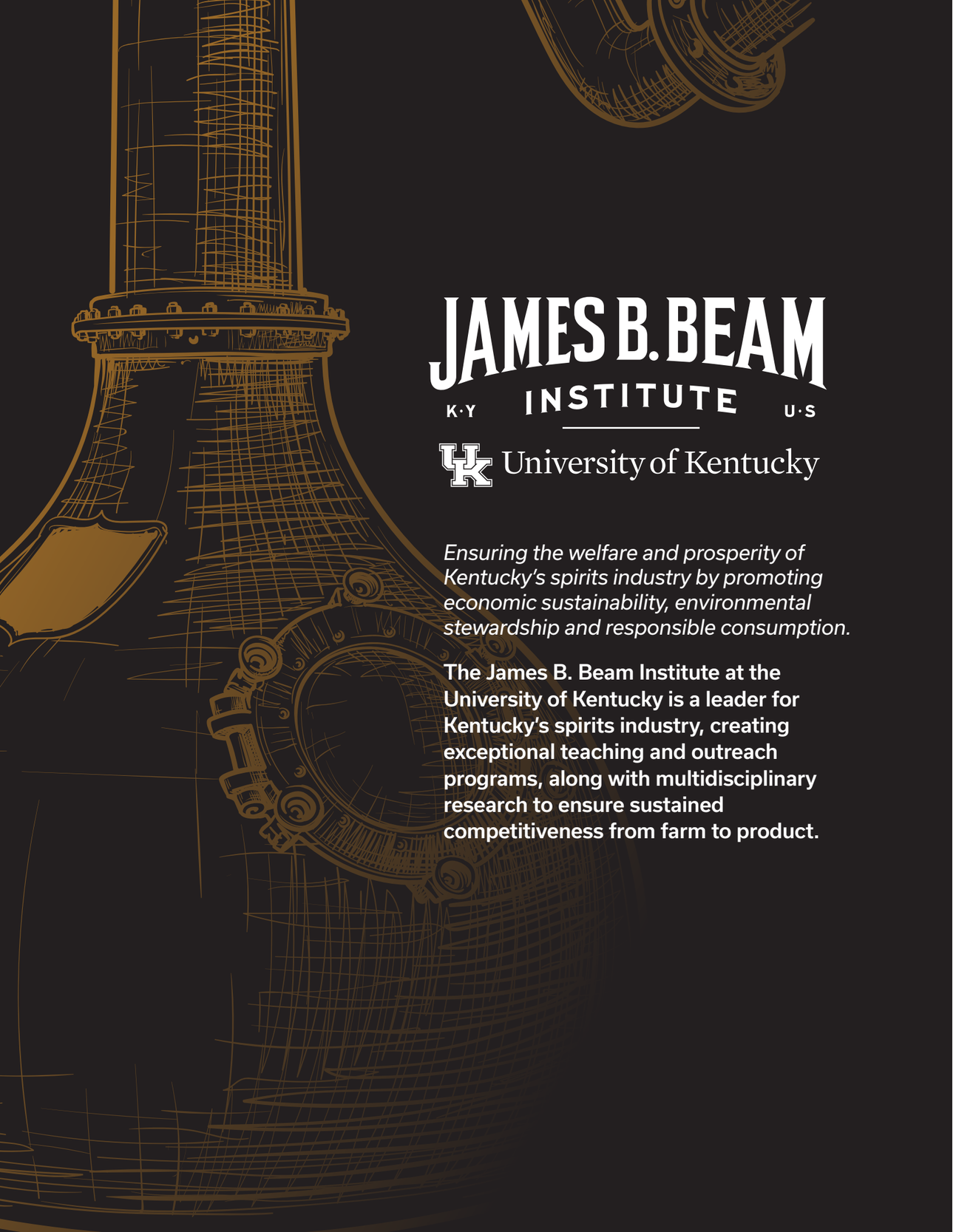
James B. Beam Institute for Kentucky Spirits

ANNUAL REPORT 2023

JAMES B. BEAM INSTITUTE K·Y U·S

University of Kentucky



JAMES B. BEAM INSTITUTE
K·Y U·S

University of Kentucky

Ensuring the welfare and prosperity of Kentucky's spirits industry by promoting economic sustainability, environmental stewardship and responsible consumption.

The James B. Beam Institute at the University of Kentucky is a leader for Kentucky's spirits industry, creating exceptional teaching and outreach programs, along with multidisciplinary research to ensure sustained competitiveness from farm to product.

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DIRECTOR'S WELCOME

The latest chapter in the University of Kentucky's James B. Beam Institute for Kentucky Spirits is an exciting one. With our official license to distill, DSP-KY-20141, in place, the James B. Beam Institute for Kentucky Spirits is now open. The combination of a "smart" classroom, a teaching laboratory and the largest teaching distillery in the world makes for an incredible student experience. The James B. Beam Institute sits on the 918 acres of the University of Kentucky campus, which is home to more than 30,000 students and 2,300 full-time faculty. Our campus is one of eight universities in the United States that has colleges of agriculture, engineering, medicine, and pharmacy on a single campus, and the only university in the country to bring them all together towards groundbreaking discoveries and unique interdisciplinary collaboration for the American spirits industry.

The James B. Beam Institute for Kentucky Spirits is leading the global advancement of the American whiskey industry through workforce education, scientific discovery, environmental sustainability, community and social responsibility. I want to mention and thank some key people who have made all this possible.

