

FY 2020 Annual Report of Accomplishments and Results

Kentucky
University of Kentucky
Kentucky State University

I. Report Overview

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

<p>1. Executive Summary (Optional)</p> <p>The University of Kentucky College of Agriculture, Food and Environment and Kentucky State University College of Agriculture, Community, and the Sciences were founded as land-grant institutions (1862 and 1890, respectively), offering access to knowledge and learning to enhance the lives of Kentuckians. The two programs are fundamentally interdisciplinary, applying the biological, physical, and social sciences to challenges in agricultural, food, and environmental systems. Our work encompasses farms and forests, food and fiber, families, and communities.</p> <p>The University of Kentucky College of Agriculture, Food and Environment holds a unique position as the home of the Kentucky Agricultural Experiment Station and the Kentucky Cooperative Extension Service. The teaching, research, and Extension programs are part of a national system that maintains a statewide presence and links local, state, national and global issues. Kentucky State University Land Grant Program and College of Agriculture, Community and the Sciences (ACS) focuses on teaching, research, and Extension to address the needs of the small-scale and limited-resource farmers; minority and underserved/disparity communities, as well as diverse and at-risk youths. These programs include research to identify new and niche products and markets for small-scale, limited-resource, and minority farmers, to enhance availability and safety of locally produced, nutritious foods, and reduce fertilizer and pesticide runoff to improve soil and water quality while reducing farmer and forester expenses.</p> <p>Our vision is to be recognized for excellence in fostering learning that changes lives, discoveries that change the world and opportunities that shape the future. Research and Extension, as full partners with expanding linkages throughout the University of Kentucky and Kentucky State University and with support from every Kentucky county, seek to 1) facilitate lifelong learning informed by scholarship and research, 2) expand knowledge through creative research and discovery, and 3) serve Kentuckians by sharing and applying knowledge.</p> <p>Research and Extension seek to sustain the land-grant heritage of achievement in these challenging times, but the Commonwealth and the universities are undergoing many significant changes. As Kentucky continues to move from a tobacco-based agricultural economy and explores new options and commodities, land-grant programs face increased demands and expectations. Technology is redefining the way people acquire and</p>
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distribute information and how they solve problems. While urbanization is claiming farmland, it is also creating new markets for traditional and non-traditional agricultural products. Changing lifestyles and demographics are challenging us with opportunities for greater involvement in youth, family, and community programs.

With nearly 80,000 farms in the state and an average 171 acres per operation, Kentucky is dominated by small family farms. However, many of these farms are major producers of traditional agricultural commodities, such as livestock, tobacco, and grain. Some seek new opportunities in specialty crops and industrial hemp. Others are operated on a part-time basis or involve limited resources. The research and extension programs at both land-grant institutions provide the breadth needed to address the state's diversity of agricultural operations and agroecosystems.

More than half of the state's cash receipts from farm markets result from animals and animal products. Signature industries include beef and equine, which rely on cutting-edge research to mitigate fescue toxicosis, control infectious diseases and improve reproductive efficiencies. Nearly all animal production systems, including poultry, swine, small ruminants and aquaculture, are faced with increasing public pressure to ensure high levels of animal welfare and operate in environmentally sustainable ways. There is increasing interest among producers for precision animal management tools that can help increase margins and a continued need for assistance developing and marketing value-added products, particularly for the state's declining dairy industry and for small and limited-resource farmers.

Soybeans and grain crops have become increasingly important to Kentucky as the tobacco industry continues to decline. Producers rely on the land-grants for research-based guidance on managing intensive production with minimal environmental impact. Research and extension programs address management of nutrients, pests and diseases, variety selection in a changing climate and water management. They help producers effectively use proven precision farming and land management tools. Additionally, forage systems underpin the state's signature equine and beef industries; their management continues to be a focus for research and extension programs in the state.

Historically, many rural communities have had major dependence on farm incomes for their economic viability. With the declining potential of tobacco to generate farm income, development and discovery of new enterprises and management strategies are essential. The land-grant system will be challenged to find new strategies to meet the demands for increased diversification in rural communities. Programs in support of high-value horticultural crops, aquaculture, industrial hemp, distillation, wine making, brewing and niche-market animal products are critical to providing viable alternatives to tobacco production. In the post-tobacco-growing era, successful risk management is important in maintaining competitiveness in the state's agricultural economy.

Value opportunities in agriculture creates jobs, many of which are within rural communities. Value opportunities also create expanded demand for local agricultural products. Initiatives are required to encourage local entrepreneurial creativity and risk-taking and to build a network of support resources. Kentucky is making substantial resource commitments to support the creation of an "agritech" ecosystem, as well as value-added innovations that utilize local agricultural products, particularly in the areas of livestock, horticulture, secondary wood products, and agritourism. The current public interest in community- and region-based local food systems provides Kentucky's research and Extension programs an ideal

opportunity to showcase relevance to all citizens across the state and address issues of food security, nutrition, prosperity, and sustainability in both rural and urban communities.

The mission of an effective food safety system is to protect and improve public health by ensuring that foods meet science-based safety standards. Over 50% of all food-borne illness can be attributed to mistakes made in food service establishments and restaurants, while 20% are traceable to consumers in their homes. Changes in the risk of food-borne disease are due primarily to changes in diet, increased use of commercial food service and food prepared and eaten away from home, new methods of producing and distributing food, and the growing number of at-risk individuals, such as the elderly and those with elevated risks to their immune systems. In addition, educational programs are also needed because of the growing use of dietary and herbal supplements that have no required safety standards, new food components that mimic traditional food components, and the introduction of new food technologies and processes.

Educational training on the safe production, preparation, handling, and storage of food for producers, processors, consumers, and at-risk groups is the traditional approach to decrease the risks of food-borne illness. Additional work is needed on research, discovery, and education in the areas of production and processing practices. These programs will focus on established businesses as well as the growing home and microprocessing food industry.

Three leading causes of morbidity and mortality in Kentucky are cardiovascular disease, cancer, and diabetes. The recommendations for their prevention and treatment of these chronic diseases include strong nutritional and physical activity components. Obesity is a contributing factor in the development of these diseases. In Kentucky, the prevalence of overweight adults has escalated over the last decades. Early diagnosis of cancer, diabetes, and cardiovascular disease is associated with improved outcomes, including improved quality of life and longevity. Prevention, detection, and treatment of chronic disease in Kentucky is particularly important in today's changing healthcare environment. People with chronic diseases require skills for self-care. Without such skills, people with diabetes or heart disease often require costly acute care. The prevention of chronic diseases through better self-care also requires skills. Diet, nutrition, and exercise are some of the most effective tools for self-care and prevention of chronic diseases.

Diets rich in fat and low in fiber contribute to obesity, diabetes, heart disease, stroke, and cancer. Nutrition programs like the National Cancer Institute's 5-A Day and USDA's MyPlate can have a profound effect on Kentucky citizens and communities. Recent studies show that fewer than one in five Kentucky adults eats an adequate number of servings of fruits and vegetables. In rural areas of Kentucky, including Appalachian and western regions as well as in urban areas, consumers may not have ready access to a variety of fresh fruits and vegetables at reasonable prices. Younger generations are less familiar with managing and preparing food at home. Over 50% of Kentuckians with incomes just below poverty level are overweight, and children and youth are especially at risk. The need to improve health and quality of life for citizens of the Commonwealth is evident.

Like most states across the nation, Kentucky is also battling addiction, primarily the opioid epidemic. This is not only affecting the health and well-being of residents, but it is also causing major economic effects. When individuals are addicted to drugs, they are unable to find meaningful

employment and support their families. In turn, this could cause businesses to reconsider locating operations in Kentucky communities due to the lack of a qualified and sober workforce. Kentucky Cooperative Extension System is working to combat these issues through university and community partnerships.

Kentucky's natural biological wealth and beauty has drawn the attention of people for centuries. The agricultural, forest, and coal industries have historically been the economic base for Kentucky's economy, but Kentucky's biological wealth is threatened. Protecting soil, air and water resources through better land management and production technologies is a prime goal of programs that serve the spectrum of Kentucky's agricultural enterprises, rural landscapes and communities. Our programs have been instrumental in the implementation of no-till production and that legacy will continue through new innovations in soil and water management.

Concern over ecosystem issues by the general public as well as national and state government has generated recognition of the need for research and education programs. Kentucky's biological wealth may continue to be threatened unless comprehensive and sustainable approaches are researched and utilized for enjoying, studying, and, at the same time, harvesting the fruits of the land through logging, mining, and agricultural production. Ecosystem services must be preserved, anti-microbial resistance must be mitigated and pollinator populations must be protected. Approaches must also consider how these systems adapt to and mitigate climate change. Programs must strive to elucidate how climate change will impact agricultural and natural resource systems while developing programs and technologies that will help farmers, foresters, and others adapt.

The land grant system's mission of enhancing economic opportunity and improving the quality of life for Americans goes well beyond agricultural production. It includes the empowerment of people and communities through research-based information and education to address economic and social challenges facing our youth, families, and communities. Some of the challenges are:

Families face increasing financial difficulties. Many Kentucky families are in debt and are not saving enough to secure their financial future; many are on the edge of financial disaster. Families need assistance in learning to live within their income and earning capacity and in planning for the future.

Both urban and rural areas of the state continue to be plagued by high unemployment and underemployment. Nearly 30% of Kentucky's youth fail to graduate from high school. With many industries relocating to other countries, job closings have affected many areas of the state. Many Kentuckians lack the educational preparation and skills needed to secure and maintain employment or qualify for new-era jobs. Throughout their lives, both youth and adult Kentuckians need to develop skills essential to become productive members of the community and workforce. Being a productive member of society as an adult requires young people to gain experience as active citizens at an early age. 4-H community service activities provide learning experiences that help youth develop life skills needed to be effective in various adult roles in society.

Our goal is to improve the capacity of communities to identify and address these critical issues, and others that affect the lives of citizens. We can best do this by fostering the development of personal and interpersonal skills, stimulating volunteer leadership, and promoting active participation

in community problem-solving. Without the acquisition of life skills needed by young people and adults, it is doubtful the citizens of Kentucky will reach their full potential as both individuals and as members of families.

Kentucky State University Cooperative Extension Program (KSUCEP) continues to focus on specific educational programs that will impact and change the lives of the limited-resourced, minority farmers, and the underserved population in Kentucky. We have extended our program reach by providing school garden initiatives, production of urban agriculture, and backyard gardening. We have continued to assist stakeholders with parenting skills to grandparents who have custody of their grandchildren. We continue to strengthen our commitment to food security through healthy food initiative programs and by building food production capacities among residents in food desert areas. (KSUCEP) remains a champion for non-traditional audiences and will strive to deliver quality programs like our Third Thursday program, and virtual Extension programs to create a lasting impact for all Kentuckians.

We approach Kentucky's challenges through an integrated model that includes a needs assessment conducted at the grassroots level through the Cooperative Extension Service, advisory groups, councils, and committees. Once identified as priorities, specific problems and needs are addressed by our researchers and Extension specialists. The research, developments, findings, and technologies are transferred through traditional and innovative mechanisms, including educational and training programs, technology transfer, research reports, and partnerships with other colleges, universities, and state and local governments.

Whether it is preserving our rich agricultural tradition by helping farmers, food processors, and agribusiness cope with technical issues, reaching goals, or enhancing the life skills of families, our research, education, and Extension programs are helping shape the future of Kentucky's agriculture, food systems, and communities as well as the quality of life of its citizens.

Kentucky Critical issues include: Life Skills Development; Nutrition & Healthy Lifestyles; Food Safety & Security; Agriculture, Environment & Natural Resources; Leadership & Community Engagement; Economic & Financial Well-being; Small Farm Development.

II. Merit and Scientific Peer Review Processes

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

Process	Updates ONLY
1. The <u>Merit Review Process</u>	No Updates
2. The <u>Scientific Peer Review Process</u>	No Updates

III. Stakeholder Input

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

Stakeholder Input Aspects	Updates ONLY
1. Actions taken to seek stakeholder input that encouraged their participation with a brief explanation	No Updates
2. Methods to identify individuals and groups and brief explanation.	No updates
3. Methods for collecting stakeholder input and brief explanation.	No Updates
4. A Statement of how the input will be considered and brief explanation of what you learned from your stakeholders.	No Updates

IV. Critical Issues Table of Contents

No.	Critical Issues in order of appearance in Table V. Activities and Accomplishments
1.	Life Skills Development
2.	Nutrition and Healthy Lifestyles
3.	Food Safety & Security
4.	Agricultural, Environment and Natural Resources
5.	Leadership and Community Engagement
6.	Economic and Financial Well-Being
7.	Small Farm Development

V. Activities and Accomplishments

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

No.	Project or Program Title	Outcome/Impact Statement	Critical Issue Name or No.
1.	Positive Youth Development Through STEM	Recent research suggests that learning science requires fluency in multiple aspects of conceptual understanding, practices of science, and identification with the scientific community. While 4-H programs have historically emphasized the development of science process, there is movement towards more authentic engagement in scientific and engineering practices, as outlined in the new Framework for K-12 Science Education. Science and engineering are human enterprises. In 2020, Kentucky 4-H introduced a number of pedagogical frameworks for engaging youth in science and engineering, including 4-H SET Abilities, Exploratorium’s science process skills, and the NGSS scientific and engineering practices. Over the past year, the Kentucky 4-H SET program, through the efforts of volunteers and 4-H Professionals have worked to increase STEM related programming to all audiences. Kentucky 4-H SET programs have reached over 74,000	Life Skills Development

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		<p>Youth and close to 3,000 volunteers. In addition, Leadership development, career exploration, decision-making skills, youth voice and personal development are important parts of the Kentucky 4-H Youth Development program and are offered through state 4-H Teen Leadership Boards. In 2019-20, the SET leadership board was formed, consisting of 8 youth and 3 advisors. The goal of this Board is to develop an educational program that provides youth opportunities to: master technical skills and creative abilities; explore careers in science, technology, engineering and mathematics; develop leadership abilities and character; build self-confidence; improve public speaking and presentation skills and share knowledge with others.</p> <p>Kentucky Extension has also formed collaborations with local schools to help bring hands-on lessons on robotics and coding to low income schools in the state. Non-tradition 4-H youth have been exposed to youth programming through environmental camps, food science seminars, and cooking demonstrations. During the COVID-impacted year of 2020, Kentucky Extension provided hundreds of 4-H Virtual Project kits and offered online (Facebook) programming to teach youth about technology and science. Participants and parents have reported how the information in the kits have helped youth. Over 600 Project bags were distributed across the state. Sixty percent indicated that their children learned new skills as a result of what was provided. Approximately 72% indicated that the resources helped to enhance their child’s online (school) instruction experience during the 2020 school year.</p>	
<p>2.</p>	<p>KSU Extension Offers Assistance to Parents</p>	<p>Parents in Kentucky spend a large number of hours working to provide a stable home environment for their families. According to the Kentucky Community Assessment report, at least 40% of the population within Hardin county work at least part-time and earn a median income of \$33,226 for men and \$23,494 for women. As a result, of these changes within our society, Kentucky State University Cooperative Extension provides families with a Parenting Program that assists families with reuniting parents with their children. The way that the program works is that parents who participate in the program complete a 6 to 8 week parenting program in</p>	<p>Life Skills Development</p>

		<p>which they learn how to resolve problems & disagreements more effectively, develop nurturing discipline techniques, and establish boundaries and develop time management skills to improve the overall well-being of their family. After the program has been completed clients receive a certificate of completion and a verification letter to present to court officials and healthcare workers for completing the program. Approximately 25 participants have completed the parenting program compared to only about 10 from the previous year. There has been a significant increase of about 70% of program participation since the program's inception in 2018. The parents who participate in this parenting program found the classes to be more interactive and easier to learn new concepts versus other parenting programs. After parents have completed this program, they typically regain custody of their children and find it much easier to bond with them, because they have learned information about how to meet their child's individual needs through the parenting program. More importantly, they walk away from this program knowing how to communicate more effectively and deal with conflict in a more productive manner.</p>	
<p>3.</p>	<p>Improving Mental Health and Self-Worth of Men in Addiction Recovery Center through Gardening</p>	<p>In Kentucky, the number of people incarcerated and dying from drug abuse continue to rise. In Daviess County, Cooperative Extension partnered with the Owensboro Regional Recovery Center to organize and conduct a garden therapy program which serves men challenged with drug and alcohol addiction. The participants were responsible for planting, watering, fertilizing, managing insects and diseases, weeding, and harvesting produce in raised garden beds. As a result, the gardens produced approximately 232 pounds of fresh produce including tomatoes, bell peppers, onions, green beans, and summer squash. The total price value of \$477 supplemented the food dollars for the center.</p> <p>The professional staff of Owensboro Regional Recovery observed that the gardening project benefited the physical and emotional health of the participants, thus creating a sense of responsibility, increased self-worth, and reduced negative emotions. In addition, the cognitive skills improved included attention, logic and reasoning, visual processing/following directions, and asking for help. The staff also said that one of the</p>	<p>Life Skills Development</p>

		<p>participants said he could use the gardening skills he learned as a way to interact with his children while teaching them gardening skills. Another result of the garden is that five of the participants made vegetable gardens when they returned home. This contributing to an opportunity for engage in mindfulness as well as a way to offer fresh, local foods to the family. A similar project began in Jefferson County (in 2020) that included women who were in recovery.</p>	
<p>4.</p>	<p>KSU Coding with Ozobots Technology</p>	<p>Over 2.4 million STEM jobs were projected to go unfilled. Between 2017 and 2027, the number of STEM jobs will grow 13%, compared to 9% for non-STEM jobs- with positions in computing, engineering, and advanced manufacturing leading the way. Recent research puts coding at the forefront of future careers. Currently, only 35% of all high school graduates are ready to take college-level science courses, 74% of middle school girls express interest in STEM. However, only 0.3% choose computer science as a major, and African-American and Latino workers only represent 29% of the general workforce population but just 16% of the advanced manufacturing workforce, 15 % of the computing workforce and 12 % of the engineering workforce. Among these factors as well as others, there is a need for coding programs for students.</p> <p>Kentucky State University Cooperative Extension Program (KSUCEP) 4-H agent partnered with Guttermuth Elementary school to offer Coding with Ozobots to their Kindergarten team of 3 classes serving 75 students from 6 different nationalities for 6 weeks. Coding with Ozobots helps kids to establish a new, in-depth learning experience by using an Ozobot(small robot) to encourage students to be creative with visual coding with lines and colors they can touch. Using the Coding with Ozobots program, kids were able to collaboratively build skills they can apply in the real-world setting, Also helping students with getting comfortable with an introduction to coding, innovative problem solving, and interactive exploration using a tiny robot. Through the 6 weeks, students were able to learn through research-based hands-on activities that allowed them to learn coding in a fun way.</p> <p>As a result of the Coding program at Guttermuth, students were able to learn: computational skills, problem-solving skills, career opportunities in coding, creativity, and improve math skills. The students commented on</p>	<p>Life Skills Development</p>

		<p>how they loved working with the Ozobots, learning how to code, and writing codes using markers. The teachers assisting with the program stated that they noticed serious growth in the children especially the students who had been struggling in reading, math, or struggling with behavior problems but excelled in the Coding with Ozobots program. KSUCEP will continue to partner with Guttermuth and provided addition robotics programs in the future.</p>	
<p>5.</p>	<p>Extension Addresses Rise in Mental Health Issues among Farmers</p>	<p>Farms are critical to the livelihood and local economies within the state of Kentucky. However with all the uncertainties of today, many farmers are under a tremendous amount of pressure. Prior to the pandemic, farmers were already facing a significant crisis over the past several decades due to uncertainty over fluctuating market prices, impacts from trade, catastrophic weather, as well as issues around keeping the farm in the family. As a result, research in recent years has shifted toward the mental health of farmers and farm families.</p> <p>UK Extension partnered with the UK College of Nursing a few years ago when a nursing professor was appointed in the College of Agriculture Food and Environment (CAFÉ) as an agricultural health nurse. As a result, CAFÉ has noted several successes. In 2020, two research papers were published and over a dozen webinars, seminars and interviews were conducted around the country by this Extension professional to promote awareness and programs that address farmer stress. Literature and grant proposals were prepared to aid mental health initiatives. The American Soybean Association also solicited feedback on managing stress on the farm (the information was shared during virtual field days). As a result of Extension’s efforts, a number of communities continue to make plans to host “Farm Dinner Theatres” in the future (events that provide entertaining ways in which farmers and farm families can learn to know the signs of poor mental health and how to address the issues).</p>	<p>Life Skills Development</p>

<p>6.</p>	<p>KSU increases STEM education for underserved populations in Kentucky</p>	<p>There is a growing worldwide interest in developing student knowledge, skills, and attitudes toward science, technology, engineering, and mathematics (STEM) education in formal and informal learning environments. Economic projections point to a need for one million more science, technology, engineering, and mathematics (STEM) professionals in the United States will produce over the next decade. Moreover, the continued underrepresentation of certain groups from STEM fields suggest that the full range of talent is not being utilized. The beginnings of a STEM “pipeline problem” exists in the United States, where STEM careers are growing rapidly. However, many students lack of interest and proficiency in mathematics and science, specifically students of underrepresented populations. In the 2010 President’s Council of Advisors on Science and Technology report, they reported that there exists both an interest and achievement gap among African Americans, Hispanics, and females in the STEM fields, which limits participation in STEM-related jobs. There is a significant need to focus specifically on students of color, females, and students from low socioeconomic backgrounds in developing a STEM pipeline.</p> <p>An aquaponics project-based investigation (APBI) model was developed to create authentic science learning environments that promote student learning of scientific concepts in schools to enhance student interest in STEM-related disciplines and/or career pathways. Results from this project suggest that authentic instructional experiences can facilitate students’ understanding of standard-based ecological concepts and knowledge of ecosystems. The intervention design and findings will provide educators new insights and ideas on how to incorporate and use contextualized, aquaponics project-based instruction as a teaching and learning tool and thereby, develop appropriate curricula for secondary K-12 classrooms while adhering to the Next Generation Science Standards.</p>	<p>Life Skills Development</p>
<p>7.</p>	<p>Extension Helps Residents Lower Diabetes Risks</p>	<p>Prediabetes and diabetes are big problems in Kentucky. According to the 2019 Kentucky Diabetes Report, one in 10 Kentucky adults have been told by a medical professional that they have prediabetes. An additional 12% have diabetes, and Kentucky has the fourth highest mortality rate due to</p>	<p>Nutrition & Healthy Lifestyles</p>

		<p>diabetes in the nation. The University of Kentucky is helping prediabetic Kentuckians prevent or delay developing type 2 diabetes through a collaboration between the UK Cooperative Extension Service and UK HealthCare’s Barnstable Brown Diabetes Center.</p> <p>UK extension agents deliver the Centers for Disease Control and Prevention’s National Diabetes Prevention Program (DPP) to residents who have prediabetes or are at a high risk for developing type 2 diabetes. Participants are taught evidence-based ways to make lifestyle changes to eat healthier, increase their physical activity and improve their coping mechanisms. The program includes weekly meetings for the first six months with the goal of participants losing between 5% and 7% of their body weight. The second six months has fewer meetings, as the focus turns to weight loss maintenance. Previous research has shown that participants who successfully complete the yearlong program lower their risk of developing type 2 diabetes by more than 50%. Barnstable Brown offers the program to patients on UK’s campus in Lexington, KY.</p> <p>In order to present the National DPP, Extension agents are trained as program lifestyle coaches. This training is coordinated through Barnstable Brown. The agents also receive support from family and consumer sciences extension specialists on the UK campus.</p> <p>The collaboration has been successful in Washington County, which is the first county to participate. There, 12 adult participants lost an average of 5.6% of their body weight, and 75% met the weight loss goals they set at the beginning of the program. The program also had a 100% retention rate. Participants commented they appreciated the excellent information that was provided and the sharing of personal stories. While they enjoyed the face-to-face group interaction, they appreciated that Zoom allowed them to continue the sessions.</p> <p>As a result of the program, Washington County Extension reported that individuals overcame certain nutrition-related obstacles including making healthier snack choices and buying less junk food for snacks. Cooperative</p>	
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		Extension plans to introduce the program to other counties across the state in the very near future.	
8.	KSU Healthy Food Initiative Helping in Uncertain Times	According to Feeding America’s recent report, 662,660 people are food insecure in Kentucky. Of this number, 190,600 children are faced with food uncertainties. The COVID-19 virus and the necessary response for slowing down its spread has further reduced access to food for individuals and families who are food insecure in Kentucky. In response to this issue, researchers and extension professionals within Kentucky State University Cooperative Extension Program developed the Healthy Food Initiative. The goal of the Healthy Food Initiative is to provide access to healthy foods through educational opportunities in nutrition and food production, with an emphasis on assisting socially disadvantaged and limited resource individuals during the uncertain times of the COVID-19 virus. Specifically, the initiative works to provide virtual nutritional programs important to health and wellness, information on how families and individuals can grow food safely through demonstration plots and provide technical assistance to the increasing number of individuals who desire to grow their own foods. As a result, 4,774.02 pounds of produce was donated to charities in the Frankfort area and educational materials were developed and disseminated to the public.	Nutrition & Healthy Lifestyles
9.	Addiction Education: Rural Opioid Technical Assistance	In 2019 amid an opioid epidemic, the state of Kentucky reported approximately 15% less overdoses than the previous year. This reduction roughly equates to 233 lives saved. Part of the state’s success is due to the Cooperative Extension Service’s new initiatives surrounding substance use. Extension conducted a state-wide needs assessment to identify programmatic aims and priorities. In virtually all 120 counties in Kentucky, substance use was identified as one of the top concerns or as the top concern. In response, UK Extension began aggressively pursuing federal funding to meet these county-level needs. Extension specialists received a SAMHSA Rural Opioid Technical Assistance (ROTA) grant with the primary aim to prevent and reduce opioid use in rural counties. In addition to funding youth drug prevention programming, the grant’s other central	Nutrition & Healthy Lifestyles

		<p>aim is to develop an addiction education curriculum to be delivered in a diverse array of settings and to a wide range of audiences. Since the grant was funded in 2019, the formalized Addiction 101 program has been delivered in-person on more than 20 different occasions, in six different states, in collaboration with four other land grant universities, as well as for multiple virtual events as well. Addiction 101 has been utilized to target youth in 4-H, Extension agents, Extension Homemakers, rural healthcare providers, social service workers, people who work in the addiction treatment field, and people in various stages of treatment and recovery.</p>	
10.	<p>Promoting Health and Physical Activity</p>	<p>Extension 4-H fitness programming has impacted males and females fourth through twelfth grade and includes individuals of all races (white, black, Hispanic, Asian) as well as youth with special needs. Youth participate in a variety of physical activities such as Zumba, line dancing, workout videos, outdoor workout equipment, walking trails, 5K's, and hiking trips. A number of 4-H agents also meet with the middle school gym classes for 6th through 8th graders. As a benefit, youth learn about and engaged in cardio and strength-building through circuit training and stretching and relaxation through yoga and other activities. For the past school year, 6th graders participated in a 2-day seminar using the curriculum, <i>Adolescent Brain</i>, while engaging in an additional day of dancing. The latter had youth learning about dance, participating in dance for exercise, and utilizing creative expression through development of a group dance. Post evaluations conducted with 101 sixth grade students indicated that 83% of the individuals agreed that the <i>Adolescent Brain</i> was informative and 73% said they understand how to protect their teenage brain as a result of the program. Eighty-eight percent of participants indicated that based on the program, they now have an understanding on how harmful and risky behaviors can harm the teenage brain. Concluding the program, 80% of students reported they can identify healthy lifestyle choices that serve to protect the development of a healthy teenage brain.</p>	<p>Nutrition & Healthy Lifestyles</p>
11.	<p>Getting Fit through Access to Fruits and Vegetables</p>	<p>Nationwide, only 12.2% of adults meet the daily fruit consumption recommendation and only 9.3% meet the vegetable recommendation. In</p>	<p>Nutrition & Healthy Lifestyles</p>

		<p>order to help with the lull in access to nutritious foods, Extension partnered with Farmers Market, local parks, the library and the Pendleton County Fair Board to offer a summer fitness challenge, called <i>Fitness for Produce</i>. A FCS mini grant was received to help finance this challenge. With our target audience being youth and parents of school age children, Extension and community partners offered educational classes, agent-led hikes, community service project opportunities and activities for families to do on their own. The challenge allowed families to participate in physical activity events and earn tokens to spend at a local farmer’s market. The average participant earned \$26 in tokens to spend at the market. As a result of the efforts, 51 children and adults participated in the challenge. A mother and daughter that participate shared on their Facebook page: “together we earned \$61 dollars in tokens for the Farmer’s Market through our summer fitness challenge. We will be eating healthy for a while and cannot wait to spend all our tokens.” Other participants shared that the challenge increased their awareness of hiking opportunities in their county and helped become more physically active while providing them the benefit of being able to purchase locally grown products. The Pendleton County library, where educational classes were held, shared that the program reached 245 youth and 185 adults, of which included most of the challenge participants. Another part of the fitness challenge included a 4-H 5K fundraiser in which the local 4-H raised over \$1750 to help with programming.</p>	
<p>12.</p>	<p>Kentucky’s Homebased Microprocessing Program</p>	<p>Kentucky’s Homebased Microprocessing Program (HBM) is a unique collaboration with the Cooperative Extension Service, the Department of Agriculture, and the Department for Public Health - Food Safety Branch. The program enables Kentucky farmers to increase farm profits by allowing the production of certain acidified and low acid canned foods in their home kitchens. Participants must grow an ingredient and the products must be processed using a boiling water bath canner or a pressure canner. Program participants must complete a five-hour training workshop focused on canning principles where they learn to differentiate between low acid and high acid foods and safely can fruits and vegetables using research based recipes. Participants also learn general food safety and sanitation</p>	<p>Food Safety and Security</p>

		principles. Training workshops are held at Extension offices across the state each year between February and April. This year 22 HBM workshop trainings were offered. Eight of the workshops were held virtually. A total of 123 participants received certificates.	
13.	Produce Safety Alliance Grower Trainings	The FDA Food Safety Modernization Act (FSMA) is a federal law transforming the nation’s food safety system. The “Standards for the Growing, Harvesting, Packing, and Holding of Produce for Human Consumption”, aka “Produce Safety Rule (PSR),” establishes for the first time, science-based minimum standards for the safe growing, harvesting, packing, and holding of fruits and vegetables grown for human consumption. The rule is part of the agency’s ongoing efforts to implement the FDA Food Safety Modernization Act. Growers need to attend PSA Grower training in order to fulfill FSMA Produce Safety Rule regulatory requirement. The FSMA Produce Safety Rule requires at least one supervisor or responsible party from the farm to complete a food safety training at least equivalent to that received under standardized curriculum recognized as adequate by FDA conducted by qualified trainers. In Kentucky, Extension took the lead in trainings for the state, conducting six grower trainings from July 2019- June 2020 across the state. A total of 113 participants, which included growers from the Amish and Mennonite population (a non-traditional Extension audience) successfully completed the program.	Food Safety and Security
14.	Protecting the Safety of Powdered Infant Formula	Powdered infant formula (PIF) is not required to be a sterile product and has been a vehicle of transmission in outbreaks and sporadic cases of <i>Cronobacter sakazakii</i> infection. <i>C. sakazakii</i> is a Gram-negative pathogen from the Enterobacteriaceae family which is also an occasional contaminant of PIF that can cause rare but life-threatening diseases. Though traditional heat processing used in the creation of PIF is typically enough to eliminate <i>C. sakazakii</i> , recently high-pressure processing (HPP) of food has been preferred to thermal processing, owing to its ability to inactivate microorganisms without adversely affecting quality and nutritional attributes. Increasing consumer demand for safe, minimally processed, and preservative-free foods with an extended shelf life makes HPP a potential	Food Safety and Security

