

PhD-Day at ATB Potsdam, Tuesday, 06 June 2023, Hybrid-Conference; Room Z003 and Zoom

Time	Topic	Speaker	Supervisor ATB	Supervisor University
9:00	Welcome	Prof. Dr. Barbara Sturm Dr. Ulrike Praeger		
9:10	Antimicrobial resistance spread in pig production - Mechanisms and interventions	Megarsa Bedasa Jaleta	Dr. Tina Kabelitz	Prof. Dr. Thomas Amon FU Berlin Prof. Dr. Jürgen Zentek FU Berlin
9:35	Study on the ventilation rate and airflow patterns of naturally ventilated pig barns with outdoor exercise yards: A three-column approach	Xuefei Wu	Dr. Qianying Yi	Prof. Dr. Thomas Amon FU Berlin Prof. Dr. Jürgen Zentek FU Berlin
10:00	Break			
10:30	Modeling ammonia emissions from alkalizing dynamics of urine puddle pH in a solid floor naturally ventilated dairy cattle building in Northern Germany	Thi Thanh Huyen Vu	Dr. David Janke Dr. Sabrina Hempel	
10:45	Concentration gradients of ammonia, methane, and carbon dioxide at the outlet of a naturally ventilated dairy barn	Harsh Sahu	Dr. David Janke	Prof. Dr. Thomas Amon FU Berlin Prof. Dr. Jürgen Zentek FU Berlin
11:10	Tracing activity and lying behaviour in fattening bulls using an UHF/RFID detection system	Kay Fromm	Dr. Gundula Hoffmann	Prof. Dr. Thomas Amon FU Berlin
11:35	Assessment of heat stress in dairy cows with a combined consideration of individual animal traits	Sebastián Scappini	Dr. Gundula Hoffmann	Prof. Dr. Thomas Amon FU Berlin
12:00	Group photo			
12:10	Lunch break			
13:15	Effect of cell size on mechanics of strawberry fruit tissue	Xue An	Dr. habil. Manuela Zude-Sasse	Prof. Dr. Zhiguo Li Northwest A&F University, Yangling, China
13:40	Distributive conflicts and institutional change: the role of power in biogas development in Germany	Hyunjin Park	PD Dr. habil. Philipp Grundmann	PD Dr. Philipp Grundmann HU Berlin
14:05	Unpacking barriers to circular business models in the food industry: A Fuzzy-DEMATEL analysis of cause-and-effect relationships	Davit Markosyan	PD Dr. habil. Philipp Grundmann	PD Dr. Philipp Grundmann HU Berlin Dr. Vardan Aleksanyan Armenian National Agrarian University
14:30	Break			

Time	Topic	Speaker	Supervisor ATB	Supervisor University
14:45	Impact assessment of livestock production on water scarcity in a watershed located in southern Brazil	Sofia Helena Zanella Carra	PD Dr. habil. Katrin Drastig	PD Dr. habil. Katrin Drastig HU Berlin
15:05	Changes in the physical and mechanical properties of hemp during retting and the challenges of measurement of tensile properties of hemp fibres	Angulu Morris	Dr. Hans-Jörg Gusovius	Prof. Dr. Martin Hofrichter TU Dresden
15:30	Break			
15:50	Pitch presentations of research topics in 1 minute	PhD researchers of ATB		
16:00	Alumni report on their career after employment at ATB	Prof. Dr. Heike Mempel, Faculty of Horticulture and Food Technology, University of Applied Science Weihenstephan-Triesdorf Marina Pasteris, Technical and Project Officer, European Biogas Association, Brussels		
17:00	Get together			

Abstracts

Antimicrobial resistance spread in pig production-Mechanisms and interventions

Megarsa Bedasa Jaleta

Antimicrobial resistance (AMR) is a growing health and economic threat worldwide. As a partner of the Leibniz Research Alliance "INFECTIONS in an Urbanizing World - Humans, Animals, Environments", the ATB specifically evaluates the source and the mechanism of spread of AMR pathogens using bacteriological methods and DNA sequencing and interventions through hygiene management in pig houses. Within my PhD project, I study the transmission ways of resistant *Escherichia coli* against various classes of antibiotics (sulfonamide, fluoroquinolones and cephalosporins) within and between farm flies, dust, pig feces and feed. The results will guide interventions and potential mitigation strategies to minimize the spread of antimicrobial resistance in commercial animal husbandry to reduce potential environmental contamination.