The core team of the James B. Beam Institute consists of:

- Brad Berron, Ph.D., Chemical Engineering
- Ilka Balk, M.S., Political Science
- Glenna Joyce, M.S., Food Science
- Kevin Baldridge, Ph.D., Chemical Engineering
- Czarena Crofcheck, Ph.D., Biosystems and Agricultural Engineering
- Seth DeBolt, Ph.D., Wine Science
- Lisa Banner, Ed.D., PMP, University Relations Director

The larger engine behind the Institute and its capability are the 65 faculty fellows that teach, perform research and work to advance the mission of the Institute. This year, we would like to highlight three Fellows of the year for the 2023/2024 season:

Tiffany Messer (Ph.D. Biosystems and Agricultural Engineering) for her service to the distilling community of Kentucky to advance decentralized water quality management. Her partnership with Four Roses is highlighted in her bio.

Steve Schafrik (Ph.D. Mining Engineering) for his service to the distilling community of Kentucky with a focus on corrosion and maturation houses.

Chad Lee (Ph.D. Agronomy) for his work in service of the Kentucky distilling industry to sustain our high-quality grain economy. Collectively, he is a Squire in the Order of the Writ and produces the annual sacred acre along with his efforts to enable rye production in the state.

The sense of service displayed by all our faculty fellows is the heartbeat of the James B. Beam Institute for Kentucky Spirits. A full list of fellows is available in this report.

Dr. Seth DeBolt
Director, James B. Beam Institute for Kentucky Spirits
Professor, Martin-Gatton College of Agriculture, Food and Environment

BEAM INSTITUTE OPENS DISTILLERY AND MATURATION FACILITY ON UNIVERSITY OF KENTUCKY CAMPUS

By Aimee Nielson

The University of Kentucky's James B. Beam Institute for Kentucky Spirits officially opened its doors, elevating the institute's impact on research, workforce development, education and outreach. Since 2019, the Beam Institute has served as the industry's research and development vehicle, pursuing its mission to ensure the welfare and prosperity of the spirits industry in Kentucky and beyond. Through teaching, research and outreach, the institute promotes economic sustainability, environmental stewardship and responsible consumption.

"Today's ceremony reinforces our commitment to investing in our students and Kentucky's future," said UK President Eli Capilouto at the ribbon cutting on Aug. 7, 2023. "It also reinforces the importance of our essential partnerships that will help us advance Kentucky. This new facility will help leverage trans-disciplinary work and show students that the distilling industry needs employees from a vast array of disciplines and majors."

The new UK campus facilities include a research distillery building, with a 30-foot column still as the centerpiece, and the Independent Stave Company – Boswell Family Barrel Warehouse. The maturation facility allows the Beam Institute to experiment with barrel aging spirits produced in its research distillery.

"This is the largest teaching distillery in the United States and in the world," said Seth DeBolt, Beam Institute director and UK Martin-Gatton College of Agriculture, Food and Environment professor. "It will allow us to train the next generation of distillers and researchers, and to conduct cutting-edge research on the science of spirits production."

As the first major gift partner to the Beam Institute, global premium spirits leader Suntory Global Spirits (formerly known as Beam Suntory) made a long-lasting commitment to the Institute's vision of excellent hands-on distillation. The company, known for its iconic brand portfolio that includes Jim Beam, has continued to be a broad-interest partner, adding workforce education to its list of priorities through a one-of-a-kind apprenticeship. The Whiskey Apprentice Program delivers a robust curriculum that includes safety, bourbon grains, bourbon engineering, fermentation, public speaking, customer relations, sensory, maturation and distillery science.

"When Suntory Global Spirits first partnered with the University of Kentucky to create the James B. Beam Institute for Kentucky Spirits, we did so as an investment in the future of bourbon and the future of Kentucky's workforce," said Alex Alvarez, chief supply chain officer at Suntory Global Spirits. "The institute has firmly established itself as a forum for continuing education and research, as well as collaboration across the industry to tackle some of our toughest challenges together. We're proud to be an active partner in this work, pushing our industry toward a bright future."

THE LARGEST TEACHING DISTILLERY IN THE U.S. AND IN THE WORLD

30-FOOT COLUMN STILL

1-OF-A-KIND APPRENTICESHIP

EDUCATION

DISTILLATION, WINE & BREWING STUDIES CERTIFICATE

2023-24 STATISTICS

In order to train the next generation of distillers, brewers and vintners and to prepare graduates for any profession in the beverage sector, the University of Kentucky created a Distillation, Wine and Brewing Studies (DWBS) certificate. The certificate requires a minimum of 4 classes and is offered to anyone interested in furthering their education.

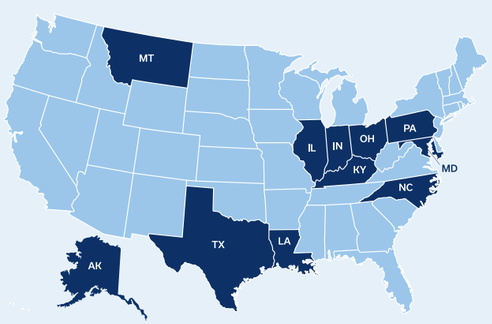
250 CERTIFICATES AWARDED SINCE 2015

GENDER DISTRIBUTION

52% **48%**

CERTIFICATE ENROLLMENT

Online Only	18
Non-Degree/ Certificate	27
2023-24 Graduates	62
Total Students Enrolled	164 (TOP ENROLLMENT TO DATE)



ENROLLMENT REACHING ACROSS **11 STATES**

UK FOOD BIOSCIENCES LAUNCHES DISTILLATION, FERMENTATION AND BEVERAGE TRACK

In Fall 2023, the Department of Animal and Food Science's Food Biosciences program launched three new areas of study to meet the needs of undergraduate students and the food industry job market. Areas of study include Research and Development, Food Business Management, and Distillation, Fermentation and Beverage Sciences. Each area allows students to specialize and take coursework that supports their interest while also fulfilling the main Food Biosciences major requirements.

> **1 OF 3 NEW AREAS OF STUDY**
>
> **INAUGURAL DISTILLATION TRACK ENROLLS 8 STUDENTS**

The distillation track requires students to study Distilling, Wine, and Brewing Science as well as Spirit Chemistry, both required courses for the DWBS certificate. Many of the DWBS certificate courses are offered as distillation track electives, including Introduction to Viticulture, Introduction to Enology (Wine Chemistry), Brewing Science and Technology, Bourbon Engineering, Beverage Tourism, Craft Writing and many more. Students can graduate with a Food Biosciences major and the DWBS certificate.

The inaugural distillation track enrolled eight UK Food Biosciences students. This track aims to support students wanting to pursue a career in the fermented beverage and distilling industry.

Learn more about the distillation track at **ca.uky.edu/foodbiosciences** or contact Beka Hott at **beka.hott@uky.edu**

SCHOLARSHIPS

THOMPSON SCHOLARSHIP

Dillon Wheatley and Chris Mattingly were recipients of this year's Hank and Kathy Thompson Scholarship. Each student received $2,500 for the 2023-2024 academic year.

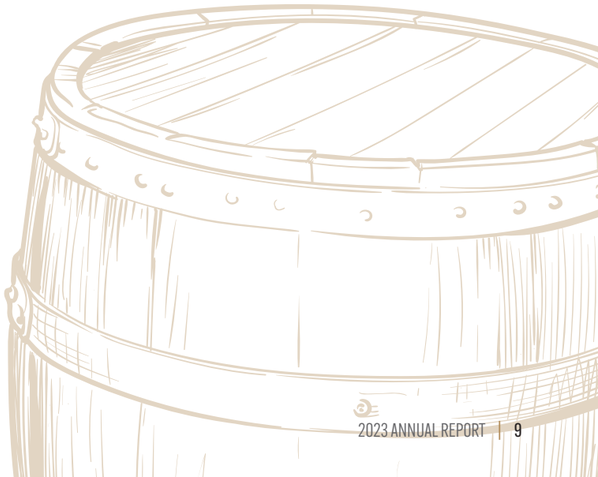
Dillon is a Nelson County High School graduate and is currently enrolled in the Distillation, Wine and Brewing Studies (DWBS) Certificate at the University of Kentucky. He is taking classes while working full time as a Distillery Team Leader at Log Still Distillery in Gethsemane, KY. He has worked in large-scale and small-scale distilleries and has been in the industry for 11 years. "It is an absolute honor to receive the Hank and Kathy Thompson Scholarship," Dillon said. "I take absolute pride in the science behind this amazing process. I am pursuing a certificate in Distillation, Wine and Brewing to help further my career in management, as well as mentor future distillers."

Chris is a Distillation Wine and Brewing Studies Certificate student originally from Louisville, KY. Chris works full time at Barrell Craft Spirits while pursuing the certificate at the University of Kentucky. He said that his work has given him a sense of belonging. "Three years later, the excitement has turned into a passion and fueled my desire to further my education. This in turn led me to apply to the DWBS program. People who have been influential in my decision to move forward and continue my career in the spirits industry are my immediate supervisors as well as members of the key leadership at Barrell. Their unwavering commitment and knowledge of the industry are major reasons why I love my job and want to further my education," Chris said. "My intention of getting my DWBS certificate is to help me grow within the spirits industry and expand my education and experience so that I can move up from being a bottling line employee to a more skilled position."

JAMES B. BEAM SCHOLARS ENDOWED FUND: BEAM SCHOLARS PROGRAM

Suntory Global Spirits continues to demonstrate its long-term commitment to the James B. Beam Institute for Kentucky Spirits and its dedication to having a positive impact on local communities where employees live and work. On November 4, 2023, Suntory Global Spirits gifted the Institute $200,000 to support one or more annual scholarships for students 21 or older who have been accepted into the Distillation, Wine, and Brewing Certificate program and have demonstrated unmet financial needs. The charitable gift was split to create an endowed and a non-endowed fund. The endowed fund has been used to establish the "James B. Beam Scholars Endowed Fund" to support future recipients and Beam Scholars. The non-endowed fund will be used to start the Beam Scholars Program and award scholarships for the 2024-25 academic year.

Along with providing tuition assistance, the Beam Scholars program will provide recipients with the opportunity to engage with Suntory Global Spirits leaders, relevant industry research, and broader industry initiatives aligned with the students' career aspirations. The investment to establish the scholarship fund was twofold: 1.) to solidify Suntory Global Spirits' long-term commitment of creating positive impacts in its local communities by giving back via scholarships and 2.) to support the active recruitment of students from all backgrounds, resulting in a more diverse, equitable and inclusive talent pipeline. The scholarship fund is one of many ways Suntory Global Spirits is actively contributing to the sustainability of the spirits industry.



RUM PRODUCTION STUDY PROGRAM TO ST. CROIX, USVI

by Aimee Nielson

The University of Kentucky James B. Beam Institute for Kentucky Spirits' students and faculty traveled to St. Croix in the U.S. Virgin Islands in the summer of 2023 for a five-day field trip. They brought some of their distillation, wine and brewing classes to life at the island's rum and vodka production facilities.

