

THE **magazine**

Volume 21 No.1

UK College of Agriculture,
Food and Environment

Ag in the 21st
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**Mountain Women
Mean Business**
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We Seek to Serve

This edition of The Ag Magazine illustrates, as always, how a land-grant university seeks to serve using the latest information and the best technologies available. In this issue, we feature two new areas of emphasis and one older program. All three of the programs highlighted are led by dedicated people who are driven every day to make a difference for Kentucky and the nation.

CAFE has a long history of research on advanced agricultural technologies to aid crop and livestock production. We, as other land-grant programs do, take our mission to feed an increasing population very seriously. One of our strengths is that we are part of a national system of land-grant agriculture colleges that share ideas that work. Our national research system continues to strive to produce more food and feed on a smaller land base. CAFE teams are using drones, robots, and self-operating machines to increase our ability to manage the land for the greatest productivity. One of the most innovative uses of drone technology is to help us manage our livestock better and more humanely. That cow in the field may not know that we will be able to check her and her calf 24-7-365, but she is better off because of it.

The two other programs featured here represent our mission to extend knowledge and make a difference for people. Mountain Women Mean Business is an innovative way to promote new businesses. We are aiming to help citizens create an economy in eastern Kentucky that will successfully and sustainably replace the coal economy. It is another highlight of our Center for Economic Development in Kentucky, a very ambitious and successful program to assist communities to follow their dreams.

The Crop Diversification Center is the oldest program featured here. It was created to replace another traditional part of the Kentucky economy, tobacco. Its leaders work hard with extension agents and farmers to make farmers successful



through new crop opportunities and technologies in fruit and vegetable production. The beauty of the land-grant university is that we provide the best, most up-to-date information to help growers sort through all of the commercial entities selling seeds, soil amendments, machinery, and chemicals. We are proud of our long tradition of providing unbiased research and extension information.

The best feature of this august land-grant system is that we try every day to be better than the day before. We have a saying in our college, "It starts with us." The people featured in this magazine start every new day focused on helping our citizens do things better.

Nancy Cox
Dean, College of Agriculture,
Food and Environment

It starts with us



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Tracking a Killer



Among the ridges and hollows of Eastern Kentucky, a killer is loose. Cancer. In Martin County, where the cancer rate is significantly higher than the national average, eyes are turning toward a dilapidated water system as one possible cause. In a shining example of town-and-gown cooperation, University of Kentucky scientists and local activists are collaborating on a pilot epidemiology study looking at drinking water quality and its possible health effects.

Jason Unrine, associate professor in CAFE's Department of Plant and Soil Sciences and the project's lead scientist, is quick to point out that Martin County isn't alone when it comes to degraded drinking water systems. This is a problem in rural communities throughout the country where money is tight and infrastructure is failing.

What enthuses Unrine about the project, which is funded by the UK Center for Appalachian Research and Environmental Sciences in the College of Medicine, is the partnership with local citizens who really understand the issues.

"We're trying to develop a model for collaboration between university researchers and local citizens. The goals are defined by the community," he said. "I make sure the study is scientifically sound, but I try to have it driven by their concerns."

Locals are concerned about the amount of cancer-causing chemicals in their drinking water, said Nina McCoy, a member of Concerned Citizens of Martin County, retired high school biology teacher and a research assistant in the study. For the past 16 years, the water company has sent out quarterly notices that the water contains disinfection byproducts linked to serious health issues.

Disinfection byproducts are a result of chlorinating water that has a lot of organic matter. Another problem stems from low water pressure in leaky delivery pipes, which causes biofilms to grow in the pipes and groundwater to enter.

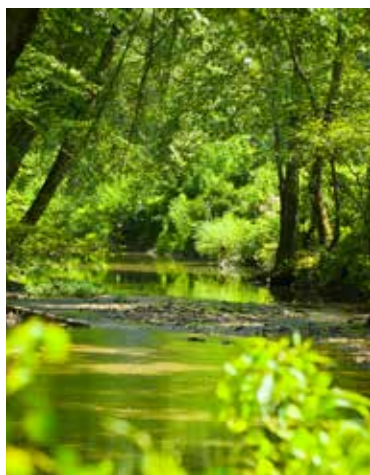
"Because there are so many leaks and so much variation in the water quality from house to house, we felt we needed to get data on the level of the individual home," Unrine said. "We're looking at how health effects are distributed spatially across the county and how that's associated with the level of contaminants in the drinking water."

McCoy said people are very excited about the project.

"They are interested because they don't trust (the water), and they don't know who to trust and what to think," she said. "I think they're so glad that UK is doing this."

Unrine hopes that this small study of about 100 homes will lead to a larger, more statistically robust one.

—Carol Lea Spence



Tune in to Water

Streams and rivers are the primary driver of Kentucky's great biodiversity and much of its economy. KYH2O, a new podcast series, examines the importance of this precious natural resource through multiple lenses.

"It's critical that we protect our water resources, but we tend to take them for granted," said Carmen Agouridis, extension associate professor in Biosystems and Agricultural Engineering. Agouridis is the series' co-producer and co-host with Amanda Gumbert, UK extension water quality specialist.

Episodes cover subjects like aquatic life, geology and the bourbon industry, environmental education, recreational opportunities, and stream cleanups.

Gumbert hopes the series will persuade people that small changes make a difference.

"Maybe they will become better consumers and better decision-makers, so we all walk a little more lightly on the earth," she said.

The podcasts are available through apps on any mobile device, iTunes, or online at <https://www.uky.edu/bae/kyh2o>.



Lynne Rieske-Kinney

As soon as she walks in the room, forest entomology professor Lynne Rieske-Kinney says, “I love my job.” Her enthusiasm for healthy forests and protecting trees from invasive insects is contagious. She gladly shares her passion with others and enjoys molding the next generation of entomologists and citizen scientists.



STEPHEN PATTON

Q: How did you become interested in entomology?

A: I grew up in what was then rural Michigan. I played in the trees and the forests and in creeks and ponds. I was always grabbing creepy crawly things that worried my mother and scared my sister. I loved it all though. Trees were my first love, especially studying their interactions with outside forces. When I was in graduate school, I had to make the decision of whether to study forest pathogens or forest insects. I chose insects.

Q: How are insects supposed to interact with trees?

