Use Efficiency</b></p>	<p><b>Issue</b>                  There is great concern about the sustainability of groundwater to meet future irrigation demand for row-crops in Arkansas. Water management and water use efficiency need innovative solutions</p> <p><b>Action</b>                  In response, regional water management programs have identified a number of technologies and management practices that can reduce the overdraft on the Mississippi Valley Alluvial and Sparta Aquifers, thereby ensuring that soybean producers can achieve sustainable groundwater yields while maintaining overall profitability. One of the Irrigation Water Management Practices that has demonstrated a water savings of 25% is Multiple Inlet Rice Irrigation (MIRI). However, a challenge has been the implementation and planning of MIRI because no tools exist to successfully implement MIRI. Another water saving technology, Alternate Wetting and Drying (AWD) aka Intermittent Flooding of rice requires the proper implementation of MIRI on precision grade or contour levees to implement AWD.</p>	<p><b>Natural Resource Conservation and Management</b>                  Agricultural and Forestry Production and Processing</p>

		<p><b>What Was Done</b></p> <ol style="list-style-type: none"> <li>1. A mobile app, “Rice Irrigation” has been under development since 2012 for Android operating systems and was made available in 2016. An iOS version for apple products was released in January of 2017 and again updated in 2020, they are available on google play and the apple app store for phones and tablets. Most growers have or use Apple products as almost no usage was observed between 2016 and 2017. Awareness of the app has been mostly by word of mouth and twitter, and brief mention at industry meetings. In 2019 an education effort was started to train end users on the app, twenty people attended the two schools.</li> <li>2. An irrigation yield contest was initiated. Participants acquired a portable flow meter, where the installation is verified and sealed to prevent tampering. Rain was predicted for each site using a computer-based tracking system. Yield was measured on 3 acres for a minimum sized 30 acre field. Participant made their own irrigation decisions. County Agents served as advisors for irrigation management and judges for the yield measurement. Some contestants used the tools they learned about in Irrigation Schools to improve their irrigation management. Contests were established for three commodities, corn, soybeans, and rice. Financial support was provided by commodity boards and industry. All corn and soybean fields were furrow irrigated.</li> <li>3. A series of full day irrigation schools were delivered to irrigators, a series of trainings for irrigators was held, one was a surge irrigation school and the other a soil moisture sensor school. Since 2018, 205 participants have attended the surge school and 230 have attended the soil moisture schools for a total of 1025 contact hours. Schools</li> </ol>	
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		<p>are limited to 20 people per school and these are designed as intense learning environments, with an average of 2-5 contact hours. Four schools were delivered in 2020 for a total of 84 attendees; however, two schools were canceled due to the pandemic. Attendees were represented by 25 counties in Arkansas.</p> <p><b>Impact</b></p> <ol style="list-style-type: none"> <li>1. The 143,730 acres of planned MIRI represents 12% of the 1.4 million rice acres grown in Arkansas. The impact of this implementation is an annual savings of 340 billion gallons of water for an Extension program that has only conducted a handful of small trainings.</li> <li>2. The Irrigation Yield Contest program is providing key data on water use, yields, and water use efficiency. The participants are demonstrating extremely high yields, low water use and high water use efficacies. Most importantly the contest demonstrates the full effect and results that can be achieved when irrigators apply highly managed crop production and irrigation management practices. The program is demonstrating how a comprehensive approach to Irrigation Water Management (IWM) can achieve sustainability. In summary the yields, water use efficiency and extremely low irrigation depths participants were able to achieve are nothing but short of amazing. Irrigation application rates were nearly half or more than half of the long term average water demand assumed and reported. This program demonstrates that through management and the use of off the shelf irrigation technology, large gains are possible to attaining a sustainable yield from the aquifer.</li> </ol>	
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