In preparation for the travel component of their rum distillation course, students studied comprehensive modules covering topics such as fermentation, raw materials, distillation and specific rum production. They also learned about sugarcane cultivation and trade with the help of study materials created by Drs. Devyn Benson and Vanessa Holden in UK's African-American and Africana Studies program.

Students spent nearly two days at Cruzan Rum, a rum producer distillery owned by Suntory Global Spirits. They learned about business planning, safety and what goes into creating an efficiently running supply chain while on an island. They also walked through each step of the rum-making process from molasses delivery to yeast seeding, fermentation and distillation.

Lexington environmental law attorney and UK alum Blaine Early is completing the DWB program through UK's Donovan Scholarship Program. The program allows anyone 65 years of age and older to take UK courses for free. He was one of eight students on the trip.

"I am interested in issues related to natural resource management, conservation and water," Early said. "Seeing how distilleries handle those issues is helpful in advising my clients."

At Cruzan Rum, the group learned about power generation and water conservation, both critical inputs due to the island's limited resources, extreme weather, power outages and water scarcity.

"At Cruzan, we are committed to building the next level of talent by developing a consistent passageway through Cruzan from institutions such as UK," said Ayanda Daniels, Cruzan Rum Distillery human resources manager.

The group also visited Mutiny Island Distillery, an innovative startup focusing on making vodka from locally grown breadfruit. Early observed that Caribbean distilleries handle fermentation and distillation in the same way as their United States' counterparts. However, water management is where the differences begin to show.

"Their wastewater handling and energy use are very important," he said. "They are limited by how much fresh water they have. The cost of energy there is about five times what we pay here. They are very committed and insightful professionals in the way they deal with resource limitations."

On the last day of the trip, the group toured Diageo's Captain Morgan distillery to explore the company's sustainability practices and how they maximize resources. The tour guides led the group through a sensory session to help them better understand quality standards.

Holly Shade, a senior studying food bioscience research and development, is also earning the distillation, wine and brewing studies' certificate.

"The St. Croix program was extremely valuable and educational for someone wanting to get into the Spirits Industry," she said.

> "THE MORE THAT WE EXTEND THE OPPORTUNITY TO ENRICH STUDENTS THROUGH LIVED EXPERIENCES, THE BETTER OUR STUDENTS WILL BE IN THE WORKFORCE AND IN LIFE.
>
> -SETH DEBOLT

APPRENTICESHIP PROGRAM

The James B. Beam Whiskey Apprenticeship Program is the first state-accredited apprenticeship for distillery workers in Kentucky. The apprenticeship is a collaboration between Suntory Global Spirits and the James B. Beam Institute for Kentucky Spirits, providing on-the-job training and coursework to Suntory Global Spirits apprentices. The program began in 2021 with 12 apprentices from the James B. Beam Distilling Co.'s (JBBDCo) Fred B. Noe (FBN) Craft Distillery. This innovative distillery was built to honor the family legacy at JBBDCo and serve as a place to experiment with innovative mash bills and craft the future of American Whiskey.

Since its inception, the program has seen two graduating classes, with the second cohort completing their 200 hours of coursework in November 2023. With the success of the apprenticeship, Suntory Global Spirits and the Beam Institute plan to expand the program beyond the FBN distillery to include apprentices from Maker's Mark, as well as various JBBDCo sites in the third-year cohort.

BEAM INSTITUTE CONTINUES DISTILLERY SAFETY TRAINING SERIES WITH CARERC

The Central Appalachian Education and Research Center (CARERC) continued its partnership with the Beam Institute and Suntory Global Spirits with three more training sessions in 2023.

The 2023 Distillery Safety Training Series started in April with Dr. Gary Brown (Eastern Kentucky University) discussing Defensive Chemical Management. Part two of the three-part series took place at the James B. Beam Distilling Co. Campus in Clermont, where Tony Cole, VP at SenezCo, covered the Key Components of a Successful Emergency Response Plan. The final event in the series took place in May, again hosted at JBBDCo's Clermont facility, for Eastern Kentucky University Professor Dr. Scotty Dunlap's presentation on OSH Management System Development and Assessment. The training series was well received by participants, and CARERC plans to offer additional training sessions in the years ahead.

The Central Appalachian Education and Research Center works with multiple colleges across the University of Kentucky, several universities across the state of Kentucky and numerous universities across the Midwest and Southeast United States to combine academic resources, fund grants for research, and provide resources for safety and health training.

RESEARCH

FACULTY PROFILES

CHAD LEE, PH.D.

PROFESSOR, DEPARTMENT OF PLANT AND SOIL SCIENCES

Dr. Chad Lee is an Extension Professor for Grain Crops at the University of Kentucky and Director of the new Grain and Forage Center of Excellence. The Grain and Forage Center of Excellence is a team of people focused on intensive agriculture and environmental quality. While the nucleus of this Center is at Princeton, KY, the people, research and extension efforts are across the Commonwealth. Through partnerships with citizens, commodity organizations, government-appointed boards, local industries and the greater agricultural community, the University of Kentucky is expanding its infrastructure to attract additional talented people to address questions relevant to the viability and sustainability of grain and forage management.

Dr. Lee leads an applied research program in corn, soybean and small grain agronomy. Projects largely focus on no-tillage systems where soil quality is as important as high yields. Dr. Lee provides leadership across Kentucky in Extension activities and teaches a grain and oilseed course to undergraduate and graduate students.

Dr. Lee works with the grains that make bourbon and the farmers who grow those grains. The vast majority of our producers are using regenerative/sustainable practices of no-tillage or minimum-tillage, crop rotation, and cover crops. Dr. Lee researches the best way to implement these practices.

TIFFANY L. MESSER, PH.D.

ASSOCIATE PROFESSOR, DEPARTMENT OF BIOSYSTEMS AND AGRICULTURAL ENGINEERING

Dr. Tiffany Messer is an associate professor in the Biosystems and Agricultural Engineering Department at the University of Kentucky. She holds degrees in Biosystems and Agricultural Engineering (University of Kentucky, B.S., 2008) and Biological and Agricultural Engineering (North Carolina State University, M.S. 2010, PhD, 2015). Additionally, Dr. Messer completed a postdoctoral appointment in the Nicholas School of the Environment at Duke University (2015-2016) to focus on ecological designs and analytical chemistry. Her research interests reside at the intersection of engineering, ecology, and agriculture with an emphasis on environmental biogeochemistry and water resources and access in human impacted ecosystems. She works specifically on identifying, tracing, and treating nutrients and emerging contaminants using ecological engineered designs (i.e., wetlands, streams, stormwater control measures). Along with being awarded over $4.9 million as a project investigator (PI) or co-PI in grant funding, she has been awarded the NSF CAREER Award (2021), USDA AFRI NIFA Postdoctoral fellowship (2016), and the EPA STAR (2012-2015) fellowship.

Over the past year she has been working with a Central Kentucky distillery to address challenges related to wastewater from a visitors' center that is disconnected from the local municipal wastewater network. Utilizing ecological-based designs, Dr. Messer and her team have developed a secondary wastewater treatment system that provides a cost-effective treatment for the varying wastewater effluent contaminant concentrations (e.g., E. coli, nutrients), and observed stillage could enhance water treatment in some cases. Further, the design provides a range of additional ecosystems services (e.g., education, habitat) for the distillery. Messer ground truths these designs using miniature treatment systems in a greenhouse on UK's North Farm by transporting wastewater effluent and stillage to the research site. The project involved 4 undergraduate senior design students, three undergraduate research assistants, and one Master's student.

STEVE SCHAFRIK, PH.D.

ASSOCIATE PROFESSOR, DEPARTMENT OF MINING ENGINEERING

Effort, care, and time go into every barrel that is stored for maturation, and all of that is wasted if the barrel fails. The industry has observed that when the maturation warehouses, both rick and pallet style, started to get larger and have concrete basements, the number of complete loss barrels has increased. Dr. Steven Schafrik has been investigating the cause of this phenomenon and solutions to it. He teaches Advanced Mine Ventilation in the Mining Engineering Department and is the primary author of commercially available mine fire simulation software. His work started out by performing surveys of air pressure within several different types of warehouses throughout the commonwealth. What he found is that within the barrel stacks there is extremely high resistance to airflow and highly stagnant air in most of the warehouse's volume. This stagnant air is not impacted by the conditions of the windows, and cross-building ventilation goes almost entirely in the outer walkway. He recently completed sheet laser testing that further backed up this conclusion.

The stagnant air is only part of what's going on in the warehouses. Because the air is stagnant, the opportunity for it to separate by density is much higher than moving air, which will concentrate heavier vapors lower in the warehouse. Unless the warehouse is conditioned, the inside environment is made up primarily of normal air, with water vapor and ethyl alcohol vapor having leaked out. Water vapor, or humid air, is less dense than normal air and will move vertically in a stagnant air column. Ethyl alcohol vapor is much more dense than normal air and will concentrate at lower levels in a stagnant air column. Ethyl alcohol and its descendants, like acetic acid, are known to be corrosive to steel and are known to be hydrophilic. Dr. Schafrik has found that the ethyl alcohol vapor is being deposited on the barrels, causing the hoops to corrode prematurely, primarily at lower elevations in the warehouses as a result of condensation. When the air temperature swings, the barrel temperature will take a while to catch up; for a while, the barrel is cold, and the air is warm, humid, and contains alcohol. It has been shown that failed hoops have the same chemical makeup as hoops exposed to accelerated corrosion by Materials Engineering students working under the supervision of Dean Buchheit, Dr. Balk, and Dr. Schafrik.

Dr. Schafrik is working toward the deployment of three different solutions to the problem. The first solution is to tolerate the corrosive agent by using a different material for the barrel hoops. A long-term Suntory Global Spirits-funded project investigating alternative materials is ongoing. As part of this work, the Materials Engineering student group is also investigating different coatings for current materials that will help to protect both the barrels and the warehouses from the corrosive environment. This work has involved developing an accelerated corrosion process and has revealed some coatings with promise, such as paraffin wax. Dr. Schafrik is also working with undergraduate students in Mechanical Engineering to develop a method for applying paraffin wax to barrel hoops.

The second solution is a typical solution used in most industries, such as mining: ventilation. The most efficient way to remove the heavier vapors is to create an area of low pressure in the basement and in the center of the stagnant air. This will give the heavier vapors a pathway to leave the house, meaning they aren't available to deposit on the barrels during condensation events. However, this is not always possible because of regulatory constraints or the house design. The next best ventilation solution is to create an area of high pressure in the stagnant air, using fresh air, that will push the heavier vapors toward exit paths from the building. In several tests that Dr. Schafrik has performed at existing warehouses or in permanent installations, it is necessary to have air blowing over the

barrels. More work needs to be done on both systems to optimize them for minimizing energy consumption. Dr. Schafrik has worked with StructuRight to monitor warehouse environments, and both have supervised Electrical Engineering students to create a Ventilation-on-Demand student project specifically for maturation warehouses.

