



Examples of successful presentation abstracts for the 2025 Beam Institute Industry Conference

Nicole Kfoury

Sample Preparation and GC-MS Techniques for the Determination of 2-Methylisoborneol and Geosmin in Corn and Finished Whiskey

Trevor Bowles

Creating Better Accessibility Practices

Savio Poovathingal

Three-dimensional analyses of Tyloses in white oak

Katherine Ristola

Wetland Treatment Systems for Municipal Wastewater at a Bourbon Distillery and Potential Value of Incorporating Stillage for Water Treatment Enhancement

John Conner

A 17 year study of losses from casks used for the maturation of Scotch whisky

David Kyrejko

Exergy Island: Breadfruit, Heat Pumps, and the Future of Sustainable Distilleries

Nicole Kfoury

GERSTEL, Inc.

Job title: Applications Scientist

Track(s): Technical

Sample Preparation and GC-MS Techniques for the Determination of 2-Methylisoborneol and Geosmin in Corn and Finished Whiskey

3–5 keywords that summarize your topic: 2-Methylisoborneol, Geosmin, Corn, Whiskey, GC-MS

Summary: 2-Methylisoborneol (MIB) and geosmin are naturally occurring metabolites produced by bacteria and fungi. These compounds have odors described as musty, earthy, dirt, potting soil, beets, etc. They have very low odor thresholds and can be smelled at 1-10 or 5-10 ppt in water for geosmin and MIB, respectively. MIB and geosmin are most often found in water sources, including drinking water, and are difficult to remove by conventional water treatment methods. They can also be found in grains if contaminated water is used in irrigation, processing, or storage or if improper storage conditions lead to the growth of mold or bacteria. As a result, products such as whiskey that utilize contaminated water and/or grains may result in musty, earthy off odors in the finished product. This study demonstrates field sampling methods for extracting these metabolites in corn bins and selectable 1D/2D-GC-MS for detection in finished whiskey, a very complex matrix.

Trevor Bowles

Maker's Mark on Star Hill Farm

Job title: Manager of VIP Experience & Trade Engagement

Track(s): Business; Sustainability

Creating Better Accessibility Practices

3–5 keywords that summarize your topic: Accessibility, Social Sustainability, deaf, blind, community

Summary: Since the first bottle of Maker's Mark was released in 1958, it has always said on the side of our label, "Any time you're in our neighborhood, stop in and visit us at Star Hill Farm Distillery". Hospitality has always been a part of our brand and the world, our guests, and their needs have evolved over time since we first started giving tours. In this session I hope to share the journey we have taken at Maker's Mark on Star Hill Farm to create better accessibility for our guest through creating experiences for the blind and deaf communities.

We partnered with ASL Interpreting Services to offer tours in sign language for guests in the deaf community and also had them come in to teach out hospitality team about the deaf community.

We have also partnered with the American Printing House in Louisville to create a hospitality experience for the blind community, including labels in braille, and donating a Maker's Mark Private Selection Barrel to help raise money for their upcoming museum.

In this session we hope to offer insights and tools to help create better accessibility at the homeplaces of distilleries across the Kentucky Bourbon Trail and beyond.

Working to finalize details of the panel but looking to include Sara Logsdon, Principal Interpreter and Owner of ASL Interpreting Services. Theresa Reno-Weber GoodMaps CEO. Greg Gibbons Business Development Mgr. American Printing House

Savio Poovathingal

Affiliation (company, association, university...): University of Kentucky

Job title: Assistant Professor

Track(s): Technical

Three-dimensional analyses of Tyloses in white oak

3–5 keywords that summarize your topic: Tylose, Effect of season, Maturation loss, High-resolution imaging

Summary: American white (*Quercus alba* L.) oak casks have been used for liquid storage for centuries. Their use in aged spirits is critical to imparting flavor and mouthfeel to the final product. The reason that barrels retain liquid has been hypothesized to be the result of abundant physiological structures called tyloses in parenchyma tissues and medullary rays in white oak. Using non-destructive X-ray computed tomography (XRCT) imaging, we reveal an unprecedented view of tylose structure and quantify the pore-filling capacity of tyloses in white oak that underscores the liquid retention we observe in casks. We show that pores of white oaks are filled with sevenfold higher tylose volume compared to northern red oak (*Q. rubra*), consistent with prior literature that casks made from white oak retain liquid while red oak fails to do so. We propose that XRCT represents a methodological standard for observing these complex structures and should be employed to understand the many questions related to liquid losses from casks, cultural treatment of casks, and the influence of climate change on oak tyloses in the future.