A: All insects are important to the ecosystem and have a role there. Problems arise when invasive insects reach outbreak levels in the forest and begin destroying a whole species. My lab uses new and innovative technologies like RNA interference and remote sensing to manage insect populations and to help bring things back into balance.

Q: Can you tell us about your students?

A: I am trying to train my students to be global citizens and not just entomologists. My most important role as a professor is giving back to young people. My previous students are influencing policy and impacting forest health across the world. It's nice to know that I had a small role in their success and contributed to their development.

Q: You have done a lot of work recently to raise the awareness of the importance of Lexington's urban forests.

A: I am co-founder of the Urban Forest Initiative with Mary Arthur from Forestry and Natural Resources. UFI has raised the public's general awareness of the benefits of trees to urban ecosystems. It's so rewarding for me to know that trees are really something that you can rally people around.

I also work with Heather Norman-Burgdolf in Dietetics and Human Nutrition on the Healthy Trees, Healthy People program, designed to train people in pest detection and to become citizen scientists while providing them with the opportunity to increase their activity level. In the program, participants learn how to identify selected urban trees and how to tell when the trees might have a problem, such as an invasive insect. The participants get exercise as they look at trees along particular paths. This year, they can participate in five Lexington parks.

These outreach projects, coupled with my research addressing forest health, are the reasons I'm passionate about my work. I'm fortunate to have support in both my professional and family life that allows me to pursue my passions.

Hemp:

New Crop, New Risks

University of Kentucky plant pathologists have identified a new disease that has the potential to be a major setback to the state's growing hemp industry.

Plant pathologist Nicole Gauthier received her first report of the disease in southeastern Kentucky at the end of the 2014 season, the first year hemp was reintroduced into the state. Gauthier collected isolates of the fungus after the same producer reported it again in 2015.

"We struggled to identify it initially, because it is not a common fungus. There was nothing similar discussed in the old literature," Gauthier said.

Gauthier, graduate student Desiree Szarka, and Chris Schardl, chair of Plant Pathology, have worked to confirm the fungus of this new plant disease, sequencing the entire genome of five isolates plus individual genes of five others.

"The pathogen has unprecedented genetics and a high degree of genetic variability, which could make it hard to control," Schardl said. "This suggests that the fungus has separate, established populations throughout the region."

The disease, called hemp leaf spot, starts as small, round spots on leaves. As the disease spreads, the leaves turn brown, dry out, and twist. The disease causes plant stunting, reduces photosynthesis and bloom size, and causes necrosis of the plant's calyx leaves.

The amount of damage to the crop depends on when infection occurs. Producers have reported the disease as early as July 1, and such early infections can cause complete crop loss.

Disease reports have increased each year. As of 2018, the disease was identified in nine counties. Producers in five other eastern U.S. states also have reported incidences.

The lack of funding for hemp studies is slowing the necessary research, but UK plant pathologists are doing everything they can to learn how this new pathogen survives, how it overwinters, its potential hosts, whether it produces a toxin, potential biocontrol agents, and variety susceptibility.

—Katie Pratt



The Power of Memory



Carlos Rodríguez López is delving into how plants use memory to respond to their environment.

López joined CAFE's horticulture faculty almost a year ago. With a new grant from the U.S. Department of Agriculture, he is continuing research he conducted in Australia. There, he studied how plants respond to the environment and, in the case of grapevines, how they accumulate experience.

"Older plants produce a higher quality fruit than younger plants when grown under the same environmental conditions. Our research shows that is due to epigenetic memory," he said.

To survive and thrive, all living things need to cope with changes in their environment. Epigenetic memory is one of the molecular mechanisms that can change gene expression in response to a situation without affecting the actual sequence of those genes.

Stress is one of those situations. Exposed to the same stress later, plants cope better because they "remember."

"It's not memory in the sense we remember events, but this mechanism responds based on previous exposure," López said.

He is now looking at how asexual reproduction using dormant cuttings (the way grapevines are commercially propagated) affects the plant's epigenetic memory and if that affects how well the new plant responds in a new environment. In an earlier study using the model plant *Arabidopsis*, he found that not only can plants remember, but when propagated through seeds, offspring of sexual reproduction also remember and respond slightly better to the same or similar stress.

López hopes his work will result in more vibrant Kentucky vineyards and, ultimately, better wines for the consumer.

— Carol Lea Spence



Camping Around the Calendar

In Kentucky, 4-H camping is not just a summertime activity. The state's four regional camping facilities offer opportunities for education and exploration year round.

"Through our camps, our college has the opportunity to impact Kentuckians throughout the year," said Darrell Stillwell, principal extension specialist for 4-H Camps. "Four years ago, we hired full-time camp directors, and they have been instrumental in helping us make the best use of our camps by partnering with their communities to meet the needs of their regions."

Since 2016, these partnerships have resulted in many specialty camps that

are focused on a specific topic or interest. Kentucky 4-H averages 12 specialty camps a year. While some of these camps are region-specific, others are open to youth from across Kentucky.

West Kentucky 4-H Camp in Dawson Springs has recently incorporated more agricultural opportunities into each camping session to connect youth to their farming heritage through hands-on experiences. North Central 4-H Camp in Carlisle hosts both day and overnight environmental education camps for more than 6,500 people each year. Lake Cumberland 4-H Camp in Jabez has partnered with the National Guard to provide camping

opportunities to military youth whose parents are deployed. J.M. Feltner Memorial 4-H Camp in London partnered with the Kentucky Fire Commission to host their Junior Firefighter Camp in 2018.

Kentuckians have taken notice of 4-H's efforts. In recent years, the 4-H Camping Program has seen a 35 percent increase in enrollment due to the introduction of the specialty camps and an increase in attendance in their traditional summer camps. The result is 35,000 people visiting a Kentucky 4-H Camp each year.

—Katie Pratt

Be Fit with FitBlue



Family and Consumer Sciences extension recently launched FitBlue, a multifunctional mobile app aimed at improving Kentuckians' health and well-being.

The app features include a fitness tracker, nutrition tractor, farmers market locator, food bank locator, information on mindfulness, and exercise plans and videos for all ability levels. The UK Department of Dietetics and Human Nutrition had an early hand in the app's development as part of a grant from the Centers of Disease Control and Prevention.

"We really wanted to take a holistic approach to health," said Natalie Jones, extension specialist for family health. "This app helps us give our clients readily accessible information wherever they are in their lives."

FitBlue is available on the Apple App Store and Google Play.

—Katie Pratt



Building Trust in a Closed Society

Not the type of people to stand by when they identify a need, UK equine extension specialist Fernanda Camargo and Hardin County 4-H agent Bonnie Jolly teamed up with equine veterinarian Pedro de Pedro to improve equine health within Hardin County's Amish community.

The trio created a spring wellness clinic focused on disease prevention and biosecurity in a county underserved by large animal veterinary medicine. It is a community of traditional ways, one that shuns modern conveniences like telephones, electricity, and running water. In this farming community, horses pull plows, provide transportation, and perform any number of other important functions.

"This clinic is one of the most rewarding things I do each year," Camargo said. "We are happy to have started a positive relationship and hope to keep serving them for a long time to come."

The last remaining large animal veterinary clinic in Hardin County shifted its focus to small animal practice several years ago. Consequently, the equine population there either travels a substantial distance for health care or goes without.

In 2017, the trio offered vaccines against flu, herpesvirus types 1 and 4, eastern equine encephalomyelitis, western equine encephalomyelitis, West Nile virus, tetanus, botulism, and rabies. Though some owners refused any vaccines, 150 horses were vaccinated with all or some of the prevention package.

Between the first and second clinics, the community suffered through an outbreak of botulism. The consensus was horses vaccinated against botulism at the first clinic were unaffected, while unvaccinated animals died.

In 2018, every clinic participant asked for the botulism vaccine.

"Since then, several in (the community) have reached out to Bonnie with health and biosecurity questions that she passes along to me," Camargo said.

"They are overwhelmed with appreciation," Jolly said. "Fernanda has really built a rapport, and that means a lot to them."

"This program integrates research, outreach, and student training. It is an excellent reminder of our purpose as researchers and extension agents to appreciate, educate, and serve equine owners," Camargo said.

According to Camargo, the clinic's success is due in large part to the generosity of animal health corporations Neogen Animal Health, who donated botulism vaccines all three years, as well as Boehringer Ingelheim Animal Health and Zoetis, who donated vaccines and dewormers the first year. Additionally, the Kentucky Horse Council, Kentucky Equine Education Project and Merial (now also part of Boehringer Ingelheim) helped fund the clinics.

—Holly Wiemers

Day Camp Helps Children Feel Safe

Sometimes children have a difficult time figuring out where to turn for help in unsafe situations. To teach children what they should do if an emergency arises, the Bell County Cooperative Extension Service offered a Safe Communities Day Camp last fall.

"Community members reached out to us to see how we could help," said Rebecca Miller, Cooperative Extension agent for family and consumer sciences in Bell County. "There are so many situations where children just aren't sure what to do. With grandparents raising grandchildren and drugs affecting many families, children need to know who they can count on in a crisis."

Miller's goal was to familiarize campers with local aid workers. Miller worked with the Bell County Sheriff's office, Bell County Volunteer Fire Department, Bell County Emergency Management Service, Air Evac Lifeteam, and the Division of Forestry to make camp a reality.

"We had 18 children and their families participate," Miller said. "Over two days, they met our community helpers and learned about the services they provide."

Families met firefighters, paramedics, police officers, flight nurses, and forester rangers who



provided information on ways to keep families and communities safe.

"Through a variety of activities, we made sure the campers knew that the community helpers are their friends," she said. "We also made sure to emphasize that dialing 9-1-1 is for emergencies only."

A verbal survey after the program revealed that 90 percent of children

could identify local community helpers and 90 percent of families indicated that their children have a positive impression of community helpers and are not afraid of them. The survey also showed that 80 percent of the children recognized the numbers 9-1-1 and could dial the number for emergencies.

—Aimee Nielson

Education Within Reach

When fall classes get underway, more folks can stay at home to pursue an advanced education. The college is offering two new online master's degrees and four certificate programs. They join its already existing online master's degree program in retailing and tourism management.

"We're pleased to be able to provide this opportunity," said Larry Grabau, associate dean for instruction. "This will open the door for a lot of people who might not have the time otherwise to pursue an advanced degree or certificate on their own schedule and in their own homes."

New online master's degree programs are available in entomology and in science, translation, and outreach. Graduate certificates in positive youth development and

family and consumer sciences are being launched in conjunction with the latter degree program.

The certificate for positive youth development will explore current issues in youth and agriculture. The family and consumer sciences certificate will provide students with knowledge to help individuals and families improve their lives.

The college is also offering two undergraduate certificate programs online: distilling, wine, and brewing studies and food systems and hunger studies.

"Kentucky as a whole will benefit from our improving our academic outreach," Grabau said. "These programs will produce highly-educated, savvy graduates who will use their knowledge to build stronger families and communities."

—Jeff Franklin

Ag in the 21st

By Carol Lea Spence



MATT BARTON

Mark Williams and Joe Dvorak with the solar array that offsets all the energy used on the UK organic farm.

Agriculture has always been about innovation. Long before the ancient Greeks decided the four natural elements were earth, air, fire, and water, people were harnessing all four in an effort to create ecosystems that would sustain them. From the Chinese in the first century B.C.E. who devised a way to irrigate higher elevations by raising water with a chain pump to the Arab world developing a three-field system of crop rotation in the Middle Ages to the 20th-century development of synthetic fertilizers, pesticides, and gene manipulation, the goal has always been to increase production and make the work more efficient.

Nothing is different in the 21st century. Still, we innovate. Still, we seek to control earth, air, fire, and water. Drones are taking to the air. The sun is powering pumps and greenhouses. Tractors are starting to drive themselves. And CAFE researchers have a hand in it all.

Fire and Water

The solar array is perched on a ridgetop at the UK Horticulture Research Farm for a reason.

“We wanted it to be a statement,” said Mark Williams, interim chair of the Department of Horticulture. “We wanted people to think about sustainability when they saw these panels. And it’s working. People ask about this all the time.”

The 10-kilowatt array transforms the sun’s fire into electricity, which is fed into the power grid and offsets all the energy usage on the 30-acre organic section of the farm. Over the course of a year, the panels generate as much, and sometimes more, electricity than the unit actually uses.

The focus on the organic unit has always been on sustainable production methods. The farm’s buildings, constructed from salvaged materials, were designed in keeping with that green goal. Examining ways to use solar power makes sense in that context. The project is the first phase in the college’s efforts to use renewable energy on its farms.

“The success of this project has spurred on a change in the college. We’re going to take this concept to the entire farm, and we hope this will become a model that will work for other farms as well,” Williams said.

The solar idea actually began as part of another project. Joe Dvorak, assistant professor in Biosystems and Agricultural Engineering, had built a self-driving tractor with electric propulsion that they were testing on the organic farm. Dvorak and Williams applied for and received a UK sustainability challenge grant for the purchase and installation of solar panels to offset the energy usage for the tractor. Dvorak and fellow BAE professor Don Colliver designed the solar array and farm crews and technicians from the Agricultural Machinery Research Lab installed it.

“I was hoping that when we were done (with the tractor project) we’d have something permanent. You really want something that’s sustainable that’s going to have a long term impact,” Dvorak said.



Brent Rowell adjusts a replica he built of John Ericsson’s 1873 solar-driven motor.

New, Not New

In the first century B.C.E., Hero of Alexandria invented a sun-powered siphon. In the 1860s, a Frenchman, Augustine Mouchot, grew alarmed over the Industrial Revolution’s thirst for coal. He suggested that industry “reap the rays of the sun,” and then went on to do just that by building a steam engine powered by the sun’s heat.

Horticulture professor Brent Rowell is fascinated by solar power’s long history, particularly by the work of John Ericsson, a Swedish immigrant who did prodigious work in building prototypes for solar machines in the 19th century. A video of a reproduction 1873 Ericsson machine that Rowell built is on exhibit in the Science Museum in London, England. While Ericsson used a parabolic dish to capture and focus the heat of the sun, current solar systems, like the one at the organic farm, transform the sun’s light into energy. This is the method Rowell uses for a low-pressure irrigation system he perfected in Asia. He collaborated with engineers from Ball Aerospace in 2014 to test a combination of one-horsepower solar pumps with ultra-low pressure drip irrigation in the state of Gujarat in India. They used the pumps to raise water from open wells to small tanks located about 5 feet above the field, at which point, gravity took over to irrigate an acre of vegetables.

“After we set up one system, the Indians set up nine more,” Rowell said. “They worked extremely well.”

Though the solar pumps are often too expensive for the average farmer in the developing world, Rowell is optimistic this will change, as prices drop and less



Brent Rowell’s replica of John Ericsson’s sun motor



expensive pumps are being developed and tested. Farmers in Kentucky with no easily accessible electricity or water to their fields or those who just want to reduce their water bill could find this system useful.

Air and Earth

The drone bucked in the stiff March crosswind, but on the ground, Joshua Jackson fought it back to the right heading over an alfalfa field on Spindletop Farm. It was a test flight for one of two different drone projects Jackson, assistant extension professor in BAE, and Dvorak are working on, studies that could ultimately make farming more efficient for alfalfa growers and livestock producers.

Alfalfa's stem height is a fairly good indicator of nutrient value. As the plant gets taller, it puts more lignin into the stem, decreasing its digestibility. Height also indicates yield. Flying a drone loaded with a camera for hyperspectral imaging, which collects information from the entire electromagnetic spectrum, and lidar, which uses a laser to measure distance, the researchers are hoping to successfully map yield and nutritive value of a growing crop.

"We can tell both of those from the air with a UAV (unmanned aerial vehicle), so we're looking at whether we can take this information and use a UAV to map it," Dvorak explained.

During the first season of the project, the team marked off small plots in cubic meters and flew the drone, with a standard camera that time, over the plots. Students harvested the plots by hand and then went back to the lab where they measured the quantity and quality of the alfalfa. Comparing that information to the data from the UAV, they could see what matched and could figure out the best way to process the data.

"We have some pretty good descriptors now, so this year we're going to start scanning whole fields with some small plots in them as a check to see if

Joshua Jackson and graduate student Shawn O'Neal take the drone for a late-winter test run at Spindletop Farm.

we've measured it right when we create a field-wise estimate," Dvorak said.

Mapping a field by air like this should give farmers a tool to monitor the crop in almost real time in order to make better harvest timing decisions.

"We have this information, we can see what areas of the field may need more attention, more fertilizer or pest control. So really, it's all about making management decisions," said Jackson, who farms in Mercer County when he isn't busy with his UK work.

The second drone project concerns livestock management, which Jackson said "is very near and dear to my heart, because I have Angus cattle. At some point I really wanted an easier and quicker way to cover a lot of ground."

Jackson is hoping that by developing a facial recognition imaging system for cattle, he can help producers stay better abreast on how their herds are doing.

The base goal is to be able to fly the field and count the animals to see if any of them are off by themselves. The next goal is to find out why they might be separate from the others. This will involve being able to identify the animal through facial recognition. By using multiple drones, Jackson gathers an array of different images to see if they can distinguish between facial and body characteristics. They have been honing the process by sending drones around a bovine replica at different heights and different radii.

Keeping the animals stress-free is important. "We want this to be a tool to monitor them, not to stress them," Jackson said.

The work the team has done so far with actual dairy cows—measuring their physiological and behavioral changes with heartrate monitors and GPS—shows that the animals don't seem to be bothered by the UAVs.

"Right now there are still a lot of FAA restrictions for completely autonomous flight, but we want it to be something where you can sit at your computer and instruct it to fly and tell you what the problems are," Jackson said. "It will take a number of years to get there, and I'm hoping we'll get as close as we can with this cattle project, but it's something I want for beef producers. I want this technology."



Brent Rowell advised the installation of rainwater catchment and solar + gravity-fed drip irrigation systems for high tunnels at GreenHouse 17 in Lexington.

Autonomous Tractors

The small, electric-powered tractor Dvorak built and tested at the organic unit showed that something like this could conceivably work for the small- to mid-size grower. Being driverless, however, does not mean being farmerless, Dvorak emphasized.

"If you're making decisions on what you're planting, when you're planting it, how you are going to manage it, the cab of a tractor is a really nice spot to be to make those decisions," he said.

Rather than ousting the farmer from the cab, Dvorak sees a "mother-ship" arrangement with the farmer driving the main tractor and autonomous tractors spanning the field copying the main vehicle's every move. To Dvorak, the autonomy question becomes, how does it interface with the producer?

"You're not going to get rid of the producer, because he knows what works best on that farm. But if we can make autonomous vehicles support his decision-making, that's a whole other ballgame."

The Long View

Ag in the 21st century has to have a long view. Agricultural methods must change in order to feed 9 billion people in the near future, while making sure to sustain the soil and find alternative fuels to ensure food production in the distant future.

What does 21st century agriculture look like to these researchers?

"We're not trying to get rid of the farmer. Why would we want to?" Dvorak said. "But if we can support them and give them the tools to do it even better, that's our goal."

Jackson hopes they can make producers' lives a lot easier.

"I see our work as complementary," he said. "It may be idealistic, but I think that's the way we should design it to work." ■



*“And the Spring arose on the garden fair,
Like the Spirit of Love felt everywhere;
And each flower and herb on Earth’s dark breast
Rose from the dreams of its wintry rest.”*

—Percy Bysshe Shelley



Mountain Women Mean Business

By Aimee Nielson
Photography by Matt Barton



“When you grow up here, you think you’re successful if you get out,” Kristin Smith said of Eastern Kentucky. Growing up on a Whitley County farm, Smith believed that. After she graduated from college, she got about as far away from Eastern Kentucky as she could—as a missionary to China. After her two-year commitment was complete, she decided to stay a while longer translating Chinese restaurant menus to English. Then the call came.



Kristin Smith "means business" in Corbin with her thriving restaurant, The Wrigley Taproom.

Her grandfather back in Kentucky was ill, and she needed to return to help keep the farm afloat.

"I never thought I would go back home," she said. "All my friends were like 'Of all people, we never thought you would come back.' I decided to give it five years."

That was 11 years ago, and now Smith has turned her passion for the farm into a thriving downtown business in Corbin called The Wrigley Taproom, where she serves up tasty recipes using locally raised beef, pork, poultry, and produce in a uniquely renovated space.

"I always had a hard time selling the things we produced on the farm for a good price," she said. "So I started cooking it, adding value, and selling at the local farmers market. That turned into sort of a food truck, and it just took off."

Mountain Women Network

Smith traveled to Harlan last fall to join other innovative women, fierce fire-starters in small town revitalization projects throughout Eastern Kentucky, at the Mountain Women Mean Business Conference. The attendees shared challenges, solutions, and tales about how they are fueling growth and excitement with their out-of-the-box ideas and tenacious spirits in the Promise Zone, a cluster of eight counties in Southeastern Kentucky where local leaders partner with the federal government to improve communities.

The conference was led by the Community and Economic Development Initiative of Kentucky, part of the UK College of Agriculture, Food and Environment.

"We were trying to capture a lot of the wisdom that is out there already in the field," said Sky Marietta, CEDIK staff member and UK arts extension specialist. "If you go to our main streets in Eastern Kentucky, and you look at the businesses that are popping up over and over again, you will find that women are behind them."

Smith said the conference was helpful to her in many ways, but she was especially impressed at how much other women entrepreneurs were willing to share.

"One thing women are generally very good at is being vulnerable," Smith explained. "We aren't afraid to share the good and the bad and to learn from each other. The time is now for us to hold each other up, to support each other."

Mountain Women Have Purpose

One of the featured panelists at the conference was Mae Suramek. Her parents are Thai who settled in Chicago. While growing up in Chicago means she's not a native Kentuckian, Suramek got here as fast as she could. Twenty-five years ago, she came to the Bluegrass state to attend Berea College. After graduating, she continued to work at the college as the alumni director and then worked as the executive director of a rape crisis center.

"I spent my days throwing (fundraising) events and asking people for money," she said. "I just felt like something was off. I was very exhausted and felt like I wasn't doing as much good as I wanted to."

During a reunion, Suramek hosted about 30 people

in her home and prepared a favorite meal from her childhood—her mother’s curry noodle bowl. She said every bowl was wiped clean, and the food seemed to really bring people together.

“After that, my husband Adam and I quit our jobs. Neither of us had ever worked in the restaurant business before, but we had a vision to create epic noodle bowls and change the world,” she laughed.

Thus began their venture of buying and renovating an old theater building and opening Noodle Nirvana in Berea. They brought Mae’s family recipes and began to source as many local ingredients as possible.

Each morning, Suramek makes her way to the restaurant at 4 a.m. to create the flavorful broths essential to their menu. She kept thinking about how the space was wasted and decided to explore a way to add value to the building. Once when visiting New York City, Suramek came across a shop churning out tiny donuts to long lines of customers. With no donut shop in Berea, it was a natural fit. So now the business is Hole and Corner Donuts in the morning and Noodle Nirvana in the afternoon. But that’s still not the whole story.

The first Tuesday of each month, they donate part of their proceeds to a nonprofit. They stick with one nonprofit each year so they can really make a difference.

“We also start all our employees at \$10 an hour, so we can donate 100 percent of tips to our nonprofit,” she said. “At the core of what we do, we want to make sure our patrons know we belong to each other. We even put that phrase on the wall. It’s a daily reminder of why we quit our jobs and started a business with one of the highest failure rates and the lowest profit margins in the world.”

When she started, Suramek thought she might sell 30 noodle bowls a day. Currently they churn out between 700 and 1,000 bowls a week, far surpassing her initial expectations.

“We feel so fortunate that we have great people who want to be a part of something bigger than the daily

grind,” she smiled. “Because, it’s not easy to work in food service.”

“We are trying to lead the way and teach women that they can do this, from learning to use technology and social media to understanding taxes and business practices.”

Mountain Women Lead

Marietta is taking her own advice to heart and leading the way in Corbin. She and her husband Geoff purchased and renovated an old department store building on Main Street. She operates a gift shop and bar on the first floor called Moonbow, paying homage to the phenomenon at local Cumberland Falls. Customers can purchase arts, crafts, and other items from local artisans and partners.



Mae Suramek took an unprecedented leap into running a restaurant that also supports local nonprofit organizations.



CEDIK's Sky Marietta at her business, Moonbow, where she is showing women that starting and running their own enterprise is possible.

The rest of the building serves as event and meeting space and a business incubator-style office space for local entrepreneurs.

Already thinking of the future, the Mariettas purchased a building in downtown Harlan and plan to begin renovating it soon to try and be part of revitalizing another small town business district.

"We are really working on a duplicable business model for other areas of Eastern Kentucky," she said. "We are trying to lead the way and teach women that they can do this, from learning to use technology and social media to understanding taxes and business practices."

Women entrepreneurs in Harlan are following suit. Establishments like Sassy Trash, Roundabout Records, Harlan Yoga and Taco Holler are all woman-owned and paving the way for others to join the movement.

"Entrepreneurism is not just for the guys," said Sandi Curd, Promise Zone coordinator and Whitley County farmer. "Our Promise Zone women have seized the opportunity, gritted their teeth, and then taken the risk. The revitalization and diversification of our southeastern Kentucky economy takes everyone upping their game, and I am so proud of the mountain women who have seen fit to do so."

Mountain Women Come Home

Smith hopes that the idea of having to leave to be successful will go by the wayside. She is glad for the time she spent away from home, because it gave her something that she can give back to Eastern Kentucky.

"Success called me back home," she said.

There's a long table in The Wrigley, made from wood Smith brought from the farm. It's 24-feet long. They made it that way to encourage patrons to sit together.

"The most rewarding thing for me is watching community happen right here," she said. "It's actually happening. I see people sitting together, talking, finding solutions to local challenges, and just enjoying each other."

There is plenty of room for other women at the entrepreneurial table. Smith said they just need to be willing to take a risk, test market their products and ideas, ask for help, and work together.

"Go for it," she encouraged. "Do what you want to do with your life, with whatever skill you might have. But don't be afraid to learn new ones." ■

Center for Crop Diversification: A Regional Specialty Crop Resource

By Jeff Franklin

Photography by Stephen Patton

Agriculture and horticulture extension agents across Kentucky often receive phone calls from growers asking them what they should plant. It's a broad question that depends on a lot of factors, but in the end, the agents often point the growers to the College of Agriculture, Food and Environment's Center for Crop Diversification website. The center offers web-based marketing and production resources, price reports, podcasts, webinars, and videos. There are also printed resources on crop diversification topics.

"That information is needed, because people don't want to grow things just for fun when it is their livelihood," said Kelly Jackson, Christian County horticulture extension agent.

While there are a handful of resources scattered across the country, the center has emerged as the gold standard in the region as a source for vital information such as budget sheets and crop viability data.



The Team

The Center for Crop Diversification got its start from a U.S. Department of Agriculture special research grant in 2000. Though its original goal was to help Kentucky farmers diversify from tobacco, over time the center took on a specialty crop focus, including fruits and vegetables, tree nuts, floriculture, and nursery crops. The UK departments of Horticulture and Agricultural Economics co-manage the center today, partnering with regional and national organizations.

Christy Cassidy, a horticulture extension specialist who coordinates publication development and updates, said the favorite part of her job is being able to respond to someone who calls or emails with a question by either providing them with an answer or putting them in touch with an expert who can solve their problem. But that doesn't happen in a vacuum.

"It is a group effort with a really big team that is spread all across the state," Cassidy said. "We always try to encourage people to contact their extension agent, because we can't be extremely familiar with what is going on in every county in this state, and the agents are."

Cassidy is part of a talented team of experts. Joshua Knight, a senior extension associate, is Cassidy's colleague in horticulture. Knight's position with the CCD is funded by the Kentucky Horticulture Council through the Kentucky Agricultural Development Fund. His duties include developing resources and conducting agent trainings. Matt Ernst, a former UK extension associate in ag economics, still works as a resource on a number of projects. Agricultural economists Brett Wolff, an extension specialist, and Professor Tim Woods make up the rest of the center's team. One of Wolff's duties is to aggregate Farmers Market Price Reports for Kentucky, as well as managing the CCD's website and Facebook page. But Wolff's job isn't all about high tech;

it's the high touch, too, according to Myrissa Christy, project director for the Kentucky Center for Agriculture and Rural Development. "Brett did a workshop on helping small-scale market farmers plan their production based

on what they want their sales to be," Christy said. "Brett was willing to drive to Harlan on a Tuesday night in the middle of winter and meet with a group of farmers."

Continued demand for workshops like this one led Brett and other members to secure Specialty Block Grant funding to create a statewide basic marketing curriculum titled Marketing for All. The program covers a wide variety of marketing topics including visual merchandising, social media tactics, and setting retail prices.

Woods specializes in agribusiness management and marketing with special emphasis on horticulture, food business development, consumer and direct markets, and farm entrepreneurship. He said specialty crops could contain a lot of hidden costs that growers need be aware of up front.

"Because a lot of specialty crops are perishable, you do have to pay a lot of attention to the harvesting, cooling, distribution, and marketing," Woods said. "And a lot of those crops don't sell themselves; marketing is an important component to being successful."

The Price is Right

The center began price reporting for farmers markets in 2004, and those reports are still archived on the CCD website. Also on the CCD website are farmers market reports for Illinois, Indiana, Tennessee, and West Virginia. Produce auction reports for Kentucky, Illinois, and Ohio are also posted. Having those reports from Kentucky's border states creates a lot of regional traffic to the CCD website and includes states not contiguous to Kentucky. Thirty percent of the traffic to the CCD website is seeking information on price reports. Wolff says price reporting information is a valuable tool for growers.

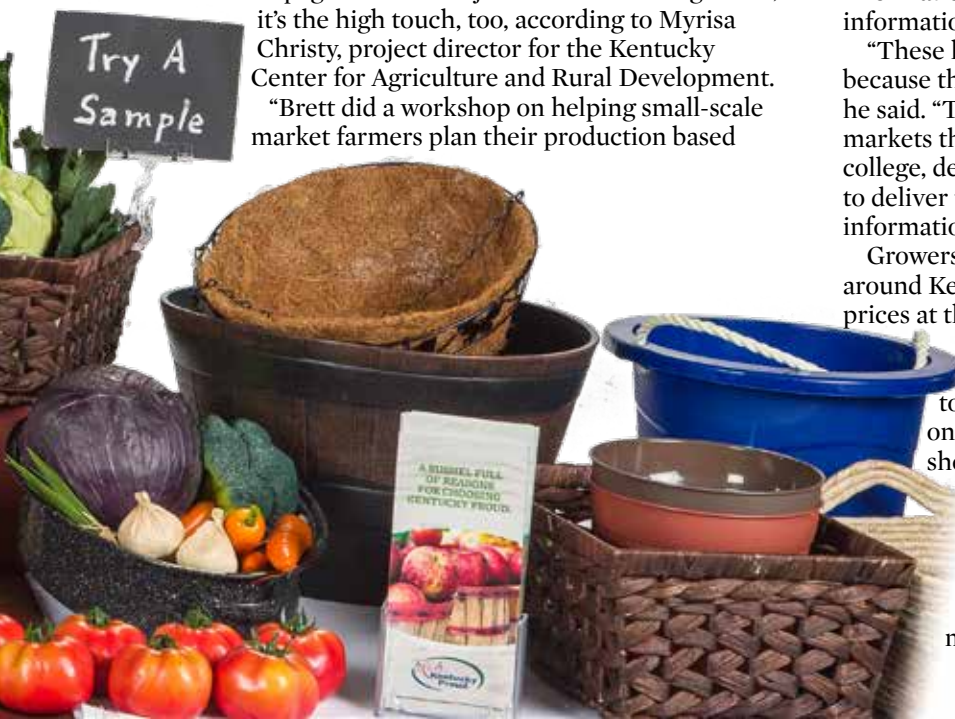
"These kinds of price data can be challenging to collect, because the markets are so variable and decentralized," he said. "Through an incredible team of reporters at markets throughout the state and the support of our college, departments, and extramural funders, we are able to deliver this much-needed, but difficult to find, market information."

Growers who sell produce at local farmers markets around Kentucky depend on the price reports for setting prices at their markets. Donna Jones is the market coordinator for the Farmers Market on the Square in Columbia. She closely watches to see what prices other markets are putting on their produce and lets vendors know if they should change their prices.

"We did that with green onions a couple of years ago. We were selling ours at a dollar a bunch, and a lot of other markets were selling them for two dollars," Jones said.

"So, we did too and had no problems at all and made twice as much money."

Brett Wolff leads workshops to help small-scale farmers plan their production based on sales goals.





Larry and Holly Laytart, S & L Farms, Cynthiana

Holly Laytart is the secretary/treasurer for the Harrison County Farmers Market in Cynthiana. She and her husband, Larry, grow “everything from A to Z,” on their S & L Farms. The S stands for Solomon, Holly’s maiden name, the L for Laytart.

“It should stand for luck and stupidity,” Holly joked. “You have to be a little bit stupid and a lot lucky to do what we do.”

The Laytarts are one of the largest vegetable producers in Harrison County, running their own Community Supported Agriculture program in addition to the farmers market and direct wholesaling to the hospital and restaurants in Cynthiana. How the Laytarts became such large vegetable growers has deep roots. Holly and Larry had a little family-friendly competition

a few years ago after they bought their farm. Larry, who grew tobacco all his life, said they had to decide if they were going to raise vegetables or tobacco. They pitted an acre of tobacco against an acre of vegetables. The one with the most profit at the end of the year was the winner.

“That was the last year we had tobacco on the farm,” said Holly. “It was no contest. There was no room for argument, or discussion.”

Laytart says she keeps the CCD’s website bookmarked on her cell phone, so she can check the price reports every week and share them with vendors at the Harrison market.

“We tell our members that we are not going to tell you the price to sell your produce,” Laytart said. “But with the information on the CCD website, they can see what they could get and adjust to our area and market.”

Up-to-Date Decision Tools

The CCD has a wealth of resources to assist growers, including 200 crop and marketing profiles, fact sheets, food safety resources, crop budgets, videos, webinars, and a monthly newsletter. Crop enterprise budgets, which are becoming rare these days because of funding challenges, can help growers evaluate crops and develop business plans. The need for small-scale budgets led the CCD to develop a second set of vegetable and melon budgets based on a 100-foot row or a tenth of an acre to better serve small growers. Crop profiles can help growers narrow the list of crops they want to grow, and marketing profiles can help them decide which marketing channels might work best for them. Much of this resource development

is made possible by funding secured through the Kentucky Specialty Crop Block Grant Program.

Crop diversification isn't specific to Kentucky. It's the focus of SERA45, a Southern Extension and Research Activity project. A group of research and extension faculty at nine universities in eight states, the project addresses the need for crop diversification across the country. The states participating are Utah, Illinois, Indiana, Iowa, Kentucky, Ohio, Tennessee, and West Virginia. SERA45 conducts assessments of resources and needs, focusing on research, extension, and marketing related to crop diversification.

As surrounding states have made funding cuts in some areas, the



CCD has become a specialty crop resource for the entire region. As a result, Cassidy and Wolff are in great demand, traveling to speak at meetings, making presentations, or just representing the center with their display at conferences and field days, both in and out of state. They talk about their resources, pass out information, and make sure people know how to find their website, <http://www.uky.edu/ccd/>.

The variety of crops, producers' diverse experience levels, and ongoing budgetary uncertainty poses real challenges for the Center for Crop Diversification team. They are responding by offering innovative on-line and in-person resources, creating stronger regional partnerships, and always keeping a focus on the needs of the producers in the state. ■



Alvin Simmons: Road to Success

The first University of Kentucky alumnus to serve as president of the world's largest entomological organization, Alvin Simmons's path to his successful career started with a bus ride to the University of Kentucky.

It was 1980, and Simmons had graduated the week before with a bachelor's of science degree in biology from East Carolina University. At UK, he was going to talk to Professor Bobby Pass about becoming a graduate student in the Department of Entomology. He had only ventured out of his home state a few times and, as a result, decided to take a bus so he could see the countryside.

The fifth of nine children, Simmons was raised on a small farm in New Bern, North Carolina. On the farm, he developed his love for science, particularly plants and insects.

"I always encountered all types of insects on the farm," he said. "I started recognizing that certain ones tended to hang out in certain environments. I was particularly fascinated with the insects that would come out at nighttime and be drawn to the lights."

During his visit, Simmons saw the laboratory space Pass shared with Professor Ken Yeargan and toured two of the college's research farms.

"During my visit, I decided that UK was where I wanted to go," Simmons said. "I liked the environment of Dr. Pass and Dr. Yeargan's lab and felt like I was getting two mentors for the price of one."

Yeargan and the late Pass served as Simmons's advisors for his master's project. Yeargan, now professor emeritus, fondly remembers Pass asking him if he wanted to be Simmons co-advisor and then reading his letter of recommendation.

"In the letter, his undergraduate advisor recommended Alvin because of his work ethic. 'He works harder than anyone,' he wrote. He was right. Alvin had an incredible work ethic," Yeargan said.

Pass and Yeargan studied alfalfa pests. For his graduate work, Simmons studied the biology and ecology of the potato leafhopper in alfalfa.