There are downsides to the coatings. Some of the coatings are expensive; others may make the barrels harder to handle. There is the cost to ventilation, including maintenance and potential regulatory concerns. Dr. Schafrik is in the process of deploying maintenance-free filters that show promise in laboratory testing for passively capturing ethyl alcohol from the air. The filters work by using the concrete slabs as a heat sink, which is typically colder than the air temperature and encourages condensation to happen inside the filter. The condensate is dropped through a vapor barrier into an inorganic filter medium. The condensate fluid can be directed through a drip line to the outer edge of the building, where it can evaporate into the walkway air that is naturally flowing with the wind.

Dr. Schafrik's recommendation for the best warehouse environment is to keep the infrastructure safe from corrosion. Silicon-based coatings and waxes have been shown to be very effective. The galvanized conduit is not immune to the corrosive environment. Exhausting ventilation is the most efficient way to remove harmful vapors and may have other benefits. Blowing ventilation will work as well, but it requires more energy. Blowing ventilation will mix the air in the maturation environment more, which may also be desirable. The filters, in laboratory testing, work to reduce the alcohol in the environment, but not as low as mechanical ventilation will but have little long-term cost.

GRAIN INNOVATION TO BENEFIT FARMERS AND DISTILLERS

Postdoctoral researcher Virginia Verges led an effort to explore flavor and aroma variability in corn. The studies were performed in an innovative partnership with Petersen Farms, which provided corn grain, and Castle & Key Distillery, which analyzed the distillates for sensory characteristics. The results concluded that variability among hybrids and heirlooms was found for distillate flavor and aroma.

The first study explored the variability of flavor and aroma together with the chemical compounds present in the distillate produced from four commercial yellow dent corn hybrids grown in Kentucky by Petersen Farms. Hybrids differed in the content of esters vs. aldehydes, and the sensory analysis performed showed distinctive flavors notes: "fruity," "floral," "alcohol" and "sweet" among hybrids. For this study, twelve (12) batches were cooked, following the lab-scale methodology for New-Make bourbon whiskey production recently published (Foods 2023, 12(3), 457).

The second experiment consisted of evaluating (8) eight heirloom corn varieties and two (2) yellow dent corn hybrids and was carried out at the University of Kentucky Horticultural Farm. The team, led by Dr. Verges, took protein and starch in whole grains samples and cooked one batch for each heirloom or hybrid. Castle and Key performed the sensory analysis in the distillate. The heirlooms showed distinctive aromas: "nutty" was highly expressed in Cocke's prolific, "mineral" in Red Floriari Flint distillate, and "hay" in Glass Gem. The flavor screening on yellow dent hybrids showed that "corn" and "malt" flavor notes were highly expressed, differentiating from Cocke's prolific that expressed notes of "nutty," Floriani Red expressed "spicy" notes for flavor, and distinctive notes of "sweet" were detected in Yellow Guinea Flint.

The study's findings have important implications for the distilling industry. By identifying and quantifying the variability in sensory parameters, chemical congeners, or grain characteristics, this research can help distillers and growers grow specific corn genetics for different commercial goals.

The partnership established with a grower and a distillery was a key collaboration to generate these results. Research like this generates positive knowledge with implications not only for the distillery industry but also for consumers and corn growers.

LONGTIME UK-UNIVERSITY OF BURGUNDY PARTNERSHIP TO EXPAND

By David Melanson, Center for Applied Energy Research

THEY SAY BURGUNDY AND BOURBON DO NOT MIX, BUT THANKS TO A LONG-STANDING UNIVERSITY OF KENTUCKY RELATIONSHIP, THAT VERY WELL MAY BE CHANGING.

The University of Kentucky Center for Applied Energy Research (CAER) and the University of Burgundy (UB) in Burgundy, France, have built a strong academic partnership over the past several decades, collaborating on an array of programs.

The strongest and most consistent connection has been CAER's relationship with a French public engineering school, the Ecole Supérieure d'Ingénieurs Numérique et Matériaux (ESIREM). For more than 20 years, CAER has hosted ESIREM's material science students for internships in its laboratories.

Thanks to funding from UKinSPIRE (Seeding Partnerships for International Research Engagement) that relationship will not only continue but will expand.

The new project, titled "Expanding a Transatlantic Research Alliance (ExTRA)," seeks to further strengthen the relationship between CAER and UB by supporting:

- UK faculty, staff and student research at UB
- Participation of UB researchers in UK research symposia
- Expanding research collaborations between additional departments at UK and UB

CAER will continue hosting several ESIREM students each year for three-to-five month internships in its laboratories. CAER students and researchers will continue to perform research at UB and deliver lectures and seminars to UB students and researchers.

"The partnership between UK and UB has been both enduring and fruitful," said Eduardo Santillan-Jimenez, Ph.D., who is the principal investigator on the project and leading the alliance. "Funding from UKinSPIRE will allow for this partnership not only to be maintained but also expanded to connect other programs, including those focused on wine and bourbon, for which Burgundy and Kentucky are renowned. We are most thankful to the UK Office of the Vice President for Research (OVPR) and the UK International Center (UKIC) for their support."

ExTRA will also support connecting UK and UB across other units related to those signature industries, particularly Distillation, Wine and Brewing Studies (DWBS) in the James B. Beam Institute for Kentucky Spirits in the UK Martin-Gatton College of Agriculture, Food and Environment.

As part of that effort, the Martin-Gatton College and UB's Jules Guyot Institute of Vine and Wine (IVW) will develop a new and exciting partnership mainly focused on the exchange of students and researchers. UB researchers will also participate in UK's annual Food, Energy and Water Symposium and the James B. Beam Institute Annual Conference.

"Internationalizing our curriculum is necessary to have our graduates be the best in the world," said Seth DeBolt, director of the James B. Beam Institute. "A partnership like this one between the University of Kentucky's James B. Beam Institute and UB's Jules Guyot Institute of Vine and Wine provides the perfect mix of shared learning and student advancement. We are thrilled to be a part of this."

In 2024, the University of Kentucky's Center for Applied Energy Research and the James B. Beam Institute for Kentucky Spirits are cooperating on a grant that will send students to the University of Burgundy in the summer of 2024. The projects are made possible through the University of Kentucky International Center's UKinSPIRE (Seeding Partnerships for International Research Engagement) grant. Two Distillation Wine and Brewing Studies certificate students, Kendall Edelen and Mattie Brock, will be conducting research on two topics:

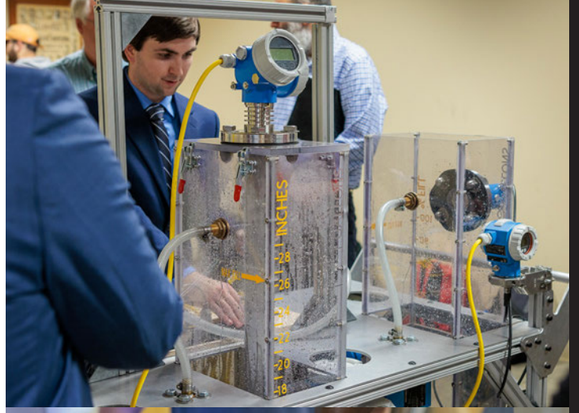
1. Impact of distillation under reduced pressure on the fate of some chemical compound
2. Molecules implied in negative interactions on Hanseniaspora uvarum and Brettanomyces bruxellensis

STUDENT CAPSTONE PROJECTS

The Beam Institute supports a broad spectrum of student projects to train the next generation of spirits professionals while creating knowledge for our industry partners. In the 2023-2024 academic year, twenty students in the Stan and Karen Pigman College of Engineering worked on projects supported by the James B. Beam Distilling Company to improve the future of the distilling industry.

Among these projects were:

- Mechanical Engineering students working with Dr. Tom Henninger on several barrel-related projects.
- Developing tools for coating hoops in wax to prevent corrosion in humid warehouses.
- Approaching the challenge of repairing a leaking barrel. Traditional cooperage techniques require swinging a hammer, so repair work requires removing the leaking barrel and any barrels blocking the leaking barrel in. One group designed and fabricated a device that allows one person to lift and rotate a barrel while still racked. Others focused on strategies for fixing the leak. One group designed a compact, spring-loaded hammer to allow coopering in tight spaces, and built out two successful prototypes. Another group of Materials Engineering students made and tested adhesive patches to seal the leak with Dr. Matt Beck.
- Beyond barreling, Chemical Engineering student groups worked with Drs. Anastasia Hauser and Brad Berron to evaluate steam recycling strategies in distilleries, where preliminary designs saved up to 30% of the total energy used in distillation.
- Four students were sponsored by Endress+Hauser to design and build a hands-on mobile cart to teach process automation concepts to students and distillers. The controls cart will be featured in the next offering of the Beam Institute's Whiskey Apprenticeship Program.



OUTREACH & COMMUNITY

Craft Sustainability Program Takes Off

Bourbon Women SIPosium

CRAFT SUSTAINABILITY PROGRAM TAKES OFF

By Kevin Baldridge

With the continuing growth of bourbon's popularity, craft distilleries are growing and appearing at an unprecedented rate. These smaller craft distilleries, in particular, face challenges in maximizing sustainability, with the focus mostly on making it past the startup phase and growing toward a more robust production scale and market share. Their smaller teams often require personnel to take on several roles throughout the distillery, which means most craft distilleries don't have one or more team members focused on sustainability. This is where the new craft sustainability educational program from the Beam Institute comes in to offer help!

Established by Research Director Dr. Brad Berron in 2023 through an EPA-funded partnership with the Kentucky Excellence in Environmental Leadership program (KY EXCEL) and the University of Louisville's Kentucky Pollution Prevention Center (KPPC), our new sustainability outreach program is led by Dr. Berron and Dr. Kevin Baldridge, the Craft Sustainability Coordinator at the Beam Institute. Working with educational experts at the University of Kentucky and with leading industry experts on sustainability and energy efficiency in distillery operations, the Beam Institute team is building a unique interactive workshop to help distillers save money on energy and reduce their carbon footprints.

Over the course of a day on-site at the distillery, the Beam Institute team works with staff to educate the whole team on key engineering principles that contribute to a facility's energy efficiency. Utilizing tools like infrared imaging to help identify opportunities for energy cost savings, we take an interactive approach to understanding best practices for energy management and teaching the whole team about efficiency. We work directly with operators running distillery processes, taking a hands-on approach to both learning how the facility operates and promoting a continuous improvement mindset that drives innovation in sustainability.

Through a combination of classroom instruction, in-the-distillery training, and online learning resources, the program aims to create meaningful change at distilleries around the state. Join the five distilleries and >100 industry professionals who have already worked with our team on this program by reaching out to work with us, and learn more about energy efficiency in distilling on our sustainability page on the Beam Institute website.

beaminstitute.ca.uky.edu

Research Director Dr. Brad Berron and Craft Sustainability Coordinator Dr. Kevin Baldridge visited several distilleries with the Beam Institute team to learn about best practices for craft distillery sustainability.