Katherine Ristola

Affiliation (company, association, university...): University of Kentucky

Job title: Graduate Research Assistant

Track(s): Sustainability

Wetland Treatment Systems for Municipal Wastewater at a Bourbon Distillery and Potential Value of Incorporating Stillage for Water Treatment Enhancement

3–5 keywords that summarize your topic: Wetlands, Stillage, Wastewater, Mesocosms, Emerging contaminants

Summary: The use of constructed treatment wetlands, as a secondary treatment method for wastewater effluent from package treatment plants and distillery stillage has the potential to be an innovative, sustainable method for improving water quality. However, the use of constructed wetlands to treat bourbon whole stillage and wastewater treatment plant effluent has been limited. Therefore, the objectives of this study were to: 1) quantify constructed wetland water quality improvement as a secondary treatment method for a distillery's municipal wastewater; 2) optimize treatment design to meet wastewater effluent discharge limits; and 3) explore the potential to enhance constructed treatment wetland nutrient removal using bourbon whole stillage as an additive carbon source. Four free water surface flow treatment wetland mesocosm experiments were completed during the summer of 2023. Denitrifying conditions were measured along with the collection of water quality grab samples over the 10-day experiments. The constructed wetlands removed nitrate-N between 50 to 99%, E. coli to 99%, and phosphate-P between 61 to 99%, depending on influent and period of the growing season. Bourbon whole stillage was found to enhance the removal of nutrients when added to the wetlands in combination with the wastewater effluent at small loading rates (76 L). Findings support constructed treatment wetlands as a potential mechanism for secondary treatment for distillery wastewater and bourbon stillage as a potential nutrient removal enhancement.

John Conner

The Scotch Whisky Research Institute

Senior Scientist - Maturation

A 17 year study of losses from casks used for the maturation of Scotch whisky

3–5 keywords that summarize your topic: Maturation, Losses, Environmental Conditions

Summary: Twelve casks maturing malt whisky were stored in a small warehouse under ambient conditions at the Scotch Whisky Research Institute, Edinburgh, Scotland. An additional 12 casks were stored under controlled conditions that were used to establish links between temperature, humidity and losses. Initial work focused on how environmental conditions influenced losses and found temperature was the main driver for ethanol loss while humidity had most influence on water loss and strength changes. The average annual percentage ethanol loss (using a compound calculation) for casks in the ambient store was consistent throughout the study but there were seasonal and cask-to-cask variations in losses. Studies then attempted to explain the differences in losses between individual casks. Fortuitously the relative humidity in both stores provided a way of separating liquid and vapour losses and this showed a relatively consistent level of vapour loss across the cask set and it was liquid loss that increased in proportion to overall losses. A comparison of samples from the casks with the highest and lowest losses at 8, 10 and 14 years did not show any significant sensory differences that could be attributed to the level of losses. This indicates that liquid leaks, the main source of loss variation in this cask set, does not have a significant impact on mature quality.

David Kyrejko

Affiliation (company, association, university...): The Engine Room

Exergy Island: Breadfruit, Heat Pumps, and the Future of Sustainable Distilleries

3–5 keywords that summarize your topic: sustainability, energy, heat pumps

Summary: As distilleries face increasing pressure to adopt sustainable practices and reduce energy costs, heat pump technology offers a revolutionary opportunity to transform energy management across the industry. However, the complexity of distillery operations and unfamiliarity with industrial-scale heat pump systems can often leave distilleries without a clear starting point. Energy-scarce regions or those dependent on fossil fuels for electricity are prime candidates for heat pump technology, yet these areas often hesitate to adopt it due to uncertainty about its practical application. This presentation seeks to illuminate the transformative potential of heat pumps for all distilleries by illustrating an almost perfect use case: a sustainability-driven distillery on an island.

Mutiny Island Vodka at Sion Farm Distillery, located in St. Croix, U.S. Virgin Islands, produces award-winning vodka from breadfruit—a unique and sustainable agricultural resource—and is committed to zero-waste production. Their location, however, presents significant energy challenges, leading to a heavy reliance on diesel for steam generation and extremely high electricity and fuel costs. While solar power is used for some of their smaller systems, the majority of their energy needs are met through diesel-powered steam, making them the perfect candidate for heat pump-based steam, cooling, and hot water systems.

Through a comprehensive case study, this presentation will show how heat pump integration and process modifications would work for this distillery and serve as a model for others. By combining hard data, mathematical proofs, and graphical layouts, this presentation engages attendees of all technical levels, demystifying the process of implementing heat pumps in distilleries.

As reliability is always a concern with new technology, we'll also demonstrate how these systems reduce financial risks and ensure that advanced technologies remain practical and cost-effective. Attendees will gain a deeper understanding of the challenges associated with relying solely on solar for steam production and explore how heat pumps offer a more efficient, sustainable solution—especially in regions reliant on fossil fuel-based electricity.

By integrating the innovative use of breadfruit with solar energy and high-temperature heat pumps, Mutiny Island Vodka at Sion Farm Distillery would be poised to become one of the most sustainable distilleries in the world. This case study illustrates that with the right engineering approach, heat pumps can be seamlessly integrated into distilleries of any size, offering reduced dependence on fossil fuels, enhanced financial resilience, and a path toward revolutionizing energy management in the distilling industry.