		<p>application in infant formula and other infant foods. Additionally, there is interest in the use of naturally derived antimicrobials as replacements for synthetic preservatives, particularly in infant nutrition.</p> <p>UK food scientists investigated the combined effects of trans-cinnamaldehyde (TC), and Chitosan (CH), two naturally derived bioactive compounds generally regarded as safe by the FDA, along with HPP to inactivate <i>C. sakazakii</i> in reconstituted infant formula. Microbiological and sensory analyses, pH, protein oxidation, and emulsion stability of each sample were determined. <i>C. sakazakii</i> was totally inactivated by HPP (600 MPa for 5 min), TC (0.05%) and CH (1%) combination after 4, 6, and 2 weeks of storage at 7, 23, and 45 degrees C, respectively. All HPP treatments exhibited a minimum of 5.5 log CFU/ml reduction while the highest reductions with non-HPP treatments were 2.1, 1.1, and 3.7 log CFU/ml at 7, 23, and 45 degrees C storage, respectively. Although TC exhibited a cinnamon-like taste, overall sensory attributes were not significantly different from the control samples. Though additional research is needed to ensure safe use in infants, these results suggest that TC and CH could be incorporated in infant formula as a natural intervention to replace the synthetic preservatives. Further, HPP could be a safe alternative to thermal processes in order to preserve the nutritional, organoleptic, and functional properties of infant formula.</p>	
<p>15.</p>	<p>Beef Health Efficiency</p>	<p>The Kentucky Beef Efficiency was again a major draw having between 300-350 beef producers, county agents and industry representatives in attendance. The goal of the program is to provide those involved in the beef industry and opportunity to improve their knowledge of beef cattle management and factors that impact their management decisions to enhance production efficiency. The program was held in Owensboro, KY prior to the start of the annual Kentucky Cattlemen’s Association convention. Speakers from Mississippi, Texas and Alabama delivered presentations on winter nutritional management of beef cows to improve calf immunity, vaccination protocols and reduce morbidity and mortality, and considerations for implementing management strategies to reduce the risk of pathogen exposure of newborn calves. Averaging 149 post-program evaluations, the potential economic benefit reported was \$1,044/operation</p>	<p>Agricultural, Environment and Natural Resources</p>

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		for a total potential impact of \$365,400. Participants indicated increased knowledge and understanding which will promote the adoption of management change in some beef herds to improve calf health and overall herd efficiency.	
16.	Aiding Livestock Producers in Meeting their Goals	The Trigg County Cooperative Extension Service in Cooperation with the Trigg County Cattlemen's Association partnered to help livestock producers better manage their herds and meet their individual goals. One way Extension helped is through the Integrated Resource Management (IRM) mineral program. Three times each year, Extension works in cooperation with a committee of Cattlemen's members to collect bids from local feed suppliers on free choice minerals formulated per the UK IRM specifications. The best prices are then offered to producers. The university's regulatory services also assist in this process by testing the mineral delivered to out producers. The producers are assured that they are buying a good quality mineral and generally it is at a better price point than what they purchased previously. In 2020, a total of 78 producers from seven counties took part in the mineral order. Mineral orders this year were over 120 tons for the three orders combined, compared to last year which was right at 100 tons. Working with mineral suppliers and using the IRM specs from Extension specialists allowed producers to select minerals that would meet their animal's requirements at a competitive price. The mineral order has grown to include six Tennessee producers from 3 counties, as well as Trigg, Christian, Caldwell and Lyon Counties in Kentucky. With an average savings of around \$4.00 per bag as reported from our participants this program has allowed producers to save \$19,000 over the course of a year and also allowed Extension to educate them on what is important in their mineral supplementation program.	Agricultural, Environment and Natural Resources
17.	Providing Pesticides for Hemp Producers	Working with the Kentucky Department of Agriculture, Extension initiated the submission of the first state local needs requests to provide pesticide tools to Kentucky hemp producers to control common insect pests. Kentucky is the first state to acquire these pesticides which helps producers to gain an advantage. Prior to this, no pesticides had been available to produce hemp. The pesticides represent the first of their kind in the country.	Agricultural, Environment and Natural Resources

		<p>There are now five pesticides that producers of hemp can use to grow their crop. Each of these materials is considered a reduced risk product.</p>	
<p>18.</p>	<p>Providing Valuable Pest Protection Tools for Diversified Farm Operations</p>	<p>Kentucky agriculture is characterized by numerous small farms, many of which have had to diversify due to the decline of tobacco over the last two decades. Operations with annual sales of less than \$10,000 make up 57% of Kentucky farms. Further, Kentucky has ecologically complex landscapes with forests accounting for ~40% and croplands and pasturelands accounting for ~40% of the total area. Understanding the costs and benefits of diversified farming systems at local and landscape scales is important for rural livelihoods in this state. Diversified farming systems can include a range of practices that incorporate crop and non-crop diversity across multiple spatial and/or temporal scales to promote beneficial organisms that deliver pest and pathogen control services to the farm and environment. For example, increased crop diversity and landscape diversity can lead to greater soil organic matter, erosion control, water-holding capacity, weed control, pathogen control, control of arthropod pests, pollination, and drought resilience. Though little research has focused on dis-services, diversified farming systems can also introduce costs to farm production if different practices introduce pests and pathogens.</p> <p>UK entomology researchers and extension specialists are collaborating with their colleagues in horticulture to study the costs and benefits of cultural practices implemented in diversified farming operations. They studied the use of physical netting barriers as alternatives to insecticides for vegetable and berry growers. Preliminary results have found that these netting barriers can reduce pests better than organic insecticides and even match or surpass the benefits of conventional insecticides in crops such as mustard greens. For organic growers, trials revealed these barriers are more effective than organic compliant insecticides for acorn squash, muskmelon, raspberries, blackberries, and eggplant. However, challenges remain for weed control, pollination, and the assessment of the overall profitability of these netting systems. Nonetheless, the use of the physical barriers show promise for a few horticultural crops that typically have major pest pressures. These</p>	<p>Agricultural, Environment and Natural Resources</p>

		results have added to the possible tools available to growers who wish to add to the diversity of higher dollar crops they produce.	
19.	Regenerative Agricultural Practices for Combating Climate Change	<p>Climate change is among the greatest challenges facing the modern world. Agriculture systems must not only adapt to changing climates and continue to meet the needs of feeding and clothing the world’s population but should also work to reduce or reverse contributions to the forces behind climate change. Regenerative or climate-smart agriculture methods are believed to help offset climate change by rebuilding soil organic matter and restoring agroecosystem biodiversity thereby contributing to carbon sequestration and offering other ecosystem services. Management practices such as no-tillage and cover crops have been widely applied in many cropping systems and are expected to offer multiple environmental benefits (e.g., soil carbon sequestration, yield stability, and climate resilience). However, the long-term effects of these management practices, especially their synergistic interaction, have not been well documented.</p> <p>To investigate the potential of long-term coupling of two common agricultural conservation practices, historical data were combined with additional field observations and an agroecosystem model to simulate soil organic carbon over time. The model analyzed yield and field data collected from research plots at the University of Kentucky that have been in continuous no-till production, including some with cereal rye as a cover crop, for over 50 years. Modeling and analysis showed that no-till and cover crops work together to simultaneously slow down soil carbon decomposition and increase carbon inputs into the soil beyond what has been observed with no-till alone. The model predicts that the benefits from cover crops will only increase with time as elevated carbon dioxide levels increase cover crop biomass yields. The results of this work contribute to the creation of best management practices for producers to help reduce their environmental footprint.</p>	Agricultural, Environment and Natural Resources
20.	The Potential for Industrial Hemp as an Economically Viable Biofuel Feedstock	Since the 2014 Farm Bill established industrial hemp pilot programs, there has been tremendous interest among farmers in Kentucky and across the US in its potential as a viable crop to add to their operations. There are multiple potential uses of the crop’s fiber, seed and floral components, but	Agricultural, Environment and Natural Resources

		<p>the expansion of potential markets for hemp in the US are critical for the long-term sustainability of the crop. Hemp-based biofuels and bioproducts represent a newer application area for this versatile crop. Though previous work has shown the potential to use hemp lignocellulose for biofuels, additional work is needed to further examine its technical and economic feasibility, particularly in comparison to other biomass feedstocks.</p> <p>An interdisciplinary team at the University of Kentucky evaluated the potential of industrial hemp as a biofuel crop using a combined agronomic, experimental and economic approach and compared it with kenaf, switchgrass and biomass sorghum. The team evaluated 11 hemp cultivars, six of which produced fiber only and five that served as a dual-purpose crop (fiber and grain). The study explored each cultivar’s ability to produce biomass, how each performed with a laboratory pretreatment and enzymatic hydrolysis, which is designed to enhance biofuel yields, and projected economic returns. Results predicted an ethanol yield of ~82 gallons/dry ton of hemp stems, which is comparable to the other feedstocks tested. In assessing the potential for economic returns, however, the additional potential of grain production from dual-purpose cultivars showed greater promise. All dual-purpose cultivars had higher economic returns than the fiber-only cultivars. The top performing cultivars were Bialobrzeskie from Poland and NWG 331 from Colorado. Bialobrzeskie had estimated returns from the sale of the grain and projected biofuel production of \$1,564 per hectare, and NWG 331 had estimated returns of \$1,482 per hectare. The results of this study show the potential for dual-purpose crops like hemp to produce both biofuels and other coproducts, helping to offset potential losses due to biofuel market fluctuations. These considerations will be important for producers as they plan for future hemp crops, especially given the recent drop in floral oil/extract prices, which had previously been the primary driver of hemp cultivation decisions in recent years.</p>	
<p>21.</p>	<p>New Insights into the Control and Transport of Salicylic Acid for Plant Defense</p>	<p>Systemic acquired resistance (SAR) is an important protection mechanism in plants that provides defense from a broad array of pathogens. SAR involves mobile signals that travel from the site of primary infection to systemic portions of the plant and prepare them for subsequent infections. Understanding the mechanisms of mobile signal generation, movement and</p>	<p>Agricultural, Environment and Natural Resources</p>

		<p>perception involved in the induction of systemic immunity is critical to developing new alternatives to existing chemical and cultural plant protection measures. Though the plant hormone salicylic acid (SA) has been known to be an important inducer of SAR, it has not previously been believed to be mobile. Research conducted by UK plant pathologists has shown this not to be the case.</p> <p>Research results showed that SA is preferentially transported from pathogen-infected to uninfected parts via the space between the cell wall and plasma membrane, while other SAR-associated signals are transported through the cytoplasm. They also found that the plant cuticle, a protective waxy film previously thought to serve only as a barrier from the environment, actively controls the chemical as it moves throughout the plant. In addition, the study shows the initial movement of salicylic acid into the plant cuticle appears to be associated with the plant’s water usage efficiency, which is essential for the plant to regulate water loss through transpiration and its ability to tolerate drought. This was discovered by tracking SA movement in Arabidopsis mutants with ruptured cuticles under high and low transpiration environments. This work represents a major breakthrough that discounts a long-accepted notion in the field that SA transport was not a key component of SAR. This new knowledge may be critical to efforts toward developing ways of harnessing SAR inducers and mechanisms to develop new plant protection technologies.</p>	
<p>22.</p>	<p>Best Practices for Ecological Intensification in High Tunnel Production Systems</p>	<p>Historically, agricultural intensification efforts have focused largely on agronomic cropping systems. There is strong argument, however, for intensification of fruit and vegetable production systems. Globally, more than 2 billion people are affected by micronutrient deficiencies that have negative impacts on health, cognition, function, survival and economic potential. As a state, Kentucky ranks third nationally for those least likely to consume the recommended daily intake of fruits and vegetables and has the fifth-highest rate of obesity in the nation. Although smaller in relative acreage than agronomic cropping systems, the net effects of horticultural intensification include significant nutrient and water use, and subsequent loss to the environment, even when viewed relative to other intensified production systems.</p>	<p>Agricultural, Environment and Natural Resources</p>

		<p>A team led by UK horticulturists is studying the effects of incorporating agroecological practices into intensive organic horticultural systems as models of ecological intensification. One example of a rapidly expanding, intensive organic systems are high tunnel (HT) systems. The increased temperatures from passive solar radiation under these tunnels result in summer crops that are ready for market 4-5 weeks earlier than field crops and yields that may be 2-4-fold greater than field production. Although this may increase the availability of locally produced foods, the intensity of these production systems leaves little time for integrating cover crops and/or fallow periods typically associated with sustainable agriculture practices. There is a need to identify management approaches that close yield gaps common in these systems while reducing external inputs and capitalizing on ecological processes and ecosystem services.</p> <p>UK researchers conducted a three-year study comparing high tunnel and open field model organic vegetable production systems focused on how season extension using high tunnels influences soil health and key ecosystem services. High tunnel systems included one in production year-round and one that incorporated cover crops. Although significant benefits were not seen from the cover crop used in this study (hairy vetch, <i>Vicia villosa</i>), it did sufficiently replace a portion of the fertilizer in these intensive systems and did not decrease yields. Key ecosystem services and soil processes differed more between the high tunnel (HT) and open field environments. Differences in greenhouse gas emissions between the high tunnel and open field indicate that trace gas flux patterns and cumulative total fluxes differ more between the open field and inside tunnels than by practices within the high tunnels. Although not statistically significant, cumulative trace gas emissions were greater in the HTs than the open field, likely due to high mineral N levels in the soil due to the management history and lack of leaching rainfall for multiple years. However, despite increased greenhouse gas emissions in some HT treatments during some years, yield-scaled global warming potential (GWP) was lower in HT treatments than the open field in all treatment/site combinations. The GWP is a sustainable intensification measure which adjusts emissions with total crop yields, giving a measure of total emissions per unit yield. Lower GWP</p>	
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		<p>values were driven by higher yields in the HTs. Yield scaled GWP was nearly identical in the HT treatments and was ~40% less than in the open field, on average. These results indicate that the best management practices for improving soil health in the open field may function differently in high tunnel systems, but that when evaluating the ecosystem service costs and benefits of HT systems, it is important to assess soil processes and agronomic traits (e.g. yield, profitability) in a holistic manner using sustainable intensification metrics.</p>	
<p>23.</p>	<p>Management Practices can Influence Seed Protein Amounts in Soybean</p>	<p>Although soybean yield in the U.S. has increased at an annual rate of 0.49 bu/ac since 1986, there has been a decrease in seed protein concentration of 0.038% per year. This decrease is cause for concern related to the future of economics and marketing of soybean as a major protein component for feed. In addition to genetics, seed composition and meal value can be influenced by environmental and management factors. Soybean producers have at their disposal a variety of management practices that can largely influence nitrogen (N) availability and thus potentially seed protein. However, the potential to influence seed composition with different management and cultural practices has received little attention. Understanding how management practices can be adapted in different U.S. regions to ensure both high productivity and improved seed quality is essential to improving the N balance in soybean.</p> <p>UK agronomy researchers conducted field experiments to test how rotation system, cultivar maturity group, and late-season input treatments affected yield and seed protein concentration in six different soybean cultivars. Preliminary results showed that yields after a cover crop compared to winter fallow were 5-10 bu/ac greater in two out of six cultivars in our study. Though late-season inputs generally did not affect yield, late nitrogen fertilizer application after R5 increased seed protein concentration, supporting the hypothesis that N availability during the seed filling phase is partially limiting protein concentration. The results of this work are informing recommendations for soybean producers and are also being used to improve simulation models that can predict C and N cycling in soybean</p>	<p>Agricultural, Environment and Natural Resources</p>