Thermal imaging equipment helps our team take a hands-on approach to energy efficiency education and identify opportunities for cost savings, like hot spots in the distillery that could be insulated for better efficiency.

BOURBON WOMEN SIPOSIUM

The Bourbon Women organization fosters a community of women who share a deep passion for bourbon, bourbon culture, and the bourbon industry. Annually, they organize the National SIPosium Conference, a three-day event that unites members, bourbon enthusiasts, and industry partners to celebrate and expand their knowledge of bourbon. In August 2023, the Beam Institute moderated a session titled, "So You Want to Study Bourbon: Bourbon in Higher Education." This session aimed to highlight educational opportunities in distilling education, featuring insights from program representatives at Moonshine University, Kentucky State University, University of Louisville, and Western Kentucky University. Each institution presented details about its specific distilling certificate programs, areas of focus, and available courses. As the bourbon industry has flourished and grown, more programs in distilling education have developed to fit needs.

In addition to the session, the Beam Institute conducted a survey among conference attendees to better understand the Bourbon Women demographic and assess their interest in spirits education. The results revealed that 94% of respondents expressed interest in pursuing a degree/certification program or taking coursework. Many indicated distilling science, marketing, and hospitality as preferred subject areas of study.

The Bourbon Women organization and the Beam Institute share a commitment to advancing knowledge within the bourbon community. The strong interest shown by conference goers underscores the growing demand for specialized programs in distilling, signaling a promising future for the continued expansion of bourbon education initiatives.

JAMES B. BEAM INSTITUTE

4TH ANNUAL CONFERENCE RECAP

800
ATTENDEES

REPRESENTATION FROM:

200+
ORGANIZATIONS

32
STATES

7
COUNTRIES

120
SPEAKERS

60
EXHIBITORS

30%
INCREASE IN ATTENDANCE
(OVER 2022)

A GROWING SUCCESS: JAMES B. BEAM INSTITUTE 4TH ANNUAL CONFERENCE

In 2023 we held the 4th annual James B. Beam Institute Conference, with 800 attendees. Representatives from all major global distillers, including Suntory Global Spirits, Brown-Forman, Four Roses, Diageo, Sazerac, Heaven Hill, Pernod Ricard, Bacardi, Bardstown Bourbon Co. and Campari, as well as many craft distillers from around the U.S., were present.

The three-day conference covered business, technical and sustainability topics relevant to the distilling industry. The conference's business and hospitality day featured talks on recruiting and corporate culture, social responsibility, sales and marketing. The technical day included talks on product quality, fermentation, maturation processes, analytical tools and practices, as well as findings in maturation. Sustainability continues to be a hot topic and one entire conference day was dedicated to these topics, from energy use to packaging, spent grains and water use.

Freddie Noe, 8th Generation Beam Distiller & Master Distiller at Fred B. Noe Distillery, summed up the importance of the James B. Beam Institute during his closing remarks, recognizing the institute as a group that brings so many from the bourbon community together to share knowledge and push us forward. It is a shining example of Suntory Global Spirits' belief that we are better together.

JAMES B. BEAM INSTITUTE
K·Y U·S
University of Kentucky

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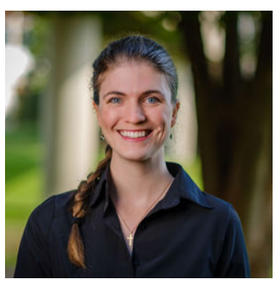

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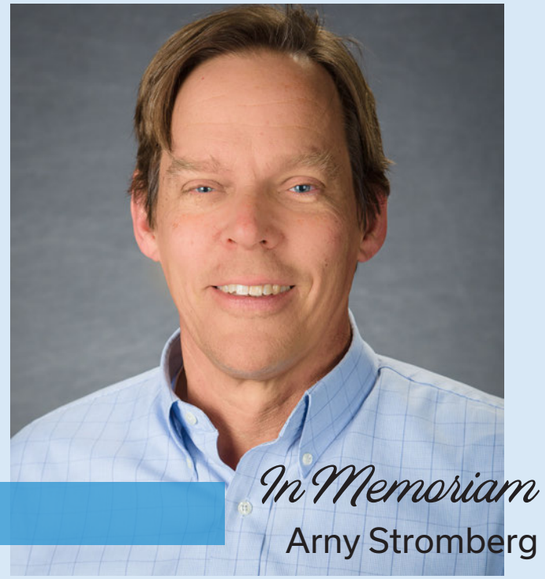

In Memoriam
Arny Stromberg

Dr. Arnold (Arny) Stromberg, a faculty fellow at the Beam Institute, died Sept. 17, 2023, at age 63. Arny was responsible for many of the early research projects that established the Beam Institute's Research program. Dr. Stromberg was a thought leader in statistical bioinformatics, computational statistics and nonlinear models. He served the UK community by guiding research projects and training young statisticians. In his time with the Beam Institute, he helped several distillers make clear decisions through the interpretation of complex manufacturing data sets. He was passionate about his work, where he always brought a big smile and excitement to project meetings.

Arnold Stromberg was born in Minneapolis and raised in West Lafayette, Indiana, where his father was a professor at Purdue. He earned a B.S. in mathematics at Stanford University in 1983 and a doctorate in statistics at the University of North Carolina at Chapel Hill in 1989. He joined the UK faculty in 1991. Dr. Stromberg is survived by his wife, Gretchen, and their four children. He supported the Beam Institute's research on a number of projects and he will be missed, not only for his expertise, but for his kindness and humanity.

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