

## PhD-Day at ATB Potsdam, Tuesday, 04 June 2024, Hybrid-Conference; Room Z003 and Zoom

Time	Topic	Speaker	Supervisor ATB	Supervisor University
9:30	Welcome	Prof. Dr. Barbara Sturm Dr. Ulrike Praeger PhD representatives		
9:45	<a href="#">Valorization of by-products from wet coffee processing: waste to carbon-rich material using hydrothermal carbonization to improve the sustainability of the coffee value chain in Vietnam</a>	Huyen Chau Dang	Dr. habil. Judy Libra	Prof. Dr. Christina Dornack, TU Dresden
10:05	<a href="#">Quality of hydrothermal carbonization products originated from salty biomass</a>	Daniela Moloeznik Paniagua	Dr. habil. Judy Libra	Prof. Dr. Vera Susanne Rotter, TU Berlin
10:25	Break			
10:50	<a href="#">Model-based electronic control device for storage and transport of fresh produce under modified O<sub>2</sub> and CO<sub>2</sub> atmosphere</a>	Yogesh B. Kalnar	Dr. Pramod Mahajan	Prof. Dr. Cornelia Weltzien TU Berlin
11:10	Advisory services on research funding from the National Contact Point Bioeconomy and Environment (NCP)	Katja Tröger	Project Management Jülich, Forschungszentrum Jülich GmbH	
11:55	Group photo			
12:00	Lunch break			
13:00	<a href="#">Mapping gas concentrations inside naturally ventilated dairy barns: Evaluating spatiotemporal dynamics and uncertainties</a>	Harsh Sahu	Dr. David Janke	Prof. Dr. Thomas Amon, FU Berlin Prof. Dr. Jürgen Zentek, FU Berlin
13:20	<a href="#">Wind tunnel study on the effect of wind directions on the ventilation performance inside a naturally ventilated pig barn with an outdoor exercise yard</a>	Xuefei Wu	Dr. Qianying Yi	Prof. Dr. Thomas Amon, FU Berlin Prof. Dr. Jürgen Zentek, FU Berlin
13:40	<a href="#">Tracing behavioural and physiological parameters in fattening bulls using wearable sensor systems</a>	Kai Fromm	Dr. Gundula Hoffmann	Prof. Dr. Thomas Amon, FU Berlin
14:00	Break			
14:20	<a href="#">Antimicrobial resistance spread in fattening pigs: mechanisms and possible interventions</a>	Megarsa Bedasa Jaleta	Dr. Tina Kabelitz	Prof. Dr. Thomas Amon, FU Berlin Prof. Dr. Jürgen Zentek, FU Berlin
14:40	<a href="#">L-(+)-lactic acid from 2nd generation renewable resources – cell-recycled continuous fermentation employing B. coagulans</a>	Linda Schroedter	Dr. Joachim Venus	Prof. Dr. Peter Neubauer, TU Berlin
15:00	<a href="#">Trustworthy soil mapping</a>	Jonas Schmidinger	Dr. Sebastian Vogel	Prof. Dr. Martin Atzmüller, Osnabrück University
15:20	Break			
15:40	Alumni talk about their career	Dr. Muluken Adamseged  Dr. habil. Jan Mumme	International Water Management Institute (IWMI), Researcher - Innovation Scaling, Deputy Country Representative – Ethiopia  Independent Consultant for Biochar & Biogas, Chief Technology Officer and Co-Founder Point2Hectare company, Potsdam	
16:45	Get together			

## **Abstracts**

### **Valorization of by-products from wet coffee processing: waste to carbon-rich material using hydrothermal carbonization to improve the sustainability of the coffee value chain in Vietnam**

**Huyen Chau Dang**

Vietnam is the world's leading producer of Robusta coffee beans. The Vietnamese Ministry of agriculture and rural development has issued the policy vision to 2030 for developing sustainable coffee to encourage the coffee farmers, cooperatives, and manufacturers to transition from dry to wet processing of coffee berries, resulting in higher quality beans. This change can disrupt traditional recycling pathways for coffee residues between the field and processing, negatively impacting soil fertility, and environmental and human health. The purpose of this study is to develop new innovative solutions to valorize by-products in the coffee processing sector by exploring the use of an emerging thermochemical conversion process, hydrothermal carbonization (HTC). Wet solid coffee by-products will be converted to carbon-rich materials to improve the sustainability of the value chain by: 1) reducing the need for fossil fuel, 2) recycling carbon and nutrients to the soil, 3) avoiding GHG and odor emissions from improper disposal of the wet solid wastes, and 4) improving the wastewater effluent quality from coffee-processing plants.

### **Quality of hydrothermal carbonization products originated from salty biomass**

**Daniela Moloeznik Paniagua**

Biomass residues have been, since ancient times, used as either energy applications (i.e. firewood combustion) or as soil applications (i.e. compost). Salty biomass is not feasible to be used for neither of these applications, due to its composition. Its high content of elements such as Cl, K, Na can lead to corrosion and slagging problems, when combusting or can lead to infertility of soils, hindering its use as fertilizer. In this study hydrothermal carbonization (HTC) processes were applied to different salty residual biomass: grass, algae, salicornia, in order to assess if the properties of HTC products can fit better for these applications.