Study on the ventilation rate and airflow patterns of naturally ventilated pig barns with outdoor exercise yards: A three-column approach

Xuefei Wu

A naturally ventilated pig housing system equipped with an indoor housing area and an outdoor exercise area can result in improved animal welfare, and a well-understanding of the air movement is a basis to take advantage of the special configuration for the pig barn. However, due to the complex natural wind and special building configuration, it is difficult to study the ventilation rate and airflow pattern inside the pig barn. Therefore, three-pillar model methods, including wind tunnel tests, on-farm measurements, and numerical modeling, are used to evaluate the air movement inside the novel pig housing system.

Modeling ammonia emissions from alkalizing dynamics of urine puddle pH in a solid floor naturally ventilated dairy cattle building in Northern Germany

Thi Thanh Huyen Vu

Urine puddle pH dynamics have been identified as one of the influential sources of ammonia emission rates in naturally ventilated housing systems. With a semi-empirical pH model, ammonia emission can be projected depending on urine alkalizing dynamics. An overestimation of emission values was observed when we set a constant pH and single exponential increasing pH in the whole curve with a hypothetical $pH_f = 11$. With 18 settings of initial and asymptotic pH dynamics, the alkalizing process was more indicated by a late exponential decay at 2 and 10 hours. The effect of alkalizing dynamics based on the same set pH parameters was investigated in reference correlations and predicted overall model accuracy.

Concentration gradients of ammonia, methane, and carbon dioxide at the outlet of a naturally ventilated dairy barn

Harsh Sahu

In naturally ventilated dairy buildings (NVDBs), accurately measuring gas emissions is both practically and economically complicated because their large vents are exposed to external weather conditions. Since representative sensor positioning for direct measurements is unknown, this study aimed to determine the optimal gas sampling position for such buildings by investigating the concentration gradients of ammonia, carbon dioxide, and methane at the outlet, taking into account the wind flows normal to the in- and outlet. The results showed that all three gases were spatially dispersed in both vertical and lateral dimensions. Subsequently, adding wind inflow speed information revealed that concentrations were mostly stable and properly mixed at the mid of the outlet, suggesting that the optimum gas sampling height should be above 1.5 m. These findings will be valuable for researchers looking to measure emissions from NVDBs by the direct method. However, the study was limited by the constant wind speed measurement height, and future research will focus on investigating vertical velocity gradients.

Tracing activity and lying behaviour in fattening bulls using an UHF/RFID detection system

Kay Fromm

Besides consumer acceptance, animal welfare has a strong influence in output and performance of cattle. The economic benefits to animal health have been sufficiently discussed about recent years. One way to trace the health and comfort situation of the herd is to determine the lying and activity behaviour. Lying time is an indirect marker for rumination, heat stress and other welfare parameters. For the measurement of activity/lying time an ultra-high-frequency (UHF) radio-frequency-identification (RFID) system was installed in a typical beef cattle barn in East Germany. Two groups from ten steers of the same age were equipped with passive ear-transponder. To validate the system, three cameras were installed to assure that the observed animals were standing and showed actual activity. Furthermore, the usage of accelerometers gave us a comparison to the activity and lying behaviour from the RFID system in the envisaged area. Over a period of 20 days videos, positions and pedometer data were gathered. The common use of the UHF system we want to evaluate is for dairy cows to predict fertility rate. The aim was to find out if we could transfer it into bull husbandry.

Assessment of heat stress in dairy cows with a combined consideration of individual animal traits

Sebastián Scappini

The effect of heat loads in high-yielding dairy cows, measured by the temperature-humidity-index (THI), on physiological and behavioral traits such as the variation of the core body temperature (CBT), ethological patterns such as standing time (ST) and lying time (LT), and their interaction with the environmental conditions (THI) are subject of study of this project. The objectives are to evaluate the effect of heat loads on the variability of physiological animal traits and activity behavior, and in particular to estimate to what extent and with what prevalence this has with core body temperature. Consequently, we hypothesized that the behavioral adaptation to heat stress, mostly seen as the position changing, whether standing (ST) to lying down (LY) and vice versa will be of similar magnitude.

Effect of cell size on mechanics of strawberry fruit tissue

Xue An

Strawberry fruit cells were suspended and cell size of strawberry fruit was measured with microscopy at different ripening stages. The laser light scattering density (LSD) particle size distribution analyzer was applied to measure the cell size distribution of cell suspension. The imaginary part, the absