Arkansas (University of Arkansas System Division of Agriculture) Annual Report - FY2021

Report Status: Approved as of 07/08/2022

Contributing Organizations

University of Arkansas System Division of Agriculture

Executive Summary

Overview

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. An office/educational complex for a fifth Research and Extension Center focusing on rice production is currently in the design/construction phase. 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, 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, workshops, 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 2021 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 FY2021 program year's efforts were greatly impacted by the ongoing the COVID-19 pandemic. Despite the changes made throughout the year, the Division of Agriculture Extension educators reached Arkansans over 13.6 million times, which is a decrease compared to FY2020. This decrease can be attributed to the coordinated effort to disseminate COVID-19 information in FY2020, which was a much smaller portion of Extension efforts in FY2021. When compared to FY2019, pre-pandemic, the Division of Agriculture Extension professionals only realized a 6.9% loss in contact figures. Social media and websites continue to be a method increasing in contacts each year. In FY2021, UADA Extension saw over 12 million contacts (both direct and indirect) reached from various social media and website platforms. The use of Zoom and other live program delivery platforms has continued and through these efforts UADA Extension conducted over 11,000 sessions, generating almost 59,000 contacts.

The Division of Agriculture relies heavily upon volunteers for increasing the impact and reach of our Extension programs. The main volunteer groups include Master Gardeners, 4-H volunteers, and the Extension Homemakers. In addition to other volunteers who gave their time and energy to the Extension programs, during FY2021 Extension volunteers served over 484,000 hours for a value of $13.8 million (Independent Sector, 2021).

During 2021, 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 19,769 participants in FY2021 through 121 course offerings, more than doubling participation when compared to FY2020. Some of the noteworthy new editions to our course offerings were Rice Field Day, Beef Cattle Reproduction, Cotton Scouting School, and Create Lift (offered in English and Spanish).

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 FY2021, NALC delivered timely and responsive distance education webinars on emerging issues including: impact of 2020 elections on agriculture, federal crop insurance updates, craft beer brewery laws, and review of top ag law developments of 2020. 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.

Critical Issue: Access to Safe and Nutritious Foods

This Critical Issue is conducted by the University of Arkansas at Pine Bluff.

Critical Issue: Agriculture and Natural Resources Economics and Marketing

This Critical Issue is worked on by the University of Arkansas at Pine Bluff.

Critical Issue: Agriculture Production and Processing

This Critical Issue is conducted by the University of Arkansas at Pine Bluff.

Critical Issue: Environment, Energy, and Climate

This Critical Issue is conducted by the University of Arkansas at Pine Bluff.

Critical Issue: Increasing Opportunities for Youth, Families, and Communities

This Critical Issue is conducted by the University of Arkansas at Pine Bluff.

Critical Issue: UADA- Access to Safe and Nutritious Food

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 Extension programs included Supplemental Nutrition Assistance Program Education (SNAP- Ed) and Expanded Food and Nutrition Education Program (EFNEP).

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.

Scientists at the Center of Excellence for Poultry Science and Poultry Health Laboratory co-developed a vaccine technology platform focused on *Salmonella* and *E. coli* — bacteria that can make consumers sick — and Eimeria, a parasite that can cause a disease called coccidiosis in chickens. In collaboration with Texas A&M University, The Ohio State University, the University of Guelph in Ontario, Canada, and with support from the U.S. Department of Agriculture, the platform has been refined and licensed for commercialization to Pacific GeneTech, a startup founded in Arkansas in 2009. The benefits of this vaccine technology over traditional vaccines are that they are long-lasting, leave no tissue lesions, and can be administered orally as an inactivated vaccine. The vaccine provides an economically alternative to antibiotics and disease-inducing live coccidiosis vaccines in poultry and can replace multiple vaccines with one vaccine through drinking water or a spray. A reduction of pathogens in the animal improves feed-conversion ratios and minimizes chances of exposing consumers to the pathogens.

UADA faculty and staff at the Center for Arkansas Farms and Food (CAFF) have initiated an apprentice program with mentor farms to provide real-world farm experience for first-time farmers. The CAFF Farm Apprenticeship program lasts one to two seasons, depending on apprentice interests, and includes a core set of classes with curriculum topics that complement the hands-on learning. CAFF works closely with the Northwest Arkansas Land Trust and the Northwest Arkansas Food Conservancy to connect new farmers with land resources where they can grow food and help get the food to market in grocery stores and restaurants. The CAFF both educates and assist aspiring producers to get into business on a smaller scale and create healthy foods from local sources. As part of the CAFF Farm Apprenticeship curriculum, instructors guide apprentices through learning basic business planning methods, marketing strategies and financial recordkeeping skills crucial for small-scale farmers.

UADA Extension Nutrition programs reached Arkansans over 587,000 times in 2021. The main programs conducted were SNAP-Ed and EFNEP. The SNAP-Ed program reached Arkansans 293,592 times during 2021. EFNEP reached 5,674 adults, youth, and families who saw a food cost savings over $32.10 per family after completing the program. The majority of both SNAP-Ed and EFNEP participants, both youth and adults, reported improving nutrition, food safety, and physical activity practices. Addressing food insecurity, obesity, and diet related chronic disease through Extension Nutrition programs can positively impact individuals and the economy through increased productivity and decreased health costs.

Food Safety is a topic covered within the EFNEP and SNAP-Ed programs, along with other Extension programs throughout 2021. Information on food safety was provided directly to over four thousand Arkansans and over 80,000 times via social media. The ServSafe program provided managers certification to 650 individuals and food handlers certification to 63 individuals. ServSafe is a food safety certification program for individuals who work in food handling or food service and related industries.

Critical Issue: UADA- Agricultural & Forestry Production & 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 to develop decision support software for both crop and livestock producers in the state of Arkansas. UADA has developed and supports twenty tools for use by producers.

UADA Extension ANR programs utilized a number of methods to reach producers and other stakeholders throughout 2021. UADA collaborated with one of the state's leading farmers' market entrepreneurs and social influencers to launch a promotional campaign to promote resources and opportunities for consumers to connect with Arkansas agricultural producers and value-added entrepreneurs. These campaign products were aired on local television, as well as utilized for social media campaigns on multiple Extension accounts. Podcasts were utilized to convey timely information to row crop producers through the creation of the "Arkansas Row Crops Radio" podcast. The Arkansas Row Crops Radio podcast also has a sub-podcast called "Weeds AR Wild" focusing on the continually changing weed problems in season that created a need for relevant and timely information being readily available to aid in-field decision-making.

In the area of row crops, UADA has continued to conduct Research Verification Programs in the areas of corn, rice, soybeans, grain sorghum, wheat, and cotton. Each program conducted on-farm demonstrations of research-based recommendations on commercial fields across Arkansas. The Rice Research Verification Program has been conducted for 38 years across 510 fields. Over the last five years, the average yield for rice verification fields is 189 bushels per acre. The Division of Agriculture continued the Soybean Verification Program in 2021 for the thirty-seventh growing season conducted on-farm demonstrations on eighteen commercial fields in eighteen Arkansas counties. All Research Verification programs continued in 2021 and represent long term examples of integrated activities conducted by Extension and Research.

The University of Arkansas Rice Processing Program (UARPP) held a virtual Industry Alliance Meeting, featuring reports on current research projects in the areas of rice drying, milling, storage, end-use processing, and sensory and consumer science.

A new jasmine-type aromatic rice called ARoma 22 was released by the Arkansas Agricultural Experiment Station amid rising U.S. demand for aromatic rice. ARoma 22 offers increased aromatics and color consistency over its predecessor, and equals several qualities looked for by consumers of imported Asian aromatic rice, according to sensory tests. Aroma 22 averaged 167 bushels per acre with high milling yields in five Arkansas Rice Variety Advancement Trials. The rice breeding program also released a high-yielding medium grain variety named Taurus and a high-yielding long grain variety named Ozark. The program also released a herbicide tolerant, high-yielding line designated CLL-18.

Other research and Extension programs conducted in row crops included a three-year study by a UADA agronomist demonstrating that a specific blend of cover crops can improve yield in soybeans by more than 10 percent, particularly those grown after a no-till, chemically terminated cover crop.

The UADA has initiated research and demonstration of hops production aimed to give local brewers access to local-grown hops. A three-year evaluation project has shown there are two varieties of hops that can be grown successfully in Arkansas. A 2021 Arkansas Hops Webinar (bit.ly/ArkHopsWebinar21) provided insight into which varieties grow best in Arkansas and give updates on hop research made possible by a Specialty Crop Block Grant from the Arkansas Department of Agriculture.

Research projects were conducted in 2021 focusing on three aspects of industrial hemp production in Arkansas: soil remediation by industrial hemp cultivars, genetic diversity among industrial hemp cultivars related to disease resistance, and characterizing hemp cultivar response to biotic and abiotic stress.

Extension educational efforts on Irrigation Water Management (IWM) practices continued in FY2021 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 10,085 times through in-person and online applicator trainings, as well as numerous demonstrations and testing. 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.

Livestock and animal products account for 45% 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 contributes over $4.1 billion in cash receipts in Arkansas, with the state ranking second nationally in broiler production. UADA researchers have continued studies to understand and improve poultry meat quality. 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.

UADA scientists developed bacterial cultivation methods to isolate different bacteria from pigs, resulting in beneficial bacteria in swine intestinal microbiomes that can serve as probiotics to protect or improve the health of pigs.

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 though 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.

In 2021, UADA faculty and staff created a long range plan to manage the forest resources on all Division of Agriculture-owned properties with the following goals: 1.) produce healthy, vigorous forests that are representative of the forest resources in a specific area of the state, 2.) provide wood, wildlife habitat, clean water, carbon sequestration and other environmental benefits, and 3) create forest management resources and programs to assist local forest landowners and managers in meeting personal management goals on their forestlands.

Critical Issue: UADA- 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, in collaboration with the Defense Logistics Agency, provided support to over nine hundred clients in 2021 through one-on-one counseling sessions or attendance in a training event. This support resulted in 1,389 contracts being awarded at a total value of $184,773,919 and 3,926 jobs were created or retained. 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. Community leaders involved with CREATE BRIDGES became more aware of local assets existing within their region. Business owners and workers learned about business management, marketing, outreach, and customer engagement resources available through project partners and regional and state entities. Through the podcast series, they also learned about best practices for retail and tourism businesses. Customized technical assistance was also provided in developing and implementing economic development strategies, including entrepreneurial support and business development.

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.

In an integrated effort, The Rural Profile of Arkansas - 2021 was published in January 2021 to create a greater understanding of the social, demographic and economic conditions in rural and urban regions of the state (https://www.uaex.uada.edu/publications/pdf/MP564.pdf). Rural areas in the state have been greatly challenged over the past several decades by economic and demographic changes and now find the loss of businesses and continuing migration of youth and talent to urban areas of critical concern. Adding to these challenges was the COVID-19 pandemic, which is affecting both rural and urban communities and highlighting some of the difficulties facing rural communities. The 2021 Rural Profile described important social, demographic and economic trends. This data may be useful in developing strategies to build strong communities and support entrepreneurship and broadband access, which will stabilize and reverse some of the negatives experienced by rural communities.

Division of Agriculture faculty and county agents have conducted many leadership programs in 2021. 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 and will complete the program in September 2022. Collectively, Extension leadership programs reached 2,953 direct contacts through 445 educational events.

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. 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. County agents delivered nearly 38,000 printed state level voter guides to voters in their communities. Website visitors downloaded the digital voter guide 18,587 times by November 5, 2020. Of those surveyed who received Extension ballot issue publications, 96% reported they had the information needed to make an informed decision on the ballot measures.

As a continued response to the COVID-19 pandemic, UADA Extension and research economists 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.

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 (SRMEC), in conjunction with three other regional Centers, delivers the national Extension Risk Management Education (ERME) Program throughout the country. The Center's goals seek to empower producers to better understand and manage risks associated with farm and ranch businesses: production, price/market, financial, legal, and human risks. In 2021, SRMEC awarded twenty-six projects totaling $1,286,852 for outreach activities across the southern region. These projects were delivered in 13 southern states and 1 territory.

Critical Issue: UADA- 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 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.

One integrated effort being conducted by UADA researchers and Extension staff is the Arkansas Discovery Farms. The Arkansas Discovery Farms Program is privately owned businesses on which water quality research is being conducted. Currently, there are 12 Arkansas Discovery Farms established throughout the state. The Arkansas Discovery Farms program continues to assess the need for and effectiveness of on-farm conservation practices, document nutrient and sediment loss reductions, soil health and water conservation in support of nutrient management planning and sound environmental farm stewardship. In 2021, Discovery Farms also incorporated wildlife habitat practices on one of the locations to improve wildlife habitat while increasing financial gains through waterfowl and deer hunting leases. The program compared nutrient concentrations in runoff from the major crops grown in Arkansas on working farms and determines the relationship between seasonal runoff volume and nutrient losses. Seasonal runoff volume, total nitrogen (TN), nitrate, soluble reactive phosphorus (SRP) and total phosphorus (TP) are measured utilizing state-of-the-art, automated edge-of-field runoff monitoring on several fields on Discovery row crop farms. The concentration of nitrate and TN in runoff from corn was slightly higher than for other crops, except for TN from cotton. Losses of SRP and TP from corn were not significantly higher than other crops. Nutrient loss increased linearly for all nutrient constituents as total runoff increased during the monitoring period. Recent results confirm intuitive thoughts that seasonal nutrient loss may increase with increases in seasonal runoff volume. The practical application is that one way of reducing nutrient losses based on this study is finding ways to reduce runoff. Soil and water conservation practices can alter runoff hydrology. For example, land leveling can create a small but uniform slope that can help reduce runoff velocity by reducing slope and the gravitational gradient. Improving soil health through cover crops such as cereal rye that can increase infiltration by creating larger pores such as root channels that can conduct water through restrictive pans can reduce runoff, increase water holding capacity and depth of water penetration in the soil. Cover crops coupled with minimum tillage can create greater soil structure to increase infiltration rates.

In FY2021, 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. 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. Since the beginning of the VFT series, there have been 14 sessions delivered, reaching over 920 webinar attendees, which included both producers and high school science students and teachers.

With water conservation in mind, UADA researchers continued decades of research in 2021 to fine tune a method of direct-cooling chickens with low-pressure sprinklers in tandem with traditional cool-cell pad systems and ventilation fans. The 2021 trial aimed to determine the effect of sprinkler technology in combination with cool cell systems on achieving broiler performance during hot weather. Water is a crucial component for poultry production, not only for bird consumption but also to alleviate heat stress in tunnel-ventilated broiler houses. Sprinkler adoption has been slow due to misconception that chicken sprinklers make poultry litter too wet to sell as fertilizer, but studies have shown that average litter moisture content in houses using sprinklers with tunnel ventilation was 34 percent — 2 percent lower than the average moisture content of litter from chicken houses with cool-cell pad systems and tunnel ventilation.

A UADA water engineer designed a patented a tailwater recovery system for use in furrow-irrigated rice, also known as "row rice," after nearly a decade of research. Row rice irrigation is challenging because it requires more frequent cycles than other row crops and timing is more critical because rice has a shallower root system. Farmers can now grow rice with about half the irrigation water used in levee rice systems using the tailwater recovery system.

UADA Extension educators continued watershed, water quality and stormwater education in 2021 to help stakeholders to address a variety of challenges they face. This program involved training County Extension Agents in water quality issues and education that they then used to deliver 65 educational events across the state. Extension water quality education partnered with over 100 municipalities, organizations, and agencies to to provide cost saving services, educational programming and demonstrations.

A two-year study by UADA agronomists concluded that a no-tillage method of growing rice resulted in significantly less nitrous oxide emissions- a significant contributor to greenhouse gas emissions- over the rice growing season compared to a more conventional method of growing rice.

Critical Issue: UADA- 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 program areas.

In the area of Health, the University of Arkansas System Division of Agriculture provided Family & Consumer Science 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. In response to the COVID-19 pandemic, UADA collaborated with USDA and CDC in the Excite Program, targeting six target counties in the Mississippi Delta region of Arkansas. Through the program, over 500 individuals were provided health services and over 150 individuals were vaccinated against COVID-19. The Arkansas 4-H Program conducted 4-H Healthy Living initiatives. Through the Healthy Habits grant from National 4-H and Walmart, 4-H was able to establish a 4-H Corner Store Food Challenge to teach youth how to practice healthy eating habits if they have limited availability of foods.

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 2021, program year, UADA childcare courses, both in person and online, reached over 4,200 individuals, awarding over 29,000 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. Across the 493 UADA Extension personal finance education programs 3,481 adult and youth consumers were reached. Forty-one percent of participants reported positive behavior changes due to program involvement.