"I felt like it was a way of helping growers who were like my parents," Simmons said. "Starting the project from scratch was priceless in terms of education and development for me. I gained the ability to identify and solve problems."

In 1983, Simmons earned his master's degree and began pursuing his doctorate. Yeargan again served as his advisor. This time, Simmons would study the green



In the early 1980s, Alvin Simmons was a graduate student in the UK Department of Entomology.

stink bug and the green cloverworm, two pests of soybeans. Simmons found that combined damage to the plant from the two insects was independent of each other and not synergistic. This important finding would earn him his doctorate in 1987.

"Alvin made more progress from start to finish during his time at UK than any other student I mentored," Yeargan said. "He was enthusiastic about every opportunity to learn."

While still a UK student, Simmons attended a seminar by UK entomology alum Charlie Rogers, who was working for the U.S. Department of Agriculture in Tifton, Georgia. During Rogers's seminar, Simmons learned about a

"Starting the project from scratch was priceless in terms of education and development for me. I gained the ability to identify and solve problems."



Today, Alvin Simmons is in line to lead the world's largest entomological organization.

post-doctoral position at the lab evaluating potential natural enemies of the fall armyworm. Simmons inquired and received the fellowship in 1987.

In three years, Simmons accepted a permanent position at the Tifton lab and within another two years, he was offered a newly created position as a USDA research entomologist in Charleston, South Carolina. Since then, he has led the program, which focuses on whitefly management in vegetables. He has authored or co-authored 106 refereed journal articles, co-released five breeding lines, and provided more than 300 technical reports that resulted in more than 200 pesticide labels. Currently, he is also serving as the acting research director and location coordinator for the entire Charleston USDA facility.

"I was quite introverted when I came to UK, but my mentors, other faculty, and students were like a family to me while I was there.

Public speaking and interacting within a group was encouraged at UK. That environment enhanced my interactions with people," Simmons said. "It was priceless in terms of where I ended up in my career. It built up my confidence."

Since November, Simmons has served as vice president of the Entomological Society of America, the world's largest entomological organization. This November, he will begin his yearlong term as president of the prestigious body. In doing so, he will join the ranks of several UK professors who have presided over this society.

Simmons also serves as president of the Entomological Foundation and president of the South Carolina Entomological Society. He was nominated by the society to co-lead a team that brought the International Congress of Entomology to the United States in 2016, co-chairing the largest gathering of entomologists to date. He has been

the recipient of numerous awards throughout his career including being named a Fellow of the Royal Entomological Society and receiving the ESA Southeastern Branch's Award for Excellence in Integrated Pest Management, ESA Recognition Award in Entomology for his outstanding contributions to agriculture, and the American Society of Horticultural Science's Team Award for Best Research Publication in Journal in 2017.

Simmons regularly allows students to earn positions in his lab. As an adjunct faculty member at Clemson University and the College of Charleston, Simmons hopes to impact his students in the same positive way that his UK professors encouraged him.

"My professors at UK encouraged us not to miss opportunities outside of the classroom and the research lab and to become well-rounded people as well as entomologists," he said.

— Katie Pratt

Certification Brings Opportunities

There is a hot demand for white oak from Kentucky's forests, thanks to a flush of new distilleries and wineries in the state and their need for barrels. That's one of the reasons Jeff Stringer, chair of the Department of Forestry and Natural Resources, has been spreading the mantra of good management and encouraging woodland owners to use methods for long-term timber viability. There is now another reason to follow sustainable practices. Markets are emerging that pay a premium price for certified products.

Irish Distillers, parent company of Jameson Whiskey, is a prime example of the expanding market for certified wood products. The company buys many used barrels from Kentucky bourbon distilleries, but now it is seeking fresh, unused casks through a certified supply chain for a new label of estate whiskey. That type of supply chain hasn't existed until the Center for Forest and Wood Certification, directed by Stringer and housed in UK Forestry extension, helped to make it happen.

Chain-of-Custody certification verifies both the woodland origin of the wood and wood products and the fact that they come from well-managed woodlands following the specifications of either the Forest Stewardship Council or the American Tree Farm system. For work with Irish Distillers, the center uses the Program for the Endorsement of Forest Certification, which is an internationally recognized certification system and allows the use of American Tree Farm wood.

Bobby Ammerman, F&NR extension associate, is in charge of the center's supply chain development. Ammerman has worked to ensure that certified logs are moved into a supply chain where every point of the chain is also certified. The Center for Forest and Wood Certification



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certifies landowners, forests, loggers, stave mills, and cooperages for Irish Distillers' new label.

"We're the only entity like this in the U.S. or in the world for that matter," Stringer said. "Nobody else is doing what we're doing, providing both dual certification for forest owners, chain of custody certification for forest industries, and helping develop certified supply chains with landowners, foresters, loggers, and the forest industry."

In November, 2018, the first cut of stave logs in the supply chain was made on a certified property in Boyle County. Under Ammerman's guidance, the first barrel in the queue should roll off the line this summer.

"There is a price premium that goes along with being certified, which can effectively benefit everyone in that supply chain," Stringer explained. "That's why we're doing this, to help our industry, help our landowners, our loggers, our stave mills, and our cooperages."

For now Irish Distillers' chain-of-custody is contained within Kentucky, but Stringer said if Irish Distillers should ask for help outside of Kentucky, the center does that as well.

"Supply chains don't end at the state line. That's why we venture out, because these supply chains sometimes go three, four, five states away," Stringer said. "Wood moves around."

Certification on this scope benefits the state in two ways. It encourages good forest management, providing an important resource for generations to come. Certification also means, at each link of the supply chain, there are more possible clients, allowing companies to glean a larger market share.

"The opportunities are there," Stringer said.

To learn about the Center for Wood and Forest Certification, visit online, <http://www.forestcertificatecenter.org/>.

—Carol Lea Spence



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Roundup

Saturday, September 14, 2019

Join the University of Kentucky College of Agriculture, Food and Environment Alumni Association for its 46th annual Roundup! Enjoy live music, yard games, a pep rally led by the UK cheerleaders and pep band, and fellowship with alums – all followed by Kentucky taking on the Florida Gators at Kroger Field.

Visit alumni.ca.uky.edu/roundup for more information.



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Change Service Requested



Landscape Architecture senior Justin Bambach presents his virtual reality work to Associate Provost Greg Heileman. Bambach used VR technology to re-imagine the UK tailgating experience.