### **Model-based electronic control device for storage and transport of fresh produce under modified O<sub>2</sub> and CO<sub>2</sub> atmosphere**

**Yogesh B. Kalnar**

The aim of this study is to develop an electronic gas control system for the storage and transport of fresh produce in modified O<sub>2</sub> and CO<sub>2</sub> atmospheres. Using a model-based approach, live temperature data will be used to provide real-time predictions of O<sub>2</sub>, CO<sub>2</sub> during the supply chain of fruit and vegetables. An airtight container will be designed to adjust gas concentrations based on temperature changes. These will be linked to respiration rates and produce quality. A control strategy based on mathematical models will regulate the gas composition using fresh air without use of O<sub>2</sub> CO<sub>2</sub> generators and sensors. Temperature is monitored by thermocouples and deviations trigger responses from the control unit, ensuring timely adjustments of respiratory gases. The integration of models with live data provides real-time validation of the intelligent storage container in a practical supply chain environment.

## **Mapping gas concentrations inside naturally ventilated dairy barns: Evaluating spatiotemporal dynamics and uncertainties**

**Harsh Sahu**

Accurately measuring gas emissions in naturally ventilated dairy buildings (NVDBs) poses practical and economic challenges due to their large vents exposed to external weather conditions. The side openings hinder the microclimate of the barn and can lead to measurement uncertainty. This doctoral research project seeks to identify optimal gas sampling positions by examining spatial and temporal gas concentration dynamics of ammonia, carbon dioxide, and methane throughout the entire barn volume. Fifty sampling points (SPs) within a cow barn are investigated, each with a high spatial resolution of 90 m<sup>3</sup> and a temporal resolution of 3-minute intervals. Utilizing two Cavity Ringdown Spectrometers (CRDS) and two Fourier Transform Infrared (FTIR) gas analyzers, the study compares the relative errors between the SPs and explores the impact of microclimatic factors (wind, temperature, and humidity) on gas distribution. The outcomes of this study will enhance emission measurement methods and address associated uncertainties.

## **Wind tunnel study on the effect of wind directions on the ventilation performance inside a naturally ventilated pig barn with an outdoor exercise yard**

**Xuefei Wu**

As a basis for optimizing the ventilation system for naturally ventilated pig barns with outdoor exercise yards, the ventilation performance inside the pig barn was evaluated under four wind directions. A 1:50 scaled model of a pig barn with an outdoor exercise yard was built for the wind tunnel test. Then, wind speeds and directions inside the scaled model were measured under different wind directions in the wind tunnel. Afterward, the influence of the wind directions on the ventilation performance inside the barn was evaluated by the visualization of the airflow pattern and the quantification of the ventilation rate.

## **Tracing behavioural and physiological parameters in fattening bulls using wearable sensor systems**

**Kay Fromm**

Germany is the second largest producer of beef in the European Union. Despite the importance of bull husbandry to the economy, the available sensor systems for bull production are very limited compared to those for dairy production. Bull husbandry faces many challenges concerning the tracing of characteristics. Rapid growth, occupational hazards and poor structural conditions of barns are obstacles for farmers and researchers attempting to translate sensor systems established in dairy cattle to bull husbandry. The first study for this doctoral thesis was conducted to investigate the possible application of a radio-frequency identification system used for oestrus detection in dairy cows to assess activity levels and lying behaviour in bulls. The second study will examine if rumen temperature data from sensor boluses correlate with thermal indices.

## **Antimicrobial resistance spread in fattening pigs: mechanisms and possible interventions**

**Megarsa Bedasa Jaleta**

Routine monitoring of biocide tolerance is important because, when used frequently, it plays a role in the development of Antimicrobial resistance (AMR) and acting as a non-antibiotic selection pressure. We analyzed the biocide resistance of *AMR-E. coli* in the stable compared to the regular disinfectant that has been used in the study farm for many years. Furthermore, intriguingly, we found that different individual AMR burdens in small cohabiting piglet group share many common characteristics but maybe related to individual factors. Therefore, close monitoring of the individual piglet situation is planned at weekly intervals in order to determine the individual AMR abundance.

## **L-(+)-lactic acid from 2nd generation renewable resources – cell-recycled continuous fermentation employing *B. coagulans***

**Linda Schroedter**

To date, feedstocks for the production of the versatile compound lactic acid (LA) are mainly sugars from beet, sugarcane or cassava. Since these are costly and in competition with the provision of food and feed, the focus of LA research shifts to alternative sugar sources. Lignocellulose (LC) is one of these promising feedstocks. For breaking its resistant structure, various pretreatment strategies exist, leading to LC substrates that differ in form and composition. Consequently, this affects the applicability of fermentation processes. The purpose of this study is to detect a microbial strain that accepts such diversity of substrate and to investigate the feasibility of continuous fermentation approaches utilizing LC substrates, aiming at long process durations and increased productivities. The outcome of this study will be a vital step towards a robust LC-based lactic acid production for the circular bioeconomy.

## **Trustworthy soil mapping**

**Jonas Schmidinger**

Soils are heterogenous in space. This means, that the quality of a soil may change from barren to fertile in just a few meters. Ideally, farmers should spatially adapt their farming practices given the local soil conditions. For example, when the in-field variability of soil nutrients is known, it allows us to spatially optimize our fertilization rate to maximize crop production, while minimizing fertilizer input. This of course requires that we have soil maps. We can use soil sensors to create cost-efficient and high-resolution soil maps. Unfortunately, these soil maps are never perfectly accurate, meaning we have to deal with a certain amount of uncertainty.