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 reach youth over 3.2 million times through 4-H programming throughout the program year. These youth were reached through the 700 4-H Clubs across the state and other youth programs. 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.

Despite the hurdles presented by the pandemic 4-H was able to continue to reach youth through “non-traditional” methods. The Arkansas 4-H Camping program offered Camp in a Box lessons. Most camps had an option for choosing the free camp option and tuning in via Zoom with their own supplies, or by choosing the Camp in a Box option where camp supplies were mailed to them before the Zoom Camp session. This approach resulted in families who had not traditionally participated in camp and/or 4-H activities becoming involved and being able to gain some of the skills normally only acquired during a physical camp session.

Family & Consumer Science and 4-H Youth Development houses two of UADA Extension's largest volunteer programs, Arkansas Extension Homemakers Council and 4-H. In 2021, EHC had a statewide membership of 2,944 across 257 clubs. The 5,856 4-H Volunteers in Arkansas assisted with all aspects of the 4-H program and gave over 54,000 hours in 2021.

Merit and Scientific Peer Review Processes

Updates

The University of Arkansas System Division of Agriculture has continued the process outlined in the 2021-2025 Plan of Work.

Stakeholder Input

Actions to seek stakeholder input that encouraged their participation with a brief explanation

The University of Arkansas System Division of Agriculture has continued the process outlined in the 2021-2025 Plan of Work.

Methods to identify individuals and groups and brief explanation

The University of Arkansas System Division of Agriculture has continued the process outlined in the 2021-2025 Plan of Work.

Methods for collecting stakeholder input and brief explanation

The University of Arkansas System Division of Agriculture has continued the process outlined in the 2021-2025 Plan of Work.

A statement of how the input will be considered and brief explanation of what you learned from your stakeholders

Within Extension in Summer 2020, each county office created a synthesized list of priority issues for each program area using stakeholder input in which they planned and focused their programmatic efforts for the the 2021 program year.

Highlighted Results by Project or Program

Critical Issue

UADA- Access to Safe and Nutritious Food

Extension Access to Safe and Nutritious Food
Project Director
Laura Hendrix
Organization
University of Arkansas System Division of Agriculture
Accession Number
7000576

Arkansas Delta Region Obesity Project

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Food insecurity is an issue for Arkansans, with 17.3% of Arkansas households being food insecure, almost 7 % higher than the national average of 10.9% (America's Health Rankings). Arkansas has high rates of obesity, overweight, and chronic disease. Adult obesity rates in Arkansas are 37.1%, higher than the national average and adult Arkansans rank 48th in physical inactivity at 31% (national average 23.8%). Eighty-five percent of adults in rural counties, compared to 62 percent in urban counties, were overweight or obese. Chronic disease rates for adults in Arkansas are higher than national average, making Arkansas the 48th most unhealthy state (America's Health Rankings). For youth, 40% of Arkansas students (K-12 grade) are classified as overweight or obese (Assessment of Childhood and Adolescent Obesity in Arkansas: Fall 2018–Spring 2019. Arkansas Center for Health Improvement). According to the CDC Healthy Schools report, only 24% of school-aged children participate in the recommended 60 minutes of daily physical activity.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

The goal is to increase access to healthy foods in the communities we serve. We work with local food pantries, farmers' markets, community gardens, and local businesses to increase the availability of healthy foods. We work to expand farmers' markets, add community gardens, and increase the healthy food offerings at local food pantries. By improving access to everyday destinations through traffic calming measures, crosswalks, and way-finding signage, community members have access to safer means of physical activity. We work with city government to find opportunities for sidewalks, playgrounds, and park enhancements. We work with community coalitions to identify project strategies and implement positive changes in the community. Coalitions are made up of local health champions, city and county government, and concerned citizens who want to make their communities healthier, safer places to live.

Briefly describe how your target audience benefited from your project's activities.

Food pantries were provided with refrigeration and shelving necessary to store and distribute fresh produce and perishable foods. Established 4 new food pantries and expanded 3 existing food pantries, reaching 2,370 people. Established one new Farmer's Market and expanded 2, working with 23 vendors to reach 16,015 residents in the target counties. Established one new community garden and expanded one with outreach to 5,278. Established 50 garden beds at schools, reaching 1,100 individuals.

Briefly describe how the broader public benefited from your project's activities.

By addressing food insecurity, obesity, and diet related chronic disease, there can be posive impacts on individuals and the economy through improved productivity and decreased health costs.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Restrictions due to COVID-19 have prevented programs from reaching their full potential impacts.

Arkansas Expanded Food and Nutrition Education Program

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Arkansas has high rates of obesity, overweight, and chronic disease. Adult obesity rates in Arkansas are 37.1%, higher than the national average and adult Arkansans rank 48th in physical inactivity at 31% (national average 23.8%). Chronic disease rates for adults in Arkansas are higher than national average, making Arkansas the 48th most unhealthy state (America's Health Rankings). For youth, 40% of Arkansas students (K-12 grade) are classified as overweight or obese (Assessment of Childhood and Adolescent Obesity in Arkansas: Fall 2018–Spring 2019. Arkansas Center for Health Improvement). According to the CDC Healthy Schools report, only 24% of school-aged children participate in the recommended 60 minutes of daily physical activity.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

The Expanded Food and Nutrition Education Program (EFNEP) seeks to empower individuals, families, and youth with limited resources to acquire knowledge, skills, attitudes and behavior changes necessary to maintain nutritionally sound diets and increase physical activity. The adults are taught in small groups or individually by trained EFNEP educators. Most participants complete the EFNEP curriculum in less than 9 sessions. The EFNEP youth program focuses on providing food and nutrition education to contribute to personal development of youth from families with low income.

Briefly describe how your target audience benefited from your project's activities.

Total Reach: 5,674 adults, youth, and families with $32.10 monthly savings per family.

Adult graduates reported the following:

- 92% adopted healthier nutrition practices
- 90% ate more fruits and vegetables
- 90% improved food resource management practices
- 71% improved food safety skills
- 55% improved physical activity practices
- 18% improved food insecurity

Youth graduates reported the following:

- 78% adopted healthier nutrition practices
- 54% improved food safety practices
- 50% improved physical activity practices

Briefly describe how the broader public benefited from your project's activities.

Addressing food insecurity, obesity, and diet related chronic disease through the EFNEP program can positively impact individuals and the economy through increased productivity and decreased health costs.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Restrictions due to COVID-19 have prevented programs from reaching their full potential impacts.

Arkansas SNAP-Education

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Arkansas has high rates of obesity, overweight, and chronic disease. Adult obesity rates in Arkansas are 37.1%, higher than the national average and adult Arkansans rank 48th in physical inactivity at 31% (national average 23.8%). Chronic disease rates for adults in Arkansas are higher than national average, making Arkansas the 48th most unhealthy state (America's Health Rankings). For youth, 40% of Arkansas students (K-12 grade) are classified as overweight or obese (Assessment of Childhood and Adolescent Obesity in Arkansas: Fall 2018–Spring 2019. Arkansas Center for Health Improvement). According to the CDC Healthy Schools report, only 24% of school-aged children participate in the recommended 60 minutes of daily physical activity.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Nutrition and physical activity can improve well-being. The typical Arkansas diet is high in fat and low in fruits, vegetables, and wholegrains. Poor diet in conjunction with too little physical activity can contribute to the development of serious health problems. Arkansas SNAP-Ed program helps consumers make better choices about what to eat in order to stay active and live better. Education methods include school programs, school gardens, cooking schools, and more.

Total contacts were 293,592.

Briefly describe how your target audience benefited from your project's activities.

Adult participants reported the following:

• 88% adopted one or more food resource management practice.

• 82% adopted one or more food safety practice.

• 81% gained knowledge about MyPlate.

• 81% used nutrition food labels more often.

• 72% improved food preparation skills.

• 58% increased vegetable intake.

• 54% increased fruit intake.

Youth participants reported the following:

• 84% intend to follow MyPlate recommendations.

• 81% improved food preparation skills.

• 70% increased knowledge about MyPlate.

• 54% ate a healthy breakfast more often.

• 44% practiced food safety practices, such as handwashing, more often.

• 43% increased knowledge about AR foods.

Parent survey results:

• 80% - child talked about healthy foods.

• 77% - child more willing to try new foods.

• 73% - family eating fruits more often.

• 69% - child asked for healthy foods.

• 63% - family eating vegetables more often.

• 61% - family increased physical activity.

Briefly describe how the broader public benefited from your project's activities.

Addressing food insecurity, obesity, and diet related chronic disease through the SNAP-Ed program can positively impact individuals and the economy through increased productivity and decreased health costs.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Restrictions due to COVID-19 have prevented programs from reaching their full potential impacts.

Food Safety

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

CDC estimates that each year roughly 1 in 6 Americans (or 48 million people) gets sick, 128,000 are hospitalized, and 3,000 die of foodborne diseases. Food safety certification is a requirement of the Arkansas Department of Health, and every facility and establishment that serves food must acquire this certification, including child care facilities, food service establishments, school cafeterias, etc.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Arkansas Extension educators provide evidence-based information to agents, Extension clientele and collaborating with other organizations to ensure that Arkansans are equipped with the best food safety information to keep their families safe from foodborne illnesses and other food-related safety issues. ServSafe is a food safety certification program for individuals who work in food handling or food service and related industries.

Briefly describe how your target audience benefited from your project's activities.

Extension food safety information was provided to 4,267 Arkansans via direct contact and 80,171 via social media. ServSafe programs were delivered across the state with 650 individuals receiving managers certification and 63 individuals receiving Food Handlers certification. Food preservation workshops were attended by 1,204 with 95% reporting knowledge gained and 76% reporting that they plan to adopt at least one recommended proper processing practice.

Briefly describe how the broader public benefited from your project's activities.

Proper food safety practices, as taught by Extension educators, help prevent foodborne illness and negative economic impacts. Foodborne illness can have an economic impact as individuals may miss work, thereby, losing income and have medical expenses. Business and industry can be negatively impacted by outbreaks of foodborne illness.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Restrictions due to COVID-19 have prevented programs from reaching their full potential impacts.

Critical Issue

UADA- Agricultural & Forestry Production & Processing

Analyses of Economic and Environmental Tradeoffs in Agricultural Production

Project Director
Michael Popp
Organization
University of Arkansas System Division of Agriculture
Accession Number
1024411

Progress Report

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

To enhance efficiency by using innovative production practices decision makers often need to be able to anticipate production, marketing and environmental impacts when reallocating resources among enterprises within the firm. The goal is to quantify outcomes of changes on commercial crop and/or livestock farms in Arkansas. More specifically:

1. Examine risk/return/environmental tradeoffs associated with choosing different enterprises on pastures and on arable land. Effects of changing one enterprise will have impacts on whole farm risk and returns, water use and net greenhouse gas (GHG) emissions. Where possible, these effects require quantification to aid decision makers about possible trade-offs they can anticipate.

2. Compare and contrast new production alternatives to conventional methods in terms of profitability, risk and environmental impact

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Dr. Shew co-authored eight peer-reviewed publications in 2021, three of which he was lead author on. The average impact factor (IF) of the journals for these publications was 5.45, with two in journals that will have new impact factors in 2022. Dr. Shew's top disciplinary publication was in Applied Economic Perspectives & Policy with an IF of 4.083, and his top interdisciplinary publication was in Global Food Security with an IF of 7.772. Notably, three of his publications were on subjects relevant for agricultural stakeholders in Arkansas: one on broadband adoption for precision agriculture, one on nitrogen management with drones, and one on the economic and environmental benefits derived from public funding for agricultural water management in rice production.
Dr. Popp's work centered on evaluation of potassium fertilizer rate recommendation for corn and cotton. Analyses revealed that producers could profitably curtail fertilizer use in corn whereas more fertilizer than currently recommended may be applied on cotton. A long term analysis of potash fertilizer use in fields with a soybean and rice rotation also revealed potential reduction in potash fertilizer use. While profitability implications, long term were minor, less fertilizer K use translates
to lesser potential for nutrient runoff while maintaining reserves of minable potash fertilizer for a longer period. Dr. Popp also modeled the use of dual purpose switchgrass in cow-calf operations. Results indicate that beef output could be maintained when using a first cutting of swtichgrass for cattle feed while harvesting the second cut for renewable biomass supply for energy production. While minimal extra corn was required along with additional fertilizer use, the model results showed increases in profitability for operation using switchgrass in comparison to bermuda grass and tall fescue for hay production in the Mid South.

Briefly describe how your target audience benefited from your project's activities.

Target audience for this project are agricultural producers, agribusinesses and policy makers that are interested in enhancing the profitability of the agricultural supply chain, mitigate environmental emissions and manage risk exposure. At the same time we reach out to students to train the next generation of agricultural research personnel.

Graduate students and research associates gained valuable research experience.

Briefly describe how the broader public benefited from your project's activities.

Presentations both on-line and in-person were given to producers, professional colleagues, students and policy makers

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

We plan to continue to attract research funding to hire additional personnel to create more materials for dissemination of this type of work.

Diet formulation research to aid productivity, profitability, and sustainability of poultry systems

Project Director
Michael Kidd
Organization
University of Arkansas System Division of Agriculture
Accession Number
1023228

Progress

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

To improve commercial poultry system productivity, profitability, and sustainability through nutritional and managerial research.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Activities in nutrition, management, and artificial intelligence research have yielded results that will improve broiler efficiency.

Briefly describe how your target audience benefited from your project's activities.

Research data published and presented at conferences has been used to validate industry diet specifications allowing nutritionists in broiler integrators to become more efficient, reduce costs, and be more environmentally friendly.

Briefly describe how the broader public benefited from your project's activities.

Publications have shown that basic science on amino acid imbalances conducted 50 years ago is financially relevant to the US broiler industry at present.

Improving nutrient use efficiency in Arkansas crop production

Project Director
Trenton Roberts
Organization
University of Arkansas System Division of Agriculture
Accession Number
1024450

Improving nutrient use efficiency in Arkansas crop production.

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Fertilization and nutrient applications represent a significant input cost for Arkansas producers and the efficient use of nutrients impacts not only producer profitability but potential environmental impacts. Improvements in nutrient use effeiciency are critical to battle climate change and rising input costs for producers.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

This project is designed to better understand how N and other nutrients (P, K, and Zn) can be managed and applied more efficiently to row crops without compromising yield or crop quality. In order to achieve this goal, a whole system approach will be used that focuses on soil
testing, tissue testing, and remote sensing to predict nutrient availability from the soil, in-season sensors to assess nutrient uptake throughout the season, post-harvest assessments of N use efficiency and increasing the use of cover crops to retain or add nutrients to the soil. The success of this project will include a better understanding of when and how to apply nutrients for optimum results, but also reducing the reliance
on costly synthetic fertilizers. By successfully developing these tools and implementing the results producers will be able to remain profitable and sustainable.

Our recent work has identified new tools that producers can use to effectively manage nutrients throughout the growing season. During the past year where most nutrient costs have more than doubled, the tools that we have developed are paying dividends by allowing producers to reduce inputs without fear of reducing productivity.

Briefly describe how your target audience benefited from your project's activities.

In a time when most fertilizer products are at all-time highs and there is continued uncertainty of the availability of fertilizer products, our tools are providing producers will real-time tools to see where they can cut or alter their nutrient management plans to optimize their inputs. Our potash rate calculator provides rice, soybean, corn, and cotton producers with the most profitable K fertilizer rate for their specific field based on their input costs, projected yields, and projected commodity value. The in-season tissue nutrient monitoring programs that we have developed and deployed allow producers to monitor nutrient levels in-season and make adjustments as needed.

Briefly describe how the broader public benefited from your project's activities.

Any improvements are that are made to increase producer profitability and nutrient use efficiency while simultaneously reducing potential environmental impacts has an immeasurable impact on the public as it influences food prices and ecosystems services. Although it may go relatively unnoticed by the common person, our work has resounding impacts on their daily lives as we work to increase the sustainability of their food, fuel and fiber supply.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

The primary method of dissemination for these results has been one on one at local crop production meetings using powerpoint presentations. The secondary methods of dissemination have been blog articles and the development of crop notes or crop production factsheets. The primary audience for the work that was accomplished under this project are row-crop producers, certified crop advisors, crop consultants, and county extension agents. Our goal is to provide both technical information regarding nitrogen use efficiency and best management practices for fertilizer use and profitability. Our secondary audience is government and regulatory agencies that make decisions concerning environmental resource management.