		<p>and serve as the basis of decision support tools that consider a variety of potential management options.</p>	
<p>24.</p>	<p>Extension Promotes Participatory Planning</p>	<p>In August of 2019, Extension met with the Executive Committee of the Green River Area Extension Master Gardeners Association (GRAEMGA). The group was struggling with three inter-related issues: (1) the need to develop a Strategic Plan, but with insufficient buy-in to include widespread participation; (2) the need to evaluate the impacts of the Association’s programming in order to better direct their limited resources; (3) the need to expand the commitment and leadership of the broader volunteer base, so that the workload could be shared more evenly across the entire group. Ripple Effect Mapping (REM) was chosen as the best tool to jump start a long-term participatory planning and evaluation process. On November 21, 2019, twenty-nine current and former members of GRAEMGA completed a REM session with Extension specialists serving as facilitators. This process involved people sharing individual stories of the program’s impact. The process itself elicited a great deal of excitement. The comments from the day’s evaluation were overwhelmingly positive, highlighting the value placed on group participation and exploring community impacts. Data were coded using the Community Capitals Framework (Flora & Flora, 1992), which makes it easier to see patterns and themes across the impacts. For example, there were significant impacts in the area of human capital, specifically in health, education & skills, and leadership development. That said, the program also strengthened social capital in the community (building bridges across organizations, fostering informal conversations, and providing opportunities for deeper connections across difference). Enhanced social capital and committed volunteers (human capital) was linked to increases in financial capital. For example, through a partnership with the Master Gardeners, the Western Kentucky Botanical Gardens was established and expanded, now hosting approximately 8,000 tourists a year with significant economic development benefits to the region. The natural capital of the community was also improved, through an expansion of gardens, increased habitat, reduced fertilizer overuse, more native plants, and overall beautification efforts, which resulted in improvements in cultural capital, such as increased community pride and respect for</p>	<p>Leadership & Community Engagement</p>

		<p>Kentucky plant life as well as strengthening local norms regarding the value of collective work. One of the Extension specialists prepared the initial analysis and is teaching the Executive Committee how to use this data to better engage their base and match up people with activities and opportunities for leadership that suit their interests and skills. Finally, using story-based prompts, GRAEMGA volunteers are currently doing phone interviews with key stakeholders to draw out their experiences with the Master Gardeners and inform the planning process. The final stage of this process involves collective development of goals and specific action items for the strategic plan.</p>	
<p>25.</p>	<p>KSU Club Day en Español at Whitney Young Elementary School</p>	<p>Whitney Young Elementary school is located on the west side of Louisville, KY, where it is considered to be an economically disadvantaged area. It is considered a Title 1 School. The majority of the students (about 66%) are African American and 22% are Hispanic, which is considered to be higher than the Kentucky state average of 24%. About 78% of the students are on free/reduced lunch. Whitney Young Elementary school ranked below average on their test scores.</p> <p>Throughout the 2019/2020 school year, Kentucky State University Jefferson County Extension Program was able to partner with Whitey Young Elementary school to take part in “Club Day”, this consisted of bringing Extension based curriculum to elementary school-aged children that would help develop their knowledge and curiosity in a variety of areas through hands-on educational activities. Jefferson County provided three different classes once a week. The students were assigned to each club (class) by the school FRYSC (Family Resource & Youth Services Center) coordinator based on their interests. These clubs were broken down into the cooking club (EFNEP), snack creation (FCS), and robotics club (4-H). Kentucky State University Cooperative Extension Program (KSUCEP) help by providing instruction and assistance to the Spanish-speaking ESL students, so that they could receive the same knowledge gain and interaction as their classmates.</p> <p>While implementing the club day en Español to the Spanish-speaking students at Whitney Young Elementary school, KSUCEP is ensuring that Hispanic youth are also able to benefit from the educational hands-on activities that they can try at home and use to develop their life skills.</p>	<p>Leadership & Community Engagement</p>

		Eating healthy and picking alternative nutritious snacks versus junk food can have an impact on educating children about their life choices and taking a preventative method towards decreasing child obesity. KSUCEP was able to help the Spanish-speaking ESL students understand what the programs consisted of. This allowed them to be able to learn and participate in the lessons given. In which children understood what was happening and became more engaged in activities.	
26.	Teen Leadership Bootcamp	Kentucky 4-H aims to engage youth through hands-on experiences where they can build leadership competencies at the beginner, intermediate, and advanced levels. In 2020, forty-two youth members completed Kentucky 4-H Leadership Bootcamp (an experience that allows youth to further develop their leadership skills and abilities). Approximately 98% of the participants reported that due to their involvement in 4-H Leadership Bootcamp, they are now prepared to apply for a Kentucky 4-H State Officer position (on the state 4-H Teen Council) or another related state leadership board. After participating, all (100%) felt more confident in an interview setting, understood the importance of an elevator speech, valued the act of showing appreciation to others, and understood the value of teamwork. The majority (98%) of the participants believe they will be better leaders and will be able to easily implement skills they learned. One youth from Henderson County applied to be on the State Teen Council and to serve as a Shooting Sports Ambassador and was accepted by both state level leadership boards/councils.	Leadership & Community Engagement
27.	Extension Helps Small Businesses Thrive	Frankfort, like most small cities and communities, wants to thrive by its treasured culture, builds around its strengths, and expand its resources to keep up with the demands of a growing diverse population. To grow and develop the City of Frankfort, there are unseen hurdles as well as known obstacles to overcome. In 2019, the Frankfort Area Chamber of Commerce, the Frankfort Mayor's Office, and the Kentucky State University Cooperative Extension Program (KSUCEP) collaborated with the University of Kentucky (UK) Community Economics Development Initiatives of Kentucky (CEDIK) to conduct a survey of local businesses to identify growth barriers and table recommendations to assist with small business development and growth in Frankfort. The Business Retention	Economic & Financial Well-Being

		<p>and Extension Initiative was used to assess challenges faced by small business owners. Interviews were conducted with 45 businesses in the City. Thirty-three percent shared the obstacles of having limited access to credit, difficulties overcoming regulations and red tape opening a business, establishing business identity in the community, and limited access to a trained and reliable workforce. A total of 64% of the businesses surveyed needed help with transition and succession planning, workforce development and financial planning, and emergency preparedness planning. Several of the businesses surveyed received guidance from Extension on how and where to apply for grants. Six businesses were able to receive a hand-delivered check for \$2500 - \$4700 as grant recipients for a total of \$26,000 to assist them with their rent, staff payroll, and inventory. KSUCEP in partnership with the Chamber of Commerce will continue to work toward allocating resources that will help small businesses thrive in the City of Frankfort.</p>	
<p>28.</p>	<p>Downtown Revitalization</p>	<p>As part of Extension’s Downtown Revitalization program, the community of Hazard participated in the First Impressions program. First Impressions is a structured assessment program that enables communities to learn about the first impression they convey to outsiders. It offers a fresh perspective on the appearance, services and infrastructure of each community. Volunteer teams undertake unannounced, one-day visits, record their observations, and give constructive feedback to the community. Their photos and responses are then compiled and presented back to the community by a CEDIK representative. In addition, the program offers suggestions and resources to address the areas identified for potential improvement. The knowledge gained through this program is intended to serve as a basis for community action.</p> <p>Hazard's First Impressions results were presented over a series of 3 forums in the community, with representatives from several community sectors, agencies, and small businesses in the community in attendance. Recommendations were made to the community to improve web presence, identify ways to provide tourists with information outside of business hours, and determine the identity and future direction of downtown Hazard. In</p>	<p>Economic & Financial Well-Being</p>

		<p>response to the First Impressions report, the city of Hazard voted to fund a full time Main Street Manager position, they organized and implemented a broad-scale social media advertising and marketing campaign, and worked to revitalize several key downtown areas. In addition, several visitor assessments identified wayfinding and signage as a challenge for the community to address. Because of their First Impressions report, the community has also secured funding to design and install wayfinding signage throughout the town to improve visitor's experiences. Through the First Impressions program, the city of Hazard was able to identify issues to improve their downtown, expand their marketing reach, and improve tourism experiences.</p>	
<p>29.</p>	<p>Helping the Jobless in Times of Need</p>	<p>As a means to address the issue of unemployment and underemployment, the Fayette County Cooperative Extension Service collaborated with the University of Kentucky Alumni Association and UK Human Resources to initiate the Central Kentucky Job Club in 2013. The purpose of the Job Club is to provide a positive environment for motivated job seekers to meet, connect, share and learn. Job Club partners also partner with 300+ local businesses, Lexington Chamber of Commerce, local unemployment services and government to provide support to those who have been laid off, gone through an unexpected job loss or looking to make a career transition. Job Club is a unique example of UK's land grant mission, providing a vital link between campus and community by disseminating research-based job search strategies to local citizens. Participants receive and improve skills needed to compete in today's workplaces that include LinkedIn, networking, financial management, online job searching, resumes mock interviews in addition to financial guidance on managing in tough times. As a bonus, Job Club attendees gain timely information regarding additional partnering programs including Extension, Alumni Career Services and HR resources and opportunities.</p> <p>Since its inception, 2,160 job seekers and 281 employment recruiters have benefited from attending with 215 participants reporting new employment. The six-year return on investment has a current value of \$8.6 million. In 2019, there were 711 new attendees, 1512 total attendees and 22 jobs secured throughout 23 sessions. Eighty-six percent of past participants</p>	<p>Economic & Financial Well-Being</p>

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		reported improving their employability as a result of Job Club. As a result of COVID-19, Job Club begin meeting via ZOOM Webinar in March 2020 and tripled its attendance (172) with statewide participation plus 14 states and Germany. When Job Club returns to normalcy (face to face), an online meeting option will continue.	
30.	Extension Shares Sewing Success	Studies indicate that sewing is not only a productive hobby and life skill, it can reduce stress and increase an individual’s feeling of self-worth. Extension in Shelby and Jefferson Counties coordinated the Louisville Area Master Clothing Volunteers (MCVs) statewide training attendance and organized a Louisville Area MCV Community Projects Sewing Day. Sharing their sewing skills with others was important to the twenty area MCVs. During the past year, the MCVs led 137 sewing programs, including 4-H sewing project days, Sewing Series, monthly Sewing Circles, “Come Sew with Us” events for beginning sewers, neighborhood sewing groups, mending events, sewing club and mission sewing groups. A total of 20 MCVs reported making 3,297 contacts this year and sewing 1,265 community service items including over 700 face masks to help others shield protection from COVID-19. They also reported volunteering 1,910 hours in teaching, preparation, continuing education, leadership, and community service. Based on the value of volunteer time (\$21.36/hr), this is a contribution worth \$40,797.60 to their communities. Some sewing students and some MCVs have used their sewing skills to make additional money for their families. Six of the Louisville Area MCVs taught at the state-wide MCV Training. Several MCVs judged homemaker cultural arts competitions and county and state fairs. The MCVs taught sewing to over 120 youth in 4-H who used their new sewing skills to complete 4-H sewing project garments or other sewing items.	Economic and Financial Well-Being
31.	Perpetuating Youth Entrepreneurship	Extension led business-planning workshops for high school students and teachers in the coal-dependent counties of Eastern Kentucky to develop entrepreneurial approaches for using abandoned coal mine sites. Student teams from ten high schools developed innovative written business proposals and oral and visual presentations that included market analyses,	Economic and Financial Well-being

		<p>competitive advantages, financial projections and feasibility studies, management team assets and other aspects. This was part of a youth entrepreneurship contest in which an Extension specialist also served as a judge. Each student in the top winning team received a \$1,000 award. Cash prizes were also awarded to students and their instructors for second and third place winners. Members of the financial community heard these presentations and provided feedback. Key contest organizers have reached out to investors to consider the most innovative proposals for potential follow-up and implementation.</p>	
<p>32.</p>	<p>Informing Practices that Spur Innovation in Small and Medium-size Agri-food Enterprises</p>	<p>In response to the boom in investing and startup activity in the agriculture and food technology sector, often referred to as “agtech” or “agritech”, there has been much interest from governments, non-profits and academia in developing programs to create ecosystems that contribute to the success of these businesses. In Kentucky, the state has created the Kentucky Agritech initiative to capitalize on the state’s strong assets in diverse agriculture, food and beverage industries to attract new and existing businesses. To be successful in creating an environment for supporting agritech businesses, we must understand the factors that contribute to the success of innovative enterprises in the agriculture and food space.</p> <p>Agricultural economists at UK examined the innovative behavior of agri-food firms located in Central and Eastern Europe. In the literature, empirical analyses on innovation activities of firms focus on various case studies from around the world. However, very few studies explore the innovation of small and medium sized enterprises from Central and Eastern Europe’s agri-food sector, which may provide insights more applicable to local efforts in states like Kentucky. Firm-level data obtained from the ERBD-World Bank Business Environment and Enterprise Performance Survey were analyzed using the logit estimation method. Results suggest that firms that spent some proportion of their financial budget on research and development, had workforce training programs, and bought fixed assets are more likely to launch product, process, organizational, and marketing innovations. The challenge for small to mid-sized firms will be to access the</p>	<p>Economic and Financial Well-being</p>

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		financial and technological resources needed to continue to upgrade and modernize their operations and remain innovative. The insights from this study can not only inform strategy for agritech businesses, but also governments and policymakers as they consider programs to help promote innovation and business growth in the agri-food sector.	
33.	Farm Business Plan for Beginners	In partnership with the local USDA Farm Service Agency, Fleming County Extension offered the Farm Business Plan for Beginners in November of 2019. The course also reached into the Amish Community where five individuals attended. Two of the attendees from the Amish Community were youth. The youth were interested in beginning their own sheep enterprise. As a result of attending, the youth spoke of how they understood farm management better. In Spring of 2020, one youth who attended the course was able to begin his endeavor in the sheep business. He also was able to suggest to other Amish youth to contact the local Extension office to learn more about management of sheep.	Small Farm Development
34.	Educating New Farmers	Kentucky State University Cooperative Extension Program (KSUCEP) offers a variety of programs to help small and beginning livestock farmers. These programs range from educational presentations, hands-on workshops, small ruminant herd appraisals, funding opportunities/grants, and email or phone consultations or on farm consultations. KSUCEP made onsite farm visits to assess what areas of management need improvement. For new and beginning small ruminant farmers, trying to become an expert overnight is often overwhelming. KSUCEP provided education and guidance on areas that could help production. Topics on facility management (fencing, feeders, shelter, and predator protection), nutrition of the herd, and health were addressed. Once these areas were under control, farmers are able to set up a breeding program. As a result of Extension programming, one farmer worked hard and made all the necessary adjustments as suggested. Slowly he began seeing many positive changes in his goat herd. After two years consisting of three site visits and numerous consultations and a lot of work on his part, the farmer has increased his herd size of breeding does and his animals are in overall better health. In 2018, he only lost 10 of 58 kids born and in 2019 his losses were down even more to only 6 deaths of 79 kids,	Small Farm Development

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		(compared to 2017, death loss 14 of 23). His farm has become more profitable and his farm more sustainable and the farmer has also recently been awarded the small-scale farm grant for \$5,000 in agroforestry to expand his goat production and maintain forest on his farm.	
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