There are no changes to the approach of the project, but there will be a shift in the dissemination of the results as more people are using social media and other platforms to gain their information. We are hoping to do more podcasts and rely on platforms usch as Twitter to get information to our stakeholders more quickly.

PHYSIOLOGICAL TOOLS FOR IDENTIFYING LIMITATIONS FOR CROP PRODUCTION IN THE MIDSOUTH

Project Director
LARRY PURCELL
Organization
University of Arkansas System Division of Agriculture
Accession Number
1024253

Progress Report

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

A. Evaluate management options and genotypic characteristics that improve crop yield responses to water, solar radiation, and nutritional resources under non-limiting and limiting conditions.
B. Identify germplasm and traits in soybean that will enhance the ability to utilize efficiently nutrients, solar radiation, and water resources.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Issue 1: Why we need a soybean variety that cannot fix nitrogen.
Soybean is valuable because the grain has high concentrations of both oil (~20%) and protein (~35-40%). The oil is used for cooking, biodiesel, and literally hundreds of industrial products. The protein is used extensively as a major component of livestock feed. Although US soybean yield has steadily increased by 13.7 bushels/acre between 1986 and 2019, average grain protein concentration has decreased by close to two percentage points over this time period. To supply the large amounts of protein, soybean takes up mineral nitrogen from the soil but also forms nodules on roots in symbiosis with rhizobium bacteria that take nitrogen gas (N2) from the atmosphere and covert it to a form the plant can use. This process is called N fixation. To improve grain protein concentration, through either genetics or management, requires a method that can separate the contributions of soil mineral nitrogen from N fixation.
Action: Separating the contribution of mineral nitrogen from N fixation for soybean requires the use of a soybean variety that is unable to form nodules that fix nitrogen, and which acquires all of its nitrogen nutrition from the soil. These so called 'non-nod' varieties should ideally be of similar maturity and have similar yields when adequately fertilized as other N-fixing varieties

being evaluated. However, non-nod varieties that are currently available were developed over 50 years ago and are not comparable to high-yielding varieties today. We developed several pairs of high-yielding maturity group 4 soybean varieties that are genetically similar except that they differ in the ability to fix N. When grown on soils with little available N, yields of the
non-nod varieties are about 10 bushels/acre, but when fertilized with N, yields are ~70 bushels/acre and similar to nodulating varieties.
Impact: One goal of the US soybean industry is to reverse the decline in grain protein concentration that has been occurring over the past 40 years, which will require the proper tools to differentiate between soil mineral nitrogen and N fixation as the sources of nitrogen nutrition. Having non-nodulating varieties with similar yield potential (when fertilized with nitrogen) as nodulating cultivars is key to understanding potential crop nitrogen limitations, developing management strategies to improve
grain protein concentration, and identifying soybean varieties with high rates of N fixation.
Issue 2: Do we really need a plastic soybean?
One trait that is of great interest for drought tolerance is water use efficiency (WUE), which is the ratio of photosynthesis to transpiration. Directly measuring WUE is challenging in field environments, but the ratio a heavy, non-radioactive isotope of carbon (C13) relative to the normal isotope of carbon (C12) in plant material is tightly associated with WUE. We have used C13 ratio as a surrogate measure of WUE to screen hundreds of diverse soybean genotypes in the USDA germplasm collection, which has identified a wide range of WUE among genotypes and over 40 chromosomal regions that contribute to greater WUE. Although high WUE is an advantage in water-limited environments, it is likely to be a disadvantage in environments with adequate soil moisture because greater WUE is usually associated with decreased photosynthesis, plant growth, and yield. The ideal genotype is a plastic one. That is, a genotype that has high WUE in water-limited environments but also has high photosynthesis (i.e., low WUE) in water-replete environments.
Action: Over a 2-year period, C13 ratio was measured on 200 diverse soybean genotypes from the germplasm collection in a total of 11 irrigated and rainfed environments. We determined the plasticity as the slope of a regression of C13 ratio of a given genotype against the average C13 ratio of all genotypes in each of the 11 environments. There were large differences in plasticity among genotypes. The most plastic genotype was 55% more plastic than the average genotype, and the least plastic genotype was 45% less plastic than the average genotype. We were also used molecular markers to identify two loci on chromosome 13 associated with C13 ratio plasticity that accounted for about 28% of the plasticity response.
Impact: This is the first reported discovery of C13 ratio plasticity in a crop and represents a major step forward in developing a drought-tolerant soybean that has the ability to grow and yield well in favorable environments. The molecular markers associated with plasticity provides a tool that will make it easier to move plasticity from unadapted genotypes to elite lines. Breeding efforts are on-going to transfer the C13 ratio plasticity into elite lines.

Briefly describe how your target audience benefited from your project's activities.

The postdoctoral associate working on this project has been mentored and has made professional presentations at meetings in addition to publication of a peer reviewed manuscript.

Briefly describe how the broader public benefited from your project's activities.

I have made numerous presentations and published several manuscripts to clientele. I have also worked closely with our Ag Communications group to inform the lay public.

Proteogenomic and molecular approaches to characterize economically important genetic traits to improve poultry production

Project Director
Byung-Whi Kong
Organization
University of Arkansas System Division of Agriculture
Accession Number
1024477

Blood biomarkers for breast myopathies in broilers

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Broiler (meat-type) chickens in poultry covers most of worldwide meat production with around 100 million tons annually. Newly emerging, stress associated-muscle myopathies including woody breast and white striping negatively impacts on chicken breast meat production due to the downgraded products. Breast myopathies have been known to cause the economic losses of more than $200 million per year in US. Researches on finding blood plasma biomarkers inlcuidng proteins and metabolites can be effective for a less invasive pre-diagnosis of WB during the growth phase of broilers, followed by improving production efficiency by disease protection.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

From the progress during 2021, protein and metabolite biomarkers contained in blood plasma were identified and a couple of markers were confirmed further biochemical analyses. We used advanced proteomics and metabolomics methods, which cand analyze possibly all proteins and major metabolites. Possibly all protein and metabolite markers were screened with these methods. Through the research activities on proteomics and metabolomics with blood plasma samples contributed to achive a goal of this project (to develop new methods to apply to field poultry production).

Briefly describe how your target audience benefited from your project's activities.

Poultry producers and breeder industries can use this knowldege and marker information to apply poultry selection, feeding strategy, and disease prevention. Those metabolite markers will be useful to predict at early growth states for the onset of woody breast myopathies by less-invasive way. Eearly prognosis of threats t of later onset of myopathies may contribute to reduce the number of disease individuals. When these markers can be applied to selection of broiler breeders, myopathy incidance in commercial populations can be reduced more effectively. Thus, the results of this project may provide tools and knowledge to reduce metabolic disases and may contribute to improve poultry meat productivity.

Briefly describe how the broader public benefited from your project's activities.

Results of this project can have impacts broadly on both the public food safety and high quality meat production. These diagnostics and selection approaches can make possible buliding both broiler chickens and improved managing systems, which have petentials to produce high quality meat. High quality meat production may conribute to maintain safer public health conditions.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

No changes will be made.

Two graduate students were trained with conducting this project.

Results were disseminated by presenting a conference meeting (Plant and Animal Genome) and by publishing refereed journal articles.

Conference presentation:

- Kong B and Bottje W. Comparative pathway analyses between woody breast myopathy and feed efficiency using proteomics data. 2021. USDA Multistate Project NC1170 Poultry Workshop. Virtual Meeting. February 23 - 24.

Journal Articles:

- Kong B, Khatri B, Kang S, Shouse S, Kadhim H, Kidd M Jr, Lassiter K, Hiltz J, Mallmann B, Orlowski S, Anthony N, Bottje W, Kuenzel W and Owens C. 2021. Blood plasma biomarkers for woody breast disease in commercial broilers. Front. Physiol. 12:712694. doi: 10.3389/fphys.2021.712694

- Bottje W, Lassiter K, Kuttappan V, Hudson N, Owens C, Abasht B, Dridi S, Kong B. 2021. Upstream regulator analysis of wooden breast myopathy proteomics in commercial broilers and comparison to feed efficiency proteomics in pedigree male broilers. Foods. 10(1):104. doi: 10.3390/foods10010104.

- Maharjan P, Beitia A, Weil J, Suesuttajit N, Hilton K, Caldas J, Umberson C, Martinez D, Kong B, Owens C, Coon C. 2021. Woody breast myopathy broilers show age-dependent adaptive differential gene expression in Pectoralis major and altered in-vivo triglyceride kinetics in adipogenic tissues. Poultry Science. 100(7): 101092. doi.org/10.1016/j.psj.2021.101092.

A provisional patent was submitted (B Kong, C. Owens. W. Kuenzel. MARKERS FOR POULTRY MYOPATHY AND USES THEREOF. US Provisional Patent. April 30, 2021. No.: 63/181,657)

Assessing the Effectiveness of Conservation Practices to Reduce Edge-of-Field Nutrient Runoff

Project Director
A Sharpley
Organization
University of Arkansas System Division of Agriculture
Accession Number
1017273

Nothing Significant to Report

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Researcher retired

Agricultural & Forestry Production & Processing

Project Director
Victor Ford
Organization
University of Arkansas System Division of Agriculture
Accession Number
7000293

Documenting cotton sustainability and improving profitability with improved soil health

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Retailers and suppliers of cotton apparel have pledged to source 100% of their raw product as sustainably produced by 2025. To ensure the viability of the U.S. Cotton Industry, producers must strive for continuous improvement with regards to sustainability as well as document their progress. In
response to the documented sustainability demand from retailers and suppliers, Better Cotton Initiative (BCI) launched a Better Cotton program in the United States in 2014. Recently, the U.S. Cotton Industry initiated the U.S. Cotton Trust Protocol (Trust Protocol), a program designed to drive continuous improvement and increase awareness of the benefits of implementing best practices.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

A field study was established in 2020 to show standard production practices (conventional tillage without the use of cover crops) compared to a management strategy utilizing cover crops and greatly reduced tillage in an effort to improve soil health and sustainability and to enroll fields
into both the Trust Protocol and BCI programs.

Briefly describe how your target audience benefited from your project's activities.

While not statistically different, a 13.7% yield increase (119 lb lint/A) was observed in the first two years of this non-irrigated three-year study, differences in sustainability metrics and improvements in soil health are clear. Energy use, and greenhouse house gas emissions were reduced 61.1% and 42.4%, respectively when practices to improve soil health, cover crops and no-till, were employed. In 2021, inputs were reduced in response to improved soil health. Seeding rate was cut in half ($74/A) and fertility rates and source were modified ($26/A). Lint yield was 180 lbs lint/A better on the improved soil health field and input costs were reduced $100/A.

Briefly describe how the broader public benefited from your project's activities.

Tillage systems result in 50% of the carbon in soil being lost to the environment. If all farms were to plant cover crops the reductions in greenhouse gas emissions would be equal to removing 22 million cars from the road. These reductions are a step in the right direction toward meeting the 2025 goals set by the U.S. Cotton Industry to improve sustainability. Enrolling farms into either program is not a difficult task and should not be a deterrent for producers interested in participating in either of these programs. This is important to document our practices as brands and retailers shift their sourcing to sustainable produced raw products to ensure our cotton is on their shopping list.

County large-plot on-farm variety trials of cotton

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Variety selection is the most important and single most expensive decision cotton producers face each year. Introduction of new transgenic technologies, particularly three-gene Bt traits enhancing worm control over a failing two-gene trait, has led to the rapid turnover of varieties available for producers to plant. Normally three-year evaluations are recommended prior to producer adoption of a particular variety. Because of the rapid turnover and continued introduction of new varieties producers need as much information as possible across multiple locations on the new varieties to make educated selection decisions.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

An integrated, education, and outreach program has been established to develop and disseminate information regarding cotton variety performance in both the traditional official variety trials and county large-plot on-farm trials to provide profitable and practical information for Arkansas producers. Field days, county and multi-county meetings, on-farm demonstrations, news articles, publications, personal contacts, and information gained from applied research projects were used to promote adoption.

Briefly describe how your target audience benefited from your project's activities.

University of Arkansas System Division of Agriculture educational efforts to integrate small-plot and large-plot testing results provide valuable information to cotton producers on both local and regional levels. The data provided by this program allows producers to place varieties by soil type, growing environment and location by evaluating 12 varieties across the state. Results of selecting the wrong variety can lead to loss of income. While the state yield is estimated to be 1287 lbs. lint/A. The top three varieties in our county testing program averaged 1530 lbs. lint/A and the bottom three averaged 1360 lbs. lint/A. The 170 lbs. yield difference translates to an extra $175/A considering lint and seed revenues. The difference in the top three three-gene Bt varieties compared to the most widely planted two-gene variety is very similar considering the differences is lint and seed revenues plus insecticide savings. Adoption of improved varieties could result in an additional $82.25 million revenue statewide based on December USDA-NASS estimate of 470,000 harvested acres

Briefly describe how the broader public benefited from your project's activities.

Reduction of insecticide use due to the Bt genes results in lower costs to farmers and less impact on the environment. Maximizing yields with reduced costs will make farms more profitable and will lead to continuation of farm family enterprises.

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Arkansas continues to see sustained growth in its local food systems specifically direct to consumer sales activity. Farmers and ranchers
continued to struggle with overcoming marketing issues to grow their market share challenged by a host of issues from inadequate post-
harvest processing and handling facilities to clouded marketing messages to transparently connect with consumers. The COVID-19
pandemic while creating challenges that magnify these issues also created a surge in online searches for direct to consumer marketing
options. Colorado State University reported that 35% of respondents from a national survey representing U.S. households tried at least one new farm or food enterprise during the Pandemic.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

UA System Division of Agriculture collaborated with one of the state's leading farmers' market entrepreneurs and social influencers to launch a promotional campaign to promote resources and opportunities for consumers to connect with Arkansas agricultural producers and value-added
entrepreneurs. Project director developed a partnership with Logan Duvall, manager/owner of Me & McGee Market; and Patrick Green, owner Green Media LLC, to create a dynamic team to develop and deliver a series of video vignettes that highlight agricultural production, value-added activities and UADA expertise supporting the economic activity. The partnership resulted in a collaboration with KATV-TV Channel 7 which featured a video segment twice a month throughout the summer of 2021 on its program, Good Morning Arkansas. The attached logo was featured prominently on each video TV segment and social media post. (https://katv.com/search?find=experience%20arkansas%20agriculture)
Additionally, program hired a communication manager to develop an online marketing strategy to amplify the TV segments with social media posts to provide enhanced exposure for Arkansas agriculture and consumers interested in connecting with these "farmers and food enterprises" to experience Arkansas agriculture. Each segment includes educational components provided by a UADA faculty expert as well as entertainment detailing the human interest side of the farm family, restaurant, market or university department. The campaign highlights MarketMaker as an online resource to allow consumers to easily identify local opportunities to connect with and support agriculture. Program featured on a UADA website with social media platforms that are leveraged throughout the campaign: https://www.uaex.uada.edu/farm-ranch/economics-marketing/experience-arkansas-agriculture

Briefly describe how your target audience benefited from your project's activities.

Campaign developed eight (8) total video segments produced from May 1-August 31, 2021 with each segment featured on statewide television, KATV:
- Six local farms highlighted in video and photo content across social media platforms
- Six local restaurants and markets highlighted in video and photo content across social media platforms
- Eight distinct video segments with premium morning show placement on KATV
- Social media paid reach of 101,345 and organic reach of 38,118 from May 1-August 31, 2021
- Invited presentations featuring campaign given to Arkansas Farm Bureau, Blackberry Growers Association and Arkansas Agritourism Association

Although no formal survey was conducted, anecdotal comments from farmers and markets details increased foot traffic and engagement at their farms/markets. KATV-TV agreed to track their social media (Facebook) activities and provided the following reports of impacts of TV segments:

Reach: 50,019. Impressions: 91,151 Link Clicks: 1258

Briefly describe how the broader public benefited from your project's activities.

Greater avialablility of fresh market foods increases the quality of life for most urban and suburban families. This availability reduces obesity, diabetes, and other associated dietary problems. The interest and increase in traffic indicates greater fresh market participation.

Fine tune chicken sprinkler technology to maintain production performance

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Water is a crucial component for poultry production, not only for chicken consumption but also to alleviate heat stress in tunnel-ventilated broiler houses. Heat stress is one of the most challenging stressors to poultry production. Evaporative cooling cell pad systems and other moisture-rich systems saturate a barn air with relative humidity greater than 70 percent. For a chicken, this is counterproductive to cooling itself by breathing.

Sprinkler systems drop a relatively small amount of water directly on the chickens to produce a windchill effect when exhaust fans pull air through the building. The sprinkler systems can save an average of 67 percent in water for cooling birds in poultry houses during the hot summer months.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

The study in 2021 focused on proper management of the cooling-cell temperature set points in houses with low-pressure sprinkler systems at two commercial broiler houses measuring about 40-by-400 feet at the Applied Broiler Research Unit in Savoy.

Tests showed that sprinklers should be activated before the poultry house temperature approaches 90 degrees Fahrenheit. The set point of a cooling-cell system should be about 21 degrees above the house set point to allow sprinkler activation under a drier thermal condition. Results of production of the hear-stress-prone summer flock were compared with a spring flock. The feed conversion rate was 1.78 in the spring flock and 1.83 in the summer flock with a “livability percentage” at 94.7 percent in the spring flock and 95.3 percent in the summer flock. Live market weights were comparable in the 2021 study with 9.24 pounds at 55 days in the spring flock and 9.37 pounds at 57 days in the summer flock.

Briefly describe how your target audience benefited from your project's activities.

Sprinkler systems offer cooling water conservation of over 50 percent compared to a cool-cell system while maintaining production without sacrificing flock performance.

Briefly describe how the broader public benefited from your project's activities.

This system conserved water and energy by more effectively cooling the chickens. As poultry industry combat climate change and heat stress, management of sprinkler systems will be crucial in meeting sustainability goals, including water conservation. As groundwater becomes a critical issue due to aquifer depletion, methods such as this will help alleviate the reduction. Energy savings put less stress on the powergrid and reduce the production of greenhouse gases. Interest in solar and wind energy solutions on the farm in combination of this technology can create enregy indenpendent and carbon neutral poultry operations.

Growing High Yielding and Profitable Corn in Arkansas

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Corn has become a crop of choice for many Arkansas growers as they see the benefits it provides their farming operations including; more and better weed control options to control glyphosate resistant weeds, profit potential, rotational benefits for following crops, water
conservation, and overall crop diversity and risk reduction. In past years, Arkansas corn yields have been steadily increasing in part to improved management practices, irrigation capability, and overall understanding of corn production. As commodity prices have declined or input prices have increased during the last few years or and overall farm profitability has declined, Arkansas producers need to have information on how to continue to raise high yielding and economical corn.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Educational efforts were made throughout the year to educate corn producers, county extension agents, crop consultants, and industry representatives on management strategies to grow quality high yielding and economical corn. Various methods were used to
disseminate information on corn production and including; newsletters, blog postings, field visits and demonstrations, verification program fields, phone calls, social media, a virtual corn production meeting, and a virtual corn field day. Educational efforts focused on proper production methods to grow high yielding and economical corn and included; impact of inputs on yield and profitability, hybrid selection, planting dates and rates, fertility, weed control, insect management, irrigation, harvest, and storage.

Briefly describe how your target audience benefited from your project's activities.

Despite 2021 being one of the more challenging growing seasons in recent years with widespread flooding South Arkansas in June, Arkansas corn producers still were able to achieve a state average yield of 183 bu/acre from 850,000 acres, the second highest state corn acreage since 1954. This is remarkable considering that nearly 50% of the state's corn crop was impacted by the early June flooding/storms. The success despite challenging conditions indicates that Arkansas corn producers have learned how to grow high yielding corn through successful extension educational programs. Corn is and will continue to be an economically important crop for Arkansas producers. In 2021, Arkansas produced approximately 155 million bushels of corn worth an estimated $750 million. With educational programs that were delivered on management practices for successful corn production, Arkansas producers grew high-yielding and profitable corn in 2021.

Briefly describe how the broader public benefited from your project's activities.

Corn as a rotational crop is a profitable alternative to grain sorghum. The use of crop rotations reduces disease and insect pressures and will result in less use of agriculture chemicals, The risk of environmental impact due to chemicals will decline with the use of crop rotations. With the E-15 initiative announced by President Biden, corn is now a strategic source of energy for automobiles. Ample supplies of corn are needed not only for human and animal food but corn is needed to extend the current stocks of gasoline. This action may held decrease the inflation rate of fuels.

Integrated Weed Management Strategies in Cotton Improve Palmer Amaranth Control

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Cotton is grown on approximately 500,000 acres in Arkansas each year, generating over $280 million in revenue for growers in the state. One of the biggest threats to successful cotton production in Arkansas is the weed Palmer amaranth. The competitive nature of Palmer
amaranth may adversely hamper cotton yields by more than 50%. Management of Palmer amaranth has become especially difficult as the weed has manifested resistance to a wide assortment of herbicides, effectively eliminating many of the primary options for weed control.
Three populations of Palmer amaranth in Northeast, AR have been recently confirmed resistant to glufosinate, and one population to dicamba and 2,4-D. These herbicides are the latest in technology development to control Palmer amaranth. In Tennessee, most counties that border
the Mississippi river harbor populations of Palmer amaranth resistant to dicamba and 2,4-D, with one population potentially resistant to glufosinate as well. With no alternative herbicides with activity on emerged Palmer amaranth, the evaluation and incorporation of alternative and
integrated methods for weed management has become imperative for successful cotton production in Arkansas.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

A long-term study was proposed and funded by Cotton Incorporated in 2019. However, research was initiated in fall of 2018 in Marianna, AR to determine the effectiveness of integrated weed management strategies on Palmer amaranth soil seedbank management. This study investigated
four separate factors for their overall benefit: the presence or absence of a one-time deep-tillage event, presence or absence of a cereal rye cover crop, presence or absence of a zero-tolerance management strategy, and comparison of dicamba- and non-dicamba-based herbicide programs.
Program effectiveness was based on total emergence and survival of Palmer amaranth each growing season along with profitability.

Briefly describe how your target audience benefited from your project's activities.

Initially, the one-time deep tillage event followed by the zero-tolerance weed management strategy had the most immediate impact on Palmer amaranth emergence. There was a 73% reduction in Palmer amaranth emergence from the first year to the second year as the result of deep tillage, reducing total Palmer amaranth emergence from 106,400 plants/acre to 28,500 plants/A. By the third year, Palmer amaranth populations were reduced but not significant, indicating that deep tillage should be conducted every 3 years. Interestingly, by the end of the three-year period, cereal rye and herbicide programs including 2 residuals at planting provided the most significant results in terms of Palmer amaranth plant reduction and profitability. By year two, the use of a cover crop yielded a $110/acre increase in profit compared to not using a cover crop. Furthermore, Palmer amaranth emergence was reduced by 82% by the end of the third year by the cover crop. One out of three years, the dicamba program resulted in greater profits primarily due to a lack of rainfall after planting leading to failure of the preemergence
herbicides to be activated in the non-dicamba program.

Briefly describe how the broader public benefited from your project's activities.

Overall, these findings show promise that use of non-chemical weed control options can be effective compliments with chemical weed control, specifically residual herbicide options for managing Palmer amaranth. Considering the
costs of herbicides increasing significantly in 2022, if a cover crop is implemented followed by two effective residual herbicides at planting, realistically one POST herbicide application could be eliminated resulting in $30/acre savings. This paired with the $110/acre increase in profit
from the cover crop becomes significant. If this practice were adopted on 50% of the 500,000 acres of cotton growing in Arkansas, that would equate to $35 million savings. By using these programs, producers can significantly reduce the amount of selection pressure placed on weeds
for herbicide resistance, thus increasing the longevity of the few effective chemical options that remain while increasing profitability of their cotton production systems.

Managing Southwestern Corn Borer Increases Grower Profitability

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Acreage of non-gmo field corn was significant in 2021 (75,000 acres) in Arkansas. The driving force behind this increase is a poultry facility paying growers a premium for non-gmo field corn. Southwestern corn borer can cause significant yield losses to non-Bt corn. This pest, as the name implies, bores into the corn stalk feeding internally on the stem. This feeding can cause reduced yields through smaller ears, ears dropping from the plant due to feeding at the point of attachment, and also often results in lodging in the infested portions of the field. Because of the hidden nature of this pest, damage may not be realized until late in the season, when corn plants begin to lodge. Heavy infestations
can result in nearly 100% lodging in large areas of the field, resulting in problems with harvest and contributes to yield loss. Monitoring for this pest is key to proper management and can easily be accomplished utilizing pheromone traps. Southwestern corn borer moths respond well to the universal IPM pheromone traps. These traps are relatively inexpensive and require weekly monitoring to detect adult borer emergence.
Corn is the primary host plant on which they feed making it relatively easy to predict infestations in non-Bt corn. In the absence of a monitoring program, growers are often rely on automatic applications of an insecticide to prevent economic infestations. These applications can be costly, often averaging approximately $30/acre. Because borers overwinter as larva in the corn stalk, cultural practices, such as stalk destruction can also reduce overwintering numbers of southwestern corn borer. County agents were encouraged to develop a management program including encouraging stalk destruction in fields that experienced borer problems the year before as well as running southwestern corn borer traps in non-GMO field corn areas to monitor for this pest

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

A southwestern corn borer monitoring program was initiated through the county IPM mini-grants program in 2016. Row crop agents participating in the program were required to include pheromone trapping for this pest in their program in order to receive funding. County agents were provided traps, pheromone and funds to cover travel to check the traps weekly.

Approximately 23-25 counties have participated in the program on a yearly bases since 2016. Agents submitted trap catches each week that were posted to the Arkansas Row Crops Blog. Agents also utilized the catch numbers in weekly newsletters sent to clientele.

Briefly describe how your target audience benefited from your project's activities.

Although non-GMO corn acreage has increased each year, there has not been a corresponding increase in southwestern corn borer across all non-GMO acreage. In the past the majority of growers made a prophylactic insecticide treatment based on corn growth stage and/or calendar date to manage southwestern corn borer. Our trapping program has indicated that economic infestations of southwestern corn borer was limited to 3 counties in the east central and northern portions of the state. This area represents about 5,000 acres of the 75,000 across the state. The majority of growers in the remaining area representing approximately 70,000 acres did not make a prophylactic insecticide treatment. A savings of $30/acre. This translates into a total savings of over $2,000,000 statewide in 2021 and over $7,000,000. since the program began in 2016. Insecticides commonly used are applied at a rate range of 0.067 to 0.098 lbs of active

Briefly describe how the broader public benefited from your project's activities.

Snce the program began in 2016., insecticides commonly used are applied at a rate range of 0.067 to 0.098 lbs of active ingredient per acre. This translates into a reduction of up to 6,860 lbs of insecticide active ingredient applied to the environment by utilizing sound IPM practices in 2021 and
over 22,860 lbs of active ingredient since 2016. Active monitoring of southwestern corn borer in non-GMO corn using pheromone traps saves growers money and reduces the pesticide load on the environment.

Maximizing Yield and Profitability of Late Planted Soybean with the Use of Inoculants

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Soybean grown in Arkansas has the largest acreage and production value compared to the other row crop commodities. In 2021, 3.01 million acres of soybean were harvested. With approximately three million acres of soybean planted in the state every year, Arkansas soybean producers need unbiased, research based agronomic and production recommendations to maximize soybean yield and increase profitability of
their crops. Soybean is a legume which can form a symbiotic relationship with rhizobia bacteria which can assimilate nitrogen (N) from the atmosphere. Of all the row-crops produced in Arkansas, soybean has the highest demand for N on a per acre basis. The ability of this relationship to provide N to the soybean plant prevents the need for additional N fertilization by soybean producers under normal conditions. However, some producers have seen soybean yield increase with the use of inoculants and additional N fertilizer applications in late planted conditions

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

For over 10 years, the University of Arkansas System Division of Agriculture researchers have evaluated the influence of new inoculation products and planting date on soybean yield under a variety of Arkansas production systems. Planting dates were selected in mid-May, June, and July to encompass the primary planting dates that are used in Arkansas production systems. Commercially available and experimental
products from numerous companies have been evaluated. Data generated from this research indicated a significant planting date by product
interaction indicating that for earlier planting dates there was no benefit to inoculation with any of the products tested. Conversely, at the later planting dates, June and July,there was a significant yield increase when any inoculant product was used compared to the untreated control.

Briefly describe how your target audience benefited from your project's activities.

Soybean yield data generated over several years suggests that inoculating soybean, even where soybean have been grown in the past, can be economically beneficial. Although the data showed mixed results for earlier plantings (April to May), there were some benefits. However, the use of an inoculant, regardless of the product, always resulted in significant yield increases with later planting dates (June to July). Inoculants were able to increase soybean grain yield for June plantings by 6 bushel per acre and 10 bushel per acre for July plantings. The breakeven yield gain to pay for most of these inoculant products is <1 bushel per acre (considering $10.00 per bushel). For the past 10 year, approximately 25% of the soybean acreages in Arkansas is planted after the first of June. If inoculants were used on the acreage planted after the first of June, soybean producers could see an additional $37.5 million in soybean production. The cost of inoculation is relatively cheap compared to the potential yield grains from itsuse making inoculation a relatively cheap insurance policy for soybean producers

Briefly describe how the broader public benefited from your project's activities.

Increased vigor in soybeans could result in less chemical inputs and better soil health. These reduced inputs will help reduce the environmental impact of farming practices. The societal goals for sustainable and healthy soil and clean water are paramont to sustainable agriculture. Practices such as these are steps to reach these goals.

Nutritional management of heifers for breeding

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Fall weaned heifers are often fed hay and supplement over winter and spring months to reach 55 to 65% of their mature weight for spring breeding. Grazing winter annuals in spring may be a more economical alternative but AI technicians often report the difficulty of getting these heifers to conceive. Excess protein in the diet is associated with elevated plasma urea nitrogen and high plasma urea nitrogen has been associated with reduced pregnancy rates in some studies.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

In 2020, a 2-year study began at the Livestock and Forestry Research Station to study the effect of feeding a low value, high tannin supplement (peanut skins) on heifer pregnancy rates. Peanuts skins may energy contribution is from fat and the tannins have been shown to increase nitrogen excretion despite peanut skins also being a source of dietary protein.

Briefly describe how your target audience benefited from your project's activities.

In the first year, we learned that peanut skins were palatable enough to use as a single ingredient supplement. Corn chops were blended with the peanut skins to be more platable in a 3 lb/d of a 50:50 peanut skins:corn blend. There was also a winter snow storm that resulted in cattle being removed from wheat pasture for a few weeks and fed dry hay. The supplemented group gained 0.25 lb/d more during the development period but were only 16 lbs heavier at AI breeding and had similar repro tract scores at AI breeding. Ultrasound pregnancy rates were greater in the supplemented group compared to control. If the second year results are similar, this project may provide a more economical solution to heifer development while improving pregnancy rates when exposed to excessive dietary protein.

Briefly describe how the broader public benefited from your project's activities.

There are only a few options to dispose of peanut skins without either burning them or landfilling them. By using this by-product, we save costs, increase heifer weight, and increase pregnancy rate. We also save on the climate impacts of burning and landfilling. Using peanut skins can lead to the reduction of potential biofuels such as soybeans and corn.

Saving Growers Money with New Defoliation Thresholds in Rice

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Armyworms are yearly pest of rice in the midsouth. Early in the growing season, true armyworms (Pseudaltia unipuncta) are the dominant armyworm species feeding on rice after migrating out of grass turnrows or wheat fields. Fall armyworms (Spodoptera frugiperda) is
typically only a pest of rice later in the growing season. Both of these pests can cause a significant amount of defoliation to rice plants, and in some cases the plant can be eaten back to the soil surface. The previous threshold for armyworms in rice was derived from our threshold
for wheat. Based on observations made in grower fields, we felt this threshold needed to reevaluated, and changed from an insect count based threshold to a percent defoliation based threshold. During the 2021 growing season, armyworms caused massive amounts of defoliation
in rice throughout the state. Not only did we observe multiple generations in rice, we also observed very poor control with our standard insecticides, so much so that we requested andreceived a section 18 for Intrepid 2F.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Experiments were conducted from 2017 through 2021 to determine the impact defoliation has on rice growth and yield. Line trimmers were used to defoliate rice at 0, 33, 66, and 100 percent at 2-3 leaf, early tiller, late tiller, and green ring growth stages, with six replications per treatment. Three planting dates were planted each year, with targeted planting dates being 1 April, 1 May, and 1 June. All of these studies were conducted in conventional rice. Heading notes were recorded at 50% heading for all plots, and yield was obtained with a plot combine. These studies showed that, regardless of planting date, defoliation occurring at 2-3 leaf and early tillering have no impact on yield, and only caused a 3-5 day heading delay. For April planted rice, yield loss was only observed for defoliation levels over 33% at the green ring growth stage. May and June planted rice saw yield losses occur for both later tiller and green when defoliation exceeded 33%. This work lead to new defoliation based thresholds based on planting date and growth stage.

Briefly describe how your target audience benefited from your project's activities.

Typically growers make one to two applications for armyworms during growing seasons when they occur. These applications cost $10 per acre, and the current products labeled for armyworm control in rice provide very little residual control. In 2021 this price increased to $15-18 per acre due to control issues with standard insecticides. During the growing season of 2021, we saw approximately 65% of our rice acres infested with either true armyworms or fall armyworms. On these acres, our new thresholds were able to prevent unwarranted applications. We promoted these thresholds through county production meetings, consultants meetings, and regional meetings over the past few years. We were also active on social media, producing videos of how to asses defoliation in rice and when applications are warranted. We estimate that this saved the rice growers of Arkansas approximately $10 million dollars. Not only does this save money for the grower, it also helps prevent flaring major pests like rice stink bugs by preserving beneficial insects. Preventing unwarranted sprays through these thresholds will help growers maintain profitability in rice production.

Briefly describe how the broader public benefited from your project's activities.

A more effective insecticide was tested and registered in Arkansas. This chemical may have less environmental impact than previouslly used chemcials.This applied research and demonstration showed that were oppportunites to reduce spraying through IPM. This reduction in spraying for armyworms also resulted in less impact on beneficials that reduced the need for spraying for stinkbugs. Spray reduction is the key to decrease environmental impacts of insecticides, preserve beneficial insects, and create a financially stable farming operation. Sustainable farming needs this information to insure more sustainable practices that lead to a more sustainable environment.

The Leading Program for Managing Southern Nematodes on Row Crops in the Southern US

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Arkansas farmers annually loose an estimated 51,000 bales of cotton, 8.6 million bushels of soybean, and 64,000 bushels of corn due to plant-parasitic nematodes for a total value of $1 billion USD. The most problematic pests include soybean cyst nematode, southern root-knot nematode, stubby-root nematode and the reniform nematode. Though nematodes cause significant yield losses very few scientists are conducting research to manage these yield-limiting pests

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Since 2015. Dr. Travis Faske's program has annually conducted several applied research studies (n = 50 to 60) to investigate the integrated manage of nematodes with crop rotation, host plant resistance and nematicides in the field, greenhouse, and lab. Commercially available soybean varieties that are marketed as resistant against the southern root-knot nematode are evaluated annually. The program leads the effort to provide free nematode soil assays to farmers and consultants in the state. Information from these trials is extended as on-line videos, national fact sheet, invited talks across the US and several articles on the row crops blog.

Briefly describe how your target audience benefited from your project's activities.

Based on these studies, we can provide answers to farmer questions on nematicide efficacy in cotton, corn, and soybean and what soybean varieties are best used in a southern root-knot nematode field. Output on this topic impacted 750 participants that attended virtual or in-person meetings in 2021. Nematode management videos were viewed more than 500 times. Since 2015, more than 6,000 nematode soil assays were processed for the Arkansas farmer, which is valued at $60,000 USD. Each year farmers from the North-Central and South-Central US request information on the resistance in soybean to the southern root-knot nematode. One twitter post of our 2021 results received more than 8,000 impressions. The program is recognized nationally for nematode management and with the SCN Coalition some 21.4 million potential impressions are estimated.

Briefly describe how the broader public benefited from your project's activities.

Reduction of pesticide use reduces farm costs but results in less toxins in the environment. By managing nematodes through genetics and cultural practices, reduction of pesticides used to control nematodes are reduced. The other alternative is increasing water and fertilizer to countermand the nematode's impact on root uptake and transport. This increase in fertilizer can increase potential for increasing stream concentrations of nutrients that impact streams and the Gulf of Mexico. Increasing water will further draw down sensitive aquifers.

Transitioning from 2 gene to 3 gene cotton varieties

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Cotton bollworm, Helicoverpa zea, (Boddie), is a major pest of cotton in Arkansas, costing growers an estimated $32 million in losses + costs in cotton alone. Until a few years ago, Bt cotton cultivars containing two insecticidal proteins (Bollgard II, Widestrike, Twinlink) provided excellent control of cotton bollworm and did not require supplemental foliar insecticide applications to manage this pest. However, resistance to the Cry1Ac protein, the primary protein responsible for controlling bollworm, has increased substantially. Early in development of resistance we recommended a foliar application of a diamide containing insecticide over the top of these two gene cultivars when a 6% damage threshold was reached. Then three gene Bt cotton cultivars came to market. These cultivars contained the genes found in the previous two gene cultivars, as well as a third insecticidal Bt gene, Vip3A. The addition of this third gene improved control of bollworm dramatically. However, the new three gene cultivars had a “yield drag”, meaning the older two gene cultivars yielded greater than the newer three gene ones. The yield difference was great enough that we continued to recommend the two gene cultivars with a supplemental foliar application over the newer three gene cultivars without a diamide application. As of recent, our research indicates that there is increasing resistance to the Cry1Ac protein and a single diamide insecticide application is not providing a sufficient level control of cotton bollworm and many growers are finding that they must make two diamide insecticide applications to adequately manage bollworm. The issue is that growers are already paying a fee for a Bt technology that does not work, then must make a diamide insecticide application which is not cheap on top of that, with an average cost of one application approaching $30 per acre. The question is, are multiple diamide applications on two gene cotton more profitable than moving to a three gene cultivar that does not require supplemental foliar insecticide applications?

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

We conducted research in Arkansas, and in cooperation with surrounding states, over the past several years looking at the yields of both two gene and the newest three gene cultivars, with and without additional foliar insecticide applications. Our research, as well as supplemental data from the OVT variety trials, indicates that the newer three gene cotton varieties are beginning to catch up yield wise to the older two gene cotton varieties. This, coupled with the increasing Cry1Ac resistance that requires growers to make multiple expensive foliar applications to control cotton bollworm on two gene cultivars, has made us change our recommendations for growers. Our data indicates that growers need to shift from two to three gene cotton cultivars to stay profitable. Over the past 2 years we began to recommend at production meetings, that growers move to three gene cotton varieties to eliminate the need for expensive supplemental foliar insecticide applications.

Briefly describe how your target audience benefited from your project's activities.

Arkansas cotton growers shifted from 75.5% two gene cotton (354,000 acres) in 2020 to 88.9% (417k acres) three gene cotton in 2021. On average, 1.5 insecticide applications were made on 78% (290,745 acres) of the two gene cotton acreage and only 2% of three gene cotton acres in 2020 with an average cost of $27.58 per insecticide application. In 2021, 1.5 insecticide applications were made on 86% of two gene cotton (44,866 acres) and 8% of three gene cotton acres received 1 insecticide application in 2021. That is elimination of a nearly $30 insecticide application on approximately 300k acres in Arkansas for a total reduction in $9 million dollars in insecticide applications. This massive change to three gene cultivars, of course, is not solely because of our recommendation but even if only 10% of that acreage was moved due to our recommendation that is a $900,000 dollar reduction in insecticide applications.cultivars, of course, is not solely because of our recommendation but even if only 10% of that acreagewas moved due to our recommendation that is a $900,000 dollar reduction in insecticide applications.

Briefly describe how the broader public benefited from your project's activities.

This information saves producers time and resources. Less herbicide application means less impact to the environment.

Weeds AR Wild Podcast

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Arkansas producers, consultants, and applicators are met with continually changing weed problems in season that creates a need for relevant and timely information being readily available to aid in-field decision-making. For example, research has shown that Palmer amaranth can grow up to four inches per day and a delay of only three days in application can result in 8-12% reduction in control. One female plant has the capability of producing up to one million seeds. As a result, a 10% reduction in control can ultimately drastically affect both the bottom line and increase the weed seed bank thereby creating additional long-term infestations. Therefore, there is a critical need for a timely delivery mechanism of university recommendations and advice for successfully managing problematic weeds in season.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

The Weeds AR Wild podcast as a part of Arkansas Row Crops Radio (accessible through Apple Podcasts or Google Podcasts) coupled with the SlickText mass text message campaign was created to satisfy the needs of this demographic. Real time issues that are occurring in the fields are immediately addressed in weekly (in season) and monthly (off season) podcast installments. Topics have included specific crop weed control recommendations, addressing weed control before and after the severe flooding events of 2021, herbicide resistance updates, commonly asked in-season questions, and innovative management strategies such as cover crops and harvest weed seed destruction. SlickText is utilized to direct growers, consultants, and applicators to the podcast as well as create an open line of communication for follow up questions. The Weeds AR Wild podcast is made up of Dr. Thomas Butts, Dr. Tom Barber, and Dr. Jason Norsworthy as the main hosts. In addition, the hosts have brought in other University of Arkansas System Division of Agriculture specialists for conversations and have had multiple nationally respected specialists guest star to lend their expertise to the topic at hand.

Briefly describe how your target audience benefited from your project's activities.

A total of 27 of the Weeds AR Wild podcast episodes have been launched, averaging around 200 downloads per episode. Since Arkansas Row Crops Radio was moved from its original hosting website (Podbean) to the current hosting site (Buzzsprout) in April, the Weeds AR Wild podcast has garnered 4,479 total downloads, accounting for 68% of all Arkansas Row Crops Radio listeners. Four special guest national co-hosts [Drs. Aaron Hager (University of Illinois), Prashant Jha (Iowa State University), Larry Steckel (University of Tennessee), and Rodrigo Werle (University of Wisconsin-Madison)] have participated which has increased the footprint of the podcast to have a national presence. In coordination with the podcast, 27 SlickText Mass texting campaigns have been sent reaching over 230 patrons with each text sent (6,000 total contacts). This has generated countless follow up questions, thus solidifying the relationships between Arkansas Extension Weed Scientists and Arkansas agricultural decision makers.

Briefly describe how the broader public benefited from your project's activities.

An Arkansas weed science survey from 2020 estimated approximately 600,000 acres of rice were represented by 123 respondents. As the Weeds AR Wild podcast has had an average of 200 downloads per episode, and the podcast covers all field crops grown in Arkansas, not only rice, it can be safely assumed in it's very first year, the Weeds AR Wild podcast has helped to inform decision-making on a minimum of 1.5 million acres, and as a result increased the timeliness and effectiveness of weed management strategies across Arkansas field cropping systems.

Critical Issue

UADA- Building Communities and Strengthening Economies

Community, Professional and Economic Development

Project Director

Stacey McCullough

Organization

University of Arkansas System Division of Agriculture

Accession Number

7000587

Building leadership capacity across organizations, communities and Arkansas

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Demand for leadership development programs and education is driven by multiple issues. The most commonly cited are: (1) a lack of individuals willing to assume leadership roles within a community or organization and (2) a lack of knowledge and skills to be effective leaders. The goal of Extension's leadership programs is to provide Arkansans with learning experiences to broaden their understanding of issues and opportunities facing our state and strengthen their skills and ability to make a positive difference at local, state, and national levels.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Leadership programs include education activities and resources for individuals who want to expand their knowledge and skills and for organizations and other entities seeking build their leadership capacity and impact. Programs are offered at the state and local levels.

LeadAR is a two-year statewide program designed to help Arkansans broaden their understanding of issues and opportunities facing our state and strengthen their ability to make a difference. Launched in September 2020, members of Class 19 participated in six virtual sessions and four in-person seminars, including a National Studies Tour to Washington, DC during the FY2021 year.

The monthly Leadership Lunch and Learn webinar series was launched in January 2021 and offers continuing leadership education to LeadAR alumni as well as University of Arkansas System Division of Agriculture employees.

Customized training workshops are offered to local leadership development programs, civic groups, nonprofits, and other organizations.

Other education and outreach are provided through social media, websites, electronic newsletters, and Extension publications.

Briefly describe how your target audience benefited from your project's activities.

LeadAR Class 19 consists of 21 class members. Thirty-two percent of participants represent agriculture, 41 percent represent rural areas of the state, and 27 percent are from urban areas. This cross-section is by design to facilitate collaboration between rural and urban segments of the state's population to address challenges facing our state and improve quality of life for all Arkansans.

To better understand their personality, LeadAR Class 19 members participated in DiSC and True Colors personality assessments and skill building activities to effectively use this knowledge to strengthen their leadership skills. They are developing communications skills through extemporaneous speaking assignments and serving as facilitators during seminars. They participated in sessions to increase their knowledge of leadership theory, ethical leadership, and diversity, belonging, equity and inclusion. Seminars in FY21 featured activities and speakers from which participants learned about major issues affecting Arkansas, including but not limited to poverty, education, criminal justice, infrastructure, and public health. They heard first-hand from local, state, and federal government officials about public policy and how issues are being addressed.

A total of 473 people participated in the Leadership Lunch and Learn webinar series during FY21. Topics covered in these trainings included: how to motivate and engage others, the value in embracing technology, how to foster innovation and creativity in the workplace, facilitating communication as a leader, time management, conflict resolution, managing for trust, and working with Generation Z.

Faculty and staff also conducted leadership skill development workshops on topics such as True Colors, effective meetings, conflict resolution, and parliamentary procedure for youth and adult audiences. A new publication, "How To Run An Effective Meeting: Parliamentary Procedure Basics", was released in FY21. Leadership features in Extension's "Strengthening Our Communities" one-minute public radio series focused on managing change through a crisis and beyond and community-based leadership programs.

Collectively, Extension leadership programs reached 2,953 direct contacts through 445 educational events. Social media posts reached 17,052 direct contacts and 128,131 indirect contacts. Electronic newletters reached 5,597 contacts.

Briefly describe how the broader public benefited from your project's activities.

Participants in leadership development programs apply the knowledge learned and skills developed in the workplace, in organizations and groups to which they belong, and through service to their community. Each LeadAR participant is asked to identify a community need and then design and implement project aimed at improving the quality of life for their community. In FY21, class members have examined community needs and are in the process of developing their project plans. Examples of projects completed by alumni in the past have included building a local library, securing grants to build restrooms for a public park, and the development of an annual Goat Festival, which brings thousands of visitors to a small town and generates revenue for the local economy.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

A comprehensive evaluation to assess Class 19 knowledge and behavioral changes resulting from the LeadAR experience will be conducted after the class graduates in late 2022.

Celebrating REtail, Accommodations, Tourism, and Entertainment by Building Rural Innovations and Developing Growth Economies

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Many rural places suffer from declining jobs, dwindling populations, and high poverty. Retail and tourism are seldom the focus of concerted workforce and economic development efforts, yet they are the primary job entry point and comprise approximately 25% of the state's workforce. Already struggling, the COVID-19 pandemic has left these sectors reeling from economic shifts and a changing workforce. CREATE BRIDGES (Celebrating REtail, Accommodations, Tourism, and Entertainment by Building Rural Innovations and Developing Growth Economies) is a pilot project designed to raise awareness of the importance of these sectors to the well-being of rural communities and to support businesses and workers through coalition building, needs assessments, informed strategy development, and strategy implementation. The project was piloted in two three-county regions, the Ozark Foothills in north central Arkansas and the 3Cs in southwest part of the state.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

After interviews and surveys of business owners, workers, and other stakeholders and analysis of secondary data, two lines of strategies were developed. The first phase focused on immediate and emergency needs as retail and tourism businesses 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 during the pandemic.

Beginning in September 2020, efforts transitioned to a second phase focused on strategies to invest in businesses and workers in the retail and tourism sectors and support long-term resilience and viability. As part of this, CREATE LIFT (Celebrating REtail, Accommodations, Tourism and Entertainment by Leading Innovation through WorkForce Training), an online workforce development certification focused on customer service, sector-specific technology, marketing, hospitality, and region-specific technology was launched in collaboration with regional community colleges and state workforce agencies (see https://www.uaex.uada.edu/business-communities/strategic-planning/create-lift.aspx for additional details). Other activities conducted in FY21 include:

- Continuation of the "Small Business, Big Rural Impact" podcast series to foster collaboration between local business owners through the sharing of ideas and best practices and highlight products and services of businesses in each of the pilot regions.

- Initiation of CREATE FORCE (Celebrating Retail, Accommodations, Tourism, and Entertainment by Fostering Opportunities for Rural Chamber Excellence). In partnership with the Arkansas State Chamber of Commerce and input from area chambers and their members, this programming featured two customized workshops for chamber staff and directors from both regions, funding to attend additional professional development trainings, and the opportunity to participate in follow up consultations to strengthen their chambers.

- Creation of four regional tourism advertising videos and an agreement in places to produce the Southwest Flavor Quest: Rural Arkansas Restaurant Guide video series (six regional food tourism videos) in the 3Cs region.

- Additional learning opportunities for pilot region business owners and workers in collaboration with other state steering committee partners. State partners include the Arkansas State Chamber of Commerce, Arkansas Economic Development Commission, Rural LISC, Winrock International, University of Central Arkansas, Arkansas Division of Workforce Services, White River and Southwest Arkansas Planning and Development Districts, Arkansas Department of Parks, Heritage and Tourism, and University of Arkansas at Little Rock Economic Development Institute.

Briefly describe how your target audience benefited from your project's activities.

Community leaders involved with CREATE BRIDGES became more aware of local assets existing within their region. Business owners and workers learned about business management, marketing, outreach, and customer engagement resources available through project partners and regional and state entities. Through the podcast series, they also learned about best practices for retail and tourism businesses.

De Queen, Arkansas has a new nail salon in town and dreams have become reality for a young woman who educated herself with free local business programs held in Sevier County this year. Back in January, salon owner Ashley Campos attended the free Spanish Business Development workshop online hosted by the Arkansas Small Business Development and Technology

Center (ASBTDC) to learn what it would take to start her own company. The event was hosted in partnership with CREATE BRIDGES of Arkansas and Sevier County Chamber of Commerce. Campos says the program taught her about organizational structure and how to form a business plan for her shop.

The same week her salon opened, Campos also attended a follow-up event held at the local Chamber of Commerce office to receive free business counseling with ASBTDC Director John Caver. She says the session helped her "gather information on how to keep the business organized and develop an effective marketing strategy." The consulting event was free of charge and provided 30-minute one-one-one sessions to advise entrepreneurs on how to start a business from scratch or take an existing company to the next level.

CREATE BRIDGES, ASBTDC, and Sevier County Economic Development have partnered to continue providing the free business consulting events to the public in Sevier, Little River and Howard counties on a quarterly basis going forward. Additionally, the group teamed up with students from UA Cossatot's Immigrant Leadership Institute last winter to deliver a "Shop Local" Holiday guide and goodie bag set to Spanish-speaking business owners alongside the Sevier County Economic Development department.

Small Business support methods developed by the CREATE BRIDGES team are formed with the realities of busy community member lifestyles kept in mind, as the podcasts can be downloaded and free advice from successful entrepreneurs is available at the listener's convenience.

The convenience of online business workshops and flexible scheduling of the one-on-one sessions allowed Campos to turn her passion into a paycheck while juggling of many other responsibilities at once. In addition to starting her own business, Ashley was also keeping up with her now 10-month-old son named Malakai Zane (who just learned how to crawl) and spending time with her fiancé Justin, who she credits as being supportive and helping throughout her nail Journey. She also continues to find time for her sisters Melanie and Daisy who "sure are lucky to have their own personal nail technician."

In 2019 Campos became a licensed Manicurist through the University of Arkansas Rich Mountain Cosmetology school and took an additional nail tech class lead by "Marie Nails," who is known for celebrity nail work. Now, at just 20-years-old, the young mom and business owner has advice for other entrepreneurs looking to reach their dreams. "Do lots of research," said said. "It never hurts to ask questions and write everything down." She also advises to never let other people's opinion of you stop you from reaching your dreams. "If you can dream it, then it's possible," Campos said.

Briefly describe how the broader public benefited from your project's activities.

CREATE BRIDGES has increased the public's awareness about the importance of retail, tourism, entertainment, and accommodation industries to local economies and how supporting these local businesses creates jobs and income for local residents.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

The COVID-19 pandemic has been particularly difficult for our regions and sectors. While we incorporated emergency strategies based on our research, it was difficult to keep people engaged. While the challenges facing the regions were already evident in the research and were exacerbated by the pandemic, the regional steering committee members were easily swayed by the whatever trend was occurring, rather than building in sustainability into their strategies.

Lessons learned are being incorporated into additional CREATE BRIDGES pilot projects being implemented in three new states (phase 2). Results from both pilot phases will be compiled into a curriculum that can be used by other regions throughout the country.

Educating voters about statewide ballot measures to be decided in the November 2020 general election

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Arkansas is one of 15 states where residents can propose an amendment to the state constitution or refer a state law to voters, and where legislators also have the authority to refer amendments to voters. Research shows that high profile candidate races often overshadow state ballot issues on Election Day (Magleby, 1984). Some voters may not develop firm opinions on ballot issues until the final days of a campaign, if they develop an opinion at all.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

The Cooperative Extension Service in Arkansas uses a county agent model to deliver most programming. Ballot Education Program materials are distributed to the state's 75 counties. We rely on agricultural, family and consumer science and 4-H agents to deliver our program. The program is only successful if the county agent is successful. To prepare county agents to deliver the 2020 Arkansas Ballot Education Program, the Public Policy Center provided the following program planning and training opportunities:

- Three Ballot Issue Education Program and Training for County Agents Webinars.
- Recording of Ballot Issue Education Program and Training for County Agents Webinar for follow up viewing.
- Communications materials, including social media campaign, newsletters, columns and press releases.
- Email updates on breaking news related to court challenges.

A new employee-only website allowed us to create a ballot issue education asset page accessible to all Extension employees. The site was shared weekly with colleagues in emails highlighting posts and graphics available for that day during a 10-week social media campaign.

Since 2004, the Public Policy Center has published unbiased fact sheets on statewide ballot measures so voters have a better understanding of what is being asked of them on Election Day. The fact sheets go through a vetting process that includes reviews by issue supporters and opponents to ensure credible, unaligned and research-based information and education. These fact sheets provide the foundation for a variety of materials produced to reach as many voters as possible. For the November 2020 election, fact sheets were combined into a single voter guide. County agents delivered nearly 38,000 printed voter guides to voters in their communities. Website visitors downloaded the digital voter guide 18,587 times by November 5, 2020.

The Arkansas Ballot News and Notes is a monthly email newsletter about statewide ballot issues. People can subscribe through our website. As of December 1, 2020, the distribution list included 2,159 subscribers.

The 2020 ballot issue education program website includes a main landing site and individual pages for each ballot measure. Each page featured:

- Issue PDF
- Link to legislative bill with complete text
- YouTube Video summary
- Text of what was being proposed
- Text about how the issue got on the ballot

- Table showing who supported or opposed the measure, with links to Ethics Commission filing sand supporter/opponent websites

Covid-19 forced social media to play a more prominent role in our education and outreach efforts in 2020. A 10-week social media campaign featuring 33 posts was created with information about ballot issues, as well as:

- Absentee voting
- How to check your voter registration status
- Voter ID requirements
- Deadline to change your address
- How to vote in person if you had requested an absentee ballot
- The start of early voting
- Election Day reminders
- Election results
- Evaluation survey prompt

Agents used social media to share materials as well as quick videos about the issues. Public Policy Center staff were invited to make several presentations that were streamed live over Facebook or put on YouTube.

Agents also order a record number of display boards, 192, that were set up in locations across the state including libraries, courthouses, Extension offices, churches, community centers, adult education centers and community colleges.

Briefly describe how your target audience benefited from your project's activities.

Links to pre-election and post-election evaluation surveys were shared through social media, newsletters and our website to gather basic data about reach and impact.

In pre-election surveys, 85 percent of those who said they would be voting said they had the information they needed to make an informed decision on the 2020 ballot issues. Between one and four percent reported still having low knowledge of an issue after reading the voter guide, with the majority of those respondents indicating they still had questions about Issue 3. Ninety percent of newsletter subscribers agreed that their knowledge of ballot measures increased because of the newsletter.

In the post-election survey, 96 percent said they had the information they needed to make an informed decision on the ballot measures. Among those subscribing to our newsletter, 84 percent said the newsletter increased their knowledge about the ballot issues. Below are examples of comments received:

“This is probably one of the most important public education efforts that the cooperative extension service provides to the people of Arkansas. The educational materials are unbiased, thorough, and written in a way that more people can understand. Please keep doing this very important work. Thank you!”

“I love the Extension's voter resources. It's unbiased and relatively clear. This was the only place I was able to find the proposed issues, as they were fully written, instead of just a vague one-line header. I have used UAEX voter resources for a few years now, and refer my friends to it. Thanks for all UAEX does to clarify the vote for Arkansans!”

“I had friends calling to ask about an explanation of the issues. I used your publication to explain the pros and cons. I took notes in the booklet. I like seeing responses to both sides of the issues.”

“The pdf ballot issue guide is amazingly well done. It is my essential go-to before voting on ballot issues.”

“I suspect you take a lot of heat from various interest groups. Please continue doing this and don't let them deter you. Also, I shared with 3 family members who used it to make their voting decisions. They likely will not respond to this survey, so I wanted to let you know. The younger voters used the videos more than the older ones.”

“I LOVE the ballot issue education materials. I access everything online, but I get printed materials for my parents, in-laws, and grandparents.”

Briefly describe how the broader public benefited from your project's activities.

In a democracy where voters decide outcomes of important public policy questions that impact the well-being of communities and states, it is critical for voters to have sufficient information to make informed choices. The goal of ballot issues education is to provide voters with unbiased, balanced information so they can make informed choices.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Changes to election law combined with a pandemic caused serious road blocks for the November 2020 Arkansas Ballot Issue Education Program.

A new administrative approval route for certifying statewide ballot issues and multiple legal challenges put us in a position of not knowing the final ballot issues until after publication deadlines.

The COVID-19 pandemic arrived in Arkansas in mid-March. There was hope the virus would fade over the summer and Extension agents could once again interact with large groups of the public. But agents said COVID-19 made delivering in-person programming nearly impossible and closed many distribution sites.

Using virtual field trips to provide soil and water conservation education

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Sustaining agricultural production and natural resource protection in Arkansas is a growing concern among scientists and farmers alike due to issues related to climate change, surface water quality, water availability for irrigation, and profitability related to high input costs and low commodity prices. Sharing conservation efforts through virtual and digital methods saves time, money, and reaches new audiences that have never been exposed to the efforts of conservation personnel through demonstration and extension of benefits.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Integrating the efforts of the Arkansas Discovery Farm and the Arkansas Soil Health Alliance, the University of Arkansas System Division of Agriculture utilized virtual field trip methods to develop and deliver virtual demonstration and educational experiences to a statewide network of participants to provide time and cost savings. The Soil and Water Conservation Series has provided an in-depth look at farm irrigation, discussing various technological advancements that are being used today in agricultural fields across the state of Arkansas to increase irrigation efficiency and maintain sustainability. Delivered live from producers’ fields and from the Water Quality Lab, Virtual Field Trips (VFTs) demonstrated equipment, software and conservation practices used. Participants had the opportunity to ask subject matter experts questions and get answers live.

Fourteen VFTs were delivered over a three-year period demonstrating water quality and soil health topics, conservation rules and policies and instrumentation needed to improve soil health. Researchers and virtual field trip presenters used appropriate learning methods for adult distance education participants. Participants included Cooperative Extension Agents, NRCS personnel, local farmers and producers, and industry professionals.

VFTs with accompanying lesson plans were also marketed to high school science teachers and students to extend the reach into the classroom. Delivery of virtual educational opportunities related to soil health and water quality were made available for high school science classes in a 45 minute - 1 hour time frame in which teachers could incorporate the VFTs into normal school day curriculum emphasizing conservation benefits with respect to water quality, irrigation water use, climate change, soil health and careers in conservation and agriculture. Lesson plans followed Next Generation Science Standards in E7 and GRC formats. Students in high school science classrooms had the opportunity to ask questions in real-time and get answers from subject matter experts. In total 12% of participants were from high school science classrooms.

A coordinated marketing and outreach program among Extension and cooperating partners was developed to promote joint virtual training efforts and make non-formal demonstrations accessible through social media. A new Arkansas Soil Health Alliance webpage was built to house resources, fact sheets, videos and recorded virtual field demonstrations.

Briefly describe how your target audience benefited from your project's activities.

The Virtual Field Trip efforts gained the attention of many traditional and non-traditional audiences. This virtual field trip series to date has had over 920 webinar attendees, including 144 high school students and 46 high school science teachers. There were 6,811 YouTube views and collectively the VFTs have reached over 52,173 people on Facebook during marketing campaigns.

Participants gained knowledge about:

- irrigation technology and scheduling to reduce water consumption,
- the Arkansas Discovery Farm Program and how research being conducted on these demonstration farms can benefit them,
- how water quality and soil health practices used on Discovery Farms are enhancing profitability and sustainability,
- surface water irrigation aquifer issues in critical groundwater regions and mitigating practices,
- using winter cover crops for no-till watermelon production
- protecting water resources through conservation on a poultry-beef grazing farm,
- improving soils and profitability through collaboration,
- improving water quality and reducing water use with surge irrigation,
- soil health, and
- agricultural sustainability, including practices specific to cotton, soybeans, rice and poultry.

Briefly describe how the broader public benefited from your project's activities.

Agriculture accounts for a major share of water use as well as withdrawals of surface water and groundwater in the United States. Current withdrawal demands are exceeding the sustainable yield of the aquifer beneath Arkansas and Mississippi resulting in declining ground water levels and cones of depression in the aquifer. Documenting the benefits of soil and water conservation and educating farmers and others about technologies and production practices that can lead to reductions in water usage while maintaining or even enhancing yields through VFTs can help reverse this trend and ensure sufficient water for all users.

In addition to public benefits related to water availability and quality, this project also increased awareness about how to effectively use virtual educational technology by other groups. Due to the success and visibility of the Soil and Water Conservation VFTs, team members were asked to assist with the 23rd and 24th Arkansas Soil and Water Education conferences. The team has also provided consultation to other groups exploring the concept of delivering virtual education.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

The VFT series has had three peer-reviewed conference presentation proposals accepted, one for the Southern Regional Water Conference in 2019, another for the Association of Natural Resources Extension Professionals in 2020 (delayed to 2021) and one for the Soil & Water Conservation Society Conference in 2021.

A soil health guidebook is being created based on the content and work of the virtual field trip series.

Critical Issue

UADA- Natural Resource Conservation and Management

Natural Resources Conservation

Project Director

Victor Ford

Organization

University of Arkansas System Division of Agriculture

Accession Number

7000294

Promoting Agricultural Sustainability and Natural Resource Protection through Soil and Water Conservation Education and On-Farm Demonstration with Discovery Farms

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Agricultural producers in Arkansas face many concerns related to sustainability and unintended impacts on soil and water resources including soil health issues; water quality concerns from the contribution of fertilizer-derived nutrients to the Gulf of Mexico hypoxic zone and manure-derived sediments to streams designated as wild and scenic and to drinking-water-source lakes; sediment-laden runoff to streams designated as impaired by turbidity and declining groundwater supplies for irrigation and other agricultural uses. These resource concerns coupled with pressure from consumers through the entire supply chain to document agricultural sustainability at the farm level, rising input costs and low commodity prices, and climate extremes place financial stress on agricultural producers who already face small profit margins per unit area of land use.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Due to the financial stress described above, agricultural producers are often reluctant to implement soil and water conservation practices even with existing federal financial assistance programs. Concerns of increased, lower productivity and low confidence in their ability to successfully manage with conservation are major obstacles to adoption of more sustainable practices. Our major program to educate and help producers gain confidence in soil and water conservation practices is the Arkansas Discovery Farm program, one of largest and premier on-farm monitoring, demonstration and

research of soil and water conservation. A Discovery Farm is a private farm that has volunteered to work as part of a team of researchers, Extension personnel, NRCS and other conservational practices to evaluate and demonstrate more sustainable practices. We currently have 13 Discovery Farms with 42 automated, edge-of-field water quality monitoring stations equipped with telemetry that alert our cell phones as to when water samples have been collected from runoff to determine nutrient and sediment loss. Four farms are livestock and poultry farms (1 grazing dairy, 2 poultry, 1 beef cattle grazing farm), and 7 row crop farms (5 rice and soybean farms, 2 cotton and corn farms), one horticulture farm (peaches) and one wildlife farm (row crops but emphasis on creating habitat for waterfowl). In addition to runoff quality, we measure water use and irrigation use efficiency, soil health, calculate sustainability metrics, soil nutrient levels for nutrient management, nutrient use efficiency and soil moisture. We also have 20 Soil Health Satellite Discovery Farm we are monitoring changes in selected soil health parameters such as infiltration, bulk density, aggregate stability, soil microbial populations and soil fertility levels. Practices that are demonstrated and monitored include cover crops, minimum tillage, irrigation water management including computerized hole selection for furrow irrigation with poly tubing, irrigation scheduling with soil moisture sensors, multiple inlet rice, land leveling, alternative wetting and drying and automated pump controls, filter strips, nutrient retention ponds, low impact development and stormwater management practices on newly constructed poultry farms, low water input and dry scraping of a dairy parlor with a passive solid separator and infiltration trench, rotational grazing, poultry litter management on row crop farms, nutrient management, and irrigation water recycling. Providing farmers monitoring data from their farm allows them to become part of the solution process as well as instills confidence that soil and water conservation practices can protect soil and water, not hurt production, and in many cases increase profitability perhaps not immediately but over a period of years. In turn, we implement farmer – to farmer learning where Discovery Famers speak at field days, meetings, workshops and conferences. Our farmers spoke to 10 and on 15 videos found on YouTube different audiences to over 8000 contacts. In addition, we prepared several Research reports that were published by the University of Arkansas Division of Agriculture's Experiment station report series. We published facts sheets on topics such as Biochar, downloading climate change from the internet, how to use the Web Soil Survey, soil health, nutrient management. We also produced 14 virtual soil and water conservation field days and a video on monitoring water use and irrigation needs on a peach farm to provide education during the COVID Pandemic. We will be adding four new Discovery Farms in 2022 including a water use efficiency in rice production farm, a strawberry farm and two nutrient use efficiency in rice production systems.

Briefly describe how your target audience benefited from your project's activities.

The Arkansas Discovery Farms program has emerged as an important program that benefits agricultural producers in many different ways including:

1. Increasing confidence in soil and water conservation practices for 13 Discovery Farmers and 20 Satellite farmers as we have conducted demonstrations and collected data that provides information on economics, effect on productivity, effect on reduction of inputs through nutrient use and water use efficiency

2. Neighboring farmers and other farmers have increased knowledge of conservation practices through farmer to farmer education which has greatly increased:
    1. the use of conservation using computerized hole selection to better design furrow irrigation to reduce tailwater losses and reducing groundwater decline

    2. Using cover crops and minimum tillage to improve soil infiltration by reducing soil compaction and increase depth of water and nutrient extraction by crop roots to increase the length of time between irrigations, thereby reducing irrigation needs and reducing fuel costs

    3. reduced nutrient inputs as soil health has increased nutrient cycling and availability. One cooperating farmer has even eliminated phosphorus and potassium fertilizer temporarily in reducing tillage and utilizing cover crops without hurting productivity

    4. One cotton farmer by using no-till and cover crops has reduced inputs such as fuel and irrigation so that the cost of producing cotton has decreased by $90/acre while yields have remained the same, thereby increasing profitability

5. Farmers attending virtual field days, tours, and meetings have increased knowledge via farmer to farmer education

6. Agriculture as a whole has benefitted as water quality monitoring data have revealed that less than 5% of Nitrogen and Phosphorus applied as fertilizer has been lost at the edge-of-field in runoff demonstrating that soil testing provides a scientifically-valid method of not overapplying fertilizers. His has helped lessen fears about water quality regulations restricting farming practices.

Briefly describe how the broader public benefited from your project's activities.

The value of the work performed and accomplished by the Arkansas Discovery Farm program has benefitted the broader public by demonstrating that Farmers are good stewards of the land and are not haphazardly applying and/or wasting inputs. It should instill confidence in the agricultural supply chain and consumers that their food is being produced in an efficient and sustainable manner where data collected via on-farm research and demonstration is providing continuous improvement in increasing soil health and protecting our natural resources. Discovery Farm Field days has opened increased cooperation and dialogue among farmers and regulatory branches of Government such as EPA. For example, one of our Discovery Farmers near Stuttgart invited EPA Regions 6 to his farm to see our efforts, who in turn invited then EPA Chief Wheeler to the farm where Chief Wheeler made an announcement that EPA was providing funding to the Arkansas Department of Agriculture to continue addressing water quality and supply issues. The virtual field days have reached new and broader audiences via YouTube where they can observe the stewardship efforts of farmers as well as see some of the practical constrainits..

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Restrictions due to COVID-19 have prevented programs from having the full possible impact.

Watershed and Stormwater Education

Project Director
Victor Ford
Organization
University of Arkansas System Division of Agriculture
Accession Number
7000292

Watershed, Water Quality and Stormwater Education

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Stakeholders in Arkansas encounter a variety of challenges to watershed health, water quality, water supply, and stormwater management. Many surface drinking water supplies are experiencing the seasonal taste and odor issues that can be linked to nutrient loading of reservoirs and correlated to watershed health (land cover, land use, hydrologic modification, invasive species, climate change, best management practice use, point and nonpoint sources of pollution, etc.). While more advanced water treatment can be installed it comes at a high cost and does not improve raw water quality or treat the causes of degraded water quality; Groundwater depletion is also an issue in portions of the state where agricultural and industrial production and communities are reliant on groundwater sources.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

The goals of the watershed, water quality and stormwater education program are to Inform stakeholders about watershed challenges and empower them to successfully recognize opportunities and address them cooperatively and effectively. To achieve progress towards the goals 67 extension Agents were trained in water quality issues and education, and they conducted 65 educational events and made 370 educational materials. Extension water quality education partnered with over 100 municipalities, organizations, and agencies to to provide cost saving services, educational programming and demonstrations. Direct consultation for citizens of Arkansas was also a part of the effort.

Briefly describe how your target audience benefited from your project's activities.

By reaching a broad and diverse audience (municipal decision makers and staff, homeowners, renters, landowners, businesses, state agency staff, agricultural producers, and conservation and development professionals), the results of this programming have helped people and communities comply with existing regulations and increase quality of life while better managing stormwater and protecting water quality. Our target municipal audience saved $500,000 among 26 municipalities to address stormwater management.

Briefly describe how the broader public benefited from your project's activities.

The public benefitted from our educational activities through their own cost savings and through an increased quality of life where they live. Water quality and stormwater management overlap with many other components of a vibrant and robust community including increased air quality, aesthetics, property value, and environmental health.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Restrictions due to Covid-19 were still an issue in conducting programs to the optimal level.

Wildlife Management Education

Project Director
Victor Ford
Organization
University of Arkansas System Division of Agriculture
Accession Number
7000291

Incorporating Wildlife Habitat Enhancements into On-Farm Operations

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Farmers who rely upon income from their land make decisions which can positively or negatively affect wildlife habitat. For entrepreneurial farmers, adding a wildlife enterprise to their operation can generate additional income while providing benefits for wildlife and associated habitats.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

The University of Arkansas System Division of Agriculture Cooperative Extension Service (Extension) partnered with Lacy Farms LLC to host a Wildlife Discover Farm. Wildlife habitat practices were established on a working farm to improve wildlife habitat while increasing financial gains through waterfowl and deer hunting leases. The farmer agreed to reveal the economic gains and losses for his efforts which contributed to educational outreach about wildlife enterprises. We presented a virtual field tour at the Wildlife Discovery Farm aimed at farmers interested in establishing wildlife habitat for recreational income and enjoyment. The professionally filmed and produced webinar included presenters from Extension, Arkansas Game and Fish Commission, Quail Forever, and Lacy Farms about cover crops, wetland habitat, native grasses, waterfowl management,

economics, and marketing. Additionally, we presented a one-hour webinar through the national Forestry and Natural Resources Webinar Portal housed at Southern Regional Extension Forestry aimed at natural resource professionals which provided an overview about wildlife enterprises, economics, and the landowner's perspective.

Briefly describe how your target audience benefited from your project's activities.

The target audience of over 500 farmers and natural resource professionals learned about wildlife enterprises and their potential for incorporating wildlife habitat enhancements into their farming operation. The benefits from this outreach program extend beyond the life of this program because outreach continues to be available online. Therefore, this number receiving direct benefits is expected to grow. Outreach benefitted landowners who might consider starting a wildlife enterprise and options available. Wildlife enterprises are not for every farmer, therefore this outreach benefits farmers by helping them with their on-farm decisions. We recommend starting small and leveraging free planning resources such as state private lands biologists, district conservationists, and foresters. The Wildlife Discovery Farm employed various Farm Bill programs which not only improve soil conservation, but also enhance wildlife habitat and economic gains from hunting leases on the property. This is not accomplished quickly. The Wildlife Discovery Farm owner indicated his wildlife enterprise was 30 years in the making. He had done some personal investigation, attended in-person workshops conducted by Extension, and had been successful at enrolling in farm bill programs prior to becoming a Wildlife Discovery Farm. This outreach benefited natural resource professionals who advise farmers about on-farm practices regarding options for wildlife enterprises and potential monetary gains for their farmers.

Briefly describe how the broader public benefited from your project's activities.

The public will benefit from this project when farmers apply more wildlife habitat and conservation practices on farms, resulting in healthier ecosystems. This outreach targeted both farmers and those who advise farmers about integrating wildlife habitat practices using a working farm as a model and highlighting potential economic gains. Oftentimes the economic gains are unknown and can only be accessed from a willing farmer who reveals their inputs and expenses. We were fortunate that Lacy Farms was willing to partner on this project. This project exposed potential economic gains to farmers willing to incorporate wildlife habitat and conservation practices into their farming operations and land use.

Enhancing Poultry Production Systems through Emerging Technologies and Husbandry Practices

Project Director
Yi Liang
Organization
University of Arkansas System Division of Agriculture
Accession Number
1021381

Enhancing Energy and Water Efficiency in Broiler Production

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Energy and water are crucial inputs for poultry production. Solar air heaters have the potential to reduce heating loads in commercial meat bird production, therefore, decrease the amount of fossil fuel such as natural gas or propane when brooding young chickens. The objective of the solar thermal study was to evaluate a low-cost solar collector to pre-heat ventilation air in commercial broiler buildings in order to reduce supplemental heating and potentially improve air quality.

Water is not only for chicken consumption but also used to alleviate heat stress in tunnel-ventilated broiler houses. Heat stress is one of the most challenging stressors to poultry production. Evaporative cooling cell pad systems and other moisture-rich systems rely on adding water vapor into the barn air, sometimes elevating relative humidity greater than 70 percent. For a chicken, this is counterproductive to cooling itself by breathing.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Six black fabric-based solar collectors of 36 m2 each were installed on south-facing rooftops of a commercial-scale broiler house. The solar collectors provided a portion of fresh air into the buildings during the ON cycle of intermittent minimum ventilation. During the OFF cycle of minimum ventilation, when the temperature under the collectors was higher than the house target temperature, additional warm air under the solar collectors was delivered continuously into the house. Performance of the solar collectors were evaluated during two consecutive fall and winter flocks.

Past research have reported that sprinkler systems can save an average of 67 percent of water for cooling birds in poultry houses during the hot summer months. The study in 2021 focused on management of the cooling-cell temperature set points with the sprinkler systems at two commercial broiler houses measuring about 40-by-400 feet at the Applied Broiler Research Farm at the University of Arkansas.

Briefly describe how your target audience benefited from your project's activities.

The performance of the solar collectors were quantified by the length of time in usage, temperature increase of the air from the collectors above the ambient during usage, and fuel savings in each flock. The daily cumulative duration of solar collectors in operation averaged 125 and 133 min per day during the first two or four weeks of brooding in the fall and winter flocks, respectively. When in operation, the solar collectors were able to raise 20°C above the ambient temperature, reducing fuel usage of 7% in the fall and winter flocks. The biggest challenge of solar collector utilization was the collectors not enclosing the fresh air inlets, allowing majority of the air entering from the original sidewall vents.

We have fine-tuned the method in managing the sprinkler and the cool-cell systems to effectively and efficiently cool broilers in the summer to maintain flock performance. Tests showed that sprinklers should be activated before the poultry house temperature approaches 90 degrees Fahrenheit. The set point of a cool-cell system should be 21 degrees above the house set point to ensure sprinkler operating under a drier thermal condition. Our work has been featured by the UA communication and Watt Poultry International, a popular press magazine.

Briefly describe how the broader public benefited from your project's activities.

The limited airflow capacity and limited active operation of the solar collectors due to existing minimum ventilation scheme is another reason of a small amount of heating fuel savings. The solar collectors need to be better integrated into the building ventilation inlets to allow better performance.

Sprinkler systems offer cooling water conservation of over 50 percent compared to a cool-cell system while maintaining production without sacrificing flock performance. As poultry industry combat climate change and heat stress, management of sprinkler systems will be crucial in meeting sustainability goals, including water conservation.

Critical Issue

UADA- Strengthening Arkansas Families

4-H Youth Development

Project Director
Martha Sartor
Organization
University of Arkansas System Division of Agriculture
Accession Number
7000072

Provide programs that encourage healthy living for Arkansas youth

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

The state of Arkansas is ranked one of the highest in the nation for obesity/overweight. Forty-one percent of Arkansas children between the ages of 2-19 are considered obese. Additionally, Arkansas ranks 4th in the nation for child poverty, and has the second highest in food insecurity. Food insecurity describes a household's inability to provide enough food for every person to live an active, healthy life. Food insecurity is one way we can measure and assess the risk of hunger.1 in 5 Arkansans

experiences food-insecurity, which means they struggle to find sufficient access to nutritious food. 25% of Arkansas children are facing hunger, and in some rural areas, it's even higher. Statistics like these are what ranks Arkansas second in the nation for food-insecurity.

Families facing hunger often have to make unthinkable choices – like buying food or paying the light bill, filling their pantry or filling their gas tanks. After the pandemic struck in 2020, these hard choices are a reality for many families who have never had to rely on a food bank or food pantry before.

One in five, or an estimated 549,000 Arkansans, does not know where their next meal may come from. Working families exist on low-wage jobs that do not pay enough to meet housing and medical expenses and also leave enough money to buy food. Approximately one-third of households in Arkansas report making tough choices like these every month.

The majority of those turning to us for help are low income families, children, and senior citizens. However, working families with young children are now the fastest-growing group at emergency food programs in local communities. Nearly 35 percent of the households we serve are among the working poor and many families are turning to us for the first time. While we admit that we cannot control the causes of hunger, we can improve accessibility of nutritious foods to impoverished Arkansans.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

4-H Healthy Living initiatives empowers youth to be healthy – body and mind – with the skills to make healthy decisions and lead healthy lifestyles. Having the confidence and skills to lead healthy lifestyles not only improves overall well-being; it enables youth to tackle life's challenges today and become leaders in their lives, careers and communities as they grow into responsible adulthood. Because of the importance of instilling Healthy Habits in Arkansas youth, the 4-H Health Coordinator secured a Healthy Habits grant from National 4-H Council and Walmart. By implementing the grant, we allowed our future generation to learn and understand the importance of maintaining a healthy lifestyle by their nutritional intake, physical activity, and mental well-being. One segment of the grant was used to host an Arkansas 4-H Healthy Food Challenge to allow participants to practice healthy choices with limited availability of foods. We started a 4-H Corner Store Food Challenge in Arkansas to help people understand they can maintain a healthy diet even when they are forced to purchase the majority of their food from a Corner Store (i.e. Dollar General, Family Dollar, etc.). The concept is related to the National 4-H Food Challenge hosted by Texas 4-H and is centered around the theme of the popular cooking TV show called "Chopped." Participants are given a bag of ingredients and asked to cook a themed dish from the ingredients available. Competitors have access to a food pantry for additional ingredients (spices, herbs, etc.) they may use if they choose. They must present the finished dish to a panel of judges and answer nutrition and health related questions regarding their dish. Senior (ages 14-19) and Junior (ages 9-13) may participate in teams within their age range.

Briefly describe how your target audience benefited from your project's activities.

4-H fitness, health, nutrition, and safety programs help youth understand the importance of eating right, and being active within a safe environment. Mastering basic health principles places young people on the right track to developing healthy habits now as well as managing their long-term health. to high food insecurity in Arkansas and a density of corner stores in low-income and rural areas, many Arkansas families rely on their local corner store for regular grocery shopping. The families who participated in the Food Challenge realized they were able to cook nutritious recipes even when limited to corner store ingredients. Teams developed a sense of comaraderie and learned teamwork when working together toward a common goal. The 4 winning teams were able to progress to the National 4-H Food Challenge held in Dallas, Texas in September held in conjunction with the Texas State Fair. Since it takes all year to prepare for the 4-H Food Challenge, teams and coaches are subjected to the healthy living initiatives involved in preparing for the 4-H Food Challenge all year to reinforce the lessons involved.

Briefly describe how the broader public benefited from your project's activities.

The 4-H Food Challenge incorporates several research-based nutrition and health lessons. FightBac – Fight Foodborne Bacteria lessons, Food and Kitchen Safety, Know your Nutrients, and MyPlate. Arkansas 4-H received good publicity from the Corner Store Food Challenge through local television segments, newspaper articles, and social media posts made by our office and the county Extension offices of the 4-H Food Challenge teams involved. Arkansas 4-H established new partnerships with Pulaski Technical Institute for the first time allowing them a chance for recruitement. We offered an additional chance for our winning teams to perform at the Mid South Cotton and Gin show in Memphis with the same premise but with an entirely new large audience. By developing new partnerships, Arkansas 4-H has the opportunity to broaden the scope of the reach it has within the state and regionally.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

This program proved to be very popular with our 4-H members. Teams participated with more enthusiasm than we expected by arriving in custom made chef uniforms, hats, and a sense of teamwork and focus that was impressive. It has become popular with male and female 4-H members and Family and Consumer Science Agents showed great excitement when approached with the idea of this 4-H event. We are looking forward to working with counties to build their programs and providing this unique opportunity to their 4-H members.

Provide programs that involve youth in science, technology, engineering, and math

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

There is an increased emphasis on digital components in our daily lives concerning learning experiences, job applications, grocery shopping, and healthcare. Because of lack of broadband availability in Arkansas, a growing digital divide is noticeable among Arkansans. In May of 2019, AR Governor Asa Hutchinson issued the AR State Broadband Plan to increase broadband deployment across Arkansas by the year 2022. The goal is to increase access to many Arkansans that will need training and education on digital literacy. Digital literacy is the ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills. Arkansas 4-H wanted to do something to begin educating adults across the state on using digital equipment and youth as the main faciliators before the deployment so they began laying the foundation to bridge the generational divide so youth can share their expertise with older Arkansas citizens who may be struggling in the digital world. The Arkansas Science Technology, Engineering, and Math (STEM) coordinator secured a grant from National 4-H Council, Microsoft, Verizon, Tractor Supply Inc., and Land O'Lakes Inc. to create a Tech Changemakers Team (TCM) using the 4-H Arkansas state 4-H Ambassador program framework already in place. The 4-H program uses highly qualified youth ambassadors to inform local citizens in their counties about the 4-H program and the benefits it brings to youth and adults. An adult leadership team was also formed comprised of county agents and state 4-H office staff. Collaboration with the adult leadership team ensures meeting space is secured for planning throughout the year, training sessions, and other events. Meetings are held throughout the year to debrief with the county and regional TCM ambassadors. These meetings will utilize the Lesson Study format to discuss successes and failures in the trainings so that teams can support one another throughout the program. Lesson study teams work in iterative inquiry cycles to collaboratively design, teach, and reflect upon the effects of a lesson. Instructors collaborate to develop a lesson plan, then teach and observe the lesson to collect data on student learning and use their observations to refine and then reteach the lesson. Community groups such as Kiwanis International, Rotary International, Extension Homemaker Councils, Master Gardener Programs, churches, senior centers, school librarians and counselors have shown an interest in the training which increases collaboration for our youth participants. We have also partnered with the Arkansas Library Association and the Arkansas Association of Instructional Media to further our reach. Collaboration with community partners is critical to the success of this program. Working in collaboration with area school and public libraries will allow for Wi-Fi access and support their community outreach goals. Other community partners for the digital ambassadors include the local internet service providers (ISPs). Working with local ISPs will give the digital ambassadors the confidence to collaborate with professional organizations. The TCM is a long term program, but Arkansas 4-H is encouraged by short term response to the program.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Eleven of Arkansas' 75 counties signed up to participate and be on the adult advisory board and youth Tech Changemakers Team (TCM). Thirty two youth Tech Changemakers began preparing to host classes to teach adults various technology skills for improving workforce skills and digital literacy for their communities. The Tech Changemakers met at the Arkansas 4-H Center to go through training modules to build relationships with team members from across the state. The training modules included community partners, economic makeup, and ready-to-go lessons. Lessons for the community include email basics, online job searches, responsible online behavior, video conferencing, reliable online information, developing your career journey, and strong passwords. This program has given the digital ambassadors a sense of belonging to a larger group, and the independence to be able to make a difference in their community. They are able to show that they have mastery in a skill that is important and pertinent to a person's overall success. These skills are vital for today's youth and part of the 4-H Essential Elements (Belonging, Independence, Mastery, and Generosity) that Arkansas 4-H strives to provide for positive youth development. Ten digital literacy kits were assembled to allow digital ambassadors access to technological resources to teach

the lessons in their communities. The majority of time in 2021 was dedicated to building the foundation for larger programmatic efforts in 2022, but ample time was used to make sure the TCM ambassadors had the training, comaraderie, and resources needed to be successful in their efforts at the local level.

Briefly describe how your target audience benefited from your project's activities.

There remains a great deal of growth potential for the TCM program, but thus far we have witnessed an excellent response from stakeholders and participants in the program. The target audience is two-fold, the digital ambassadors, and the citizens of the counties they serve. The "digital ambassadors" have incurred a sense of belonging to a larger group, and the independence to be able to make a difference in their communities. They display mastery in a skill that comes naturally to their age group and have learned tactics to communicate why the skill is important. These life skills and technical knowledge are vital for today's youth but are also pertitnent to older adults who have not aged with the technology. The citizens in the local communities in which our ambassadors serve are receiving one-on-one technological expertise resulting in multigenerational interaction. Many people in rural communities may not have the resources or the ability to connect on a regular basis. With the hotspots and computers the TCM program provides, it allows for an experience to that potentially connects them with loved ones and opens up a new opportunity for social interactions in person and online.

Briefly describe how the broader public benefited from your project's activities.

The broader public was able to witness unique 4-H programming outside of the traditional 4-H model. The 4-H teaching model is about hands-on learning and youth hone their skills with this method, but it's also an effective teaching method for adults. Youth are considered the experts in this scenario so this program provides teaching skills for youth and practice for adults. This program is helping to eliminate the opportunity gap by addressing critical challenges around broadband access and by increasing access to positive adult relationships, skill-building and leadership opportunities that give kids a sense of belonging and spark their potential. 4-H STEM programs combine the strengths of experiential, hands-on education and inquiry-based science learning with a positive youth development framework that addresses the developmental and educational needs of young people and adults.

Teach life skills to prepare youth for adulthood.

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Life skill development is an essential component of developing into a caring, self-sufficient adult who contributes to society. Through 4-H hands-on educational opportunities, youth develop soft skills to use later in life.

The best gift we can give our kids is to empower them with skills that will last for a lifetime, which is why parents have been sending their kids to 4-H summer camps for decades. 4-H was founded on the belief that when kids are empowered to pursue their passions and chart their own courses, their skills grow and take shape, helping them to become true leaders in their lives, careers and communities. 4-H is grounded in a deliberate, research-backed development and delivery model, which means at 4-H camp, kids learn critical life skills like resilience and independence. If we want our kids to be able to bounce back from adversity, stress, challenges and failures, teaching them resilience is key. Having experiences outside their comfort zones help young people become more resilient, more independent and better able to plan and reach their long-term goals.

2021 proved to be challenging with waves of COVID mandates for groups continuing from 2020. The 4-H Camping program responded with unique ways to bring camp to the families at their homes. Most camps had an option for choosing the free camp option and tuning in via Zoom with their own supplies, or by choosing the Camp in a Box option where camp supplies were mailed to them before the Zoom Camp session. There was a healthy mix of both options being chosen by participants.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

The Arkansas 4-H Camping program was able to continue hands-on learning opportunities throughout the pandemic by offering Camp in a Box lessons. The 4-H Camping Coordinator would ship a box with supplies used during the online Zoom camp sessions and she would guide youth through activities that youth and families could do together. This practice resulted in families who had not traditionally participated in camp activities becoming involved. Each month's camp activities

culminated in a Family Friday Camp Fire night where all camp participants gathered and visited around a campfire our camping coordinator had built at her home or at the Arkansas 4-H Center. Families and youth were able to work together toward a common goal. Youth were able to complete activities which developed their soft skills such as decision making, deduction, creativity, problem solving, and critical thinking. By practicing these skills now, they will be able to transfer these skills to solve real-world problems in the future.

Briefly describe how your target audience benefited from your project's activities.

4-H Camp is beneficial to our youth and adults in several ways:

Socializing and Friendship Building

During summer break, youth may find it difficult to form or maintain friendships with peers their own age. Besides their siblings or cousins, most kids would say that they mainly interact with adults when they are not in school. Not only do kids develop important life skills through socializing – such as sharing, setting boundaries, and problem-solving – they also are learning how to develop strong, healthy relationships through interacting with their peers. A 4-H summer camp program provides a safe environment for children to develop social skills, decision-making skills, and experience the great outdoors.

Eliminating Screen Time and Getting Exercise

In a world full of technology, sedentary-related conditions are on the rise. In fact, physical inactivity is currently the leading cause of disease and disabilities in the United States, and it all starts in childhood.

Attending 4-H camp not only will the kids get out of the house and have some fun, but they are sure to get some solid exercise in as well – from activities such as hiking to archery, canoeing, swimming, zip-lining, and team events. Allowing your kids to explore the outdoors and interact with new children is an excellent way to broaden their perspective and experience a whole new world for their summer break.

Positive Role Models

Another benefit of summer camp is that it provides youth with the opportunity to interact with positive adult role models. Typically, camp counselors are older teens or younger adults who are choosing to volunteer or working part-time over their own summer break from college. These counselors can be a tremendous asset in the lives of your children (and yours). Sometimes, it helps kids to see what their own lives could look like in just a few short years and, if the camp counselor has integrity and a good character, the child is likely to emulate them, too. It also gives youth a sense of community while working with others. The formation of these role model relationships can help kids to develop the confidence, self-esteem, and skills they need to be successful in school and in life. Overall, the more healthy, positive adult relationships that a child or youth has in their life, the more likely they are to thrive in all areas, long after summer camp has ended.

Briefly describe how the broader public benefited from your project's activities.

Many adults would say that some of their fondest memories were those sunny, summer camp experiences as they were growing up. While times have certainly changed and there is tremendous value in that, there is nothing quite like preserving those simple, unplugged, childhood memories. Aside from gaining decision-making skills, leadership skills, and social skills at a summer program, they also get plenty of physical activity as well. Yes, the youth may miss their phone, tablet, or gaming system at first, but once they start exploring, interacting with their peers, engaging in a variety of activities, and having new adventures, they are sure to leave summer camp with stories, photographs, friendships, life lessons, and memories that will last a lifetime.

The mission of 4-H is to provide opportunities for youth to acquire knowledge, develop life skills, form attitudes, and practice behavior that will enable them to become self-directing, productive, and contributing members of society. The way that is accomplished is through practice and time as they develop through their 4-H projects and trial and error. As 4-H'ers experience camp, they may pass on their experiences to peers in their greater community.

Family & Consumer Science

Project Director

Laura Hendrix

Organization

University of Arkansas System Division of Agriculture

Accession Number

7000290

Financial Security

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Arkansas is a high poverty state, with over 510,000 people, including more than 171,000 children, who live below the federal poverty level (Rural Profile of Arkansas). Rural counties have higher poverty rates (20 percent) compared to urban counties (16 percent). Eighteen percent of all residents and 25 percent of children in Arkansas live below the federal poverty line. According to the Financial Capability Survey, 18% of Arkansans reported that their household spent more than their income and 50% lack a sufficient emergency fund. Additionally, 67% were unable to correctly answer more than three of five questions about financial management. According to a study by Experian, average credit card debt for Arkansans in 2020 was $4,791.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Connecting trusted research to the adoption of best practices, we are a catalyst of prosperity for Arkansans. Financial literacy and empowerment help consumers build financial security. Extension personal financial education programs reached 234,023 Arkansans with direct contacts and 1,264,868 through indirect contact methods.

Briefly describe how your target audience benefited from your project's activities.

In 2021, 3,481 participated in 493 educational programs. Adults reported increased knowledge (85%) and positive behavior change (41%). As a result of participating in personal finance educational programs, youth program participants reported increased knowledge (87%), intended behavior change (56%), and positive behavior change (41%).

Briefly describe how the broader public benefited from your project's activities.

Financially stable individuals and families contribute to economically stable communities.

Health & Wellness in Arkansas

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Arkansas ranks 49th in challenges for women, infants, and children, according to America’s Health Rankings. Adult obesity rates in Arkansas are 37.1%, higher than the national average and adult Arkansans rank 48th in physical inactivity at 31% (national average 23.8%). Rates are higher in many of the rural counties that Extension serves. Eighty-five percent of adults in rural counties, compared to 62 percent in urban counties, were overweight or obese. Chronic disease rates for adults in Arkansas are 13.9% (national average 10.9%) for Type 2 Diabetes, 41.3% (national average 32.2%) for hypertension, making Arkansas the 48th most unhealthy state (America's Health Rankings). For youth, 40% of Arkansas students (K-12 grade) are classified as overweight or obese (Assessment of Childhood and Adolescent Obesity in Arkansas: Fall 2018–Spring 2019. Arkansas Center for Health Improvement). According to the CDC Healthy Schools report, only 24% of school-aged children participate in the recommended 60 minutes of daily physical activity, meaning 76% of Arkansas children do not participate in vigorous physical activity on a daily basis. Arkansas ranks in the lowest percentiles of states for several health indicators including obesity, hypertension, tobacco use, teen births, adverse childhood experiences, and community and family safety (America’s Health Rankings, 2020). Collectively, the inadequate resources coupled with undesirable rates of lifestyle-related disease mean high medical, educational, psychological, economic, and social costs.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Extension Health programs are aimed at obesity reduction, increased physical activity, community connectivity, health literacy, health promotion and disease prevention. Preventing diabetes, heart disease, cancer, and other chronic diseases continues to be a critical need throughout the state. Programs include both direct education as well as PSEs (policy, systems, and environmental interventions) to address multiple influences on health status. Primary goals of the EXICTE program were increasing knowledge and skills related to COVID-19 and COVID-19 vaccines, as well as decreasing vaccine hesitancy and increasing uptake of COVID-19 vaccines, and other adult immunizations, in six target counties in the Arkansas Delta. This was achieved through a public health messaging and communications campaign with the goal of improving education around and understanding of COVID-19 as a disease process and COVID-19 vaccines as a viable, safe, and effective intervention to reduce disease spread. Additionally, we worked in partnership with a rural healthcare partner (ARcare) to locate populations in need of adult immunizations (including COVID-19 and flu), due to lack of access to or availability of these immunizations.

Briefly describe how your target audience benefited from your project's activities.

General health and wellness programs reached 11,745 individuals via direct contact such as in-person programs and 118,728 individuals via indirect contact such as social media. The “Extension Get Fit” programs hosted more than 12,000 individuals in multi-session fitness classes and reached 173,148 with messages about wellness. The “Walk Across Arkansas” program had a total of 293 teams; 1,219 participants; 2,290,874 physical activity minutes recorded; and 68% of participants reporting that they achieved the recommended amount of physical activity each week while participating in the program. In the EXCITE program, 12 vaccine clinics were established across the six target counties, providing health services for well over 500 Arkansans, and vaccines to over 150 individuals.

Briefly describe how the broader public benefited from your project's activities.

Poor health, obesity, and disease can negatively affect individuals and the economy through decreased productivity and increased health care costs.

Human Development and Family Life

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

According to the CDC, adults reported considerably elevated adverse mental health conditions during 2020. In 2019 and 2020, Arkansans report higher rates of depression than the national average (https://www.americashealthrankings.org/). More than 139,000 children in Arkansas have parents in the workforce and many require childcare (Child Care Aware of America). Early childhood professionals in Arkansas are required to earn at least 15 hours of continuing education each year. Arkansas Extension has a long and successful history of providing training for early childhood educators.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Extension programs deliver research-based information to increase personal well-being, reduce stress, improve mental health, strengthen relationships, increase effective parenting, and improve early childhood education. Through Extension’s Best Care and Guiding Children Successfully program, childcare professionals can obtain the required hours of continuing education each year in face-to-face, online, or video-based learning.

Briefly describe how your target audience benefited from your project's activities.

Personal wellbeing and mental health programs and information were delivered to 13,011 individuals. Social media messages about wellbeing and mental health reached 1,040,218. Continuing education for early childhood educators delivered 29,722 hours of continuing education credits for 4,232 providers. Evaluation surveys show that 92% increased knowledge and 91% plan to make at least one change based on what they learned.

Briefly describe how the broader public benefited from your project's activities.

There are significant societal costs associated with mental health and wellbeing. The economic burden of depression in the United States is estimated at $210 billion, including direct medical costs, lack of workplace productivity and the cost of life lost due to suicide (United Health Foundation). According to the CDC; experiencing stress, isolation, loss, or systemic social inequities is harmful to the health of Americans. Improving emotional well-being, social connectedness, and resiliency through research-based prevention programs is critical to population health. Early childhood education is important because early childhood, particularly the first 5 years of life, impacts long–term social, cognitive, emotional, and physical development.

Type	Projects / Programs
Projects / Programs without a Critical Issue	**0**

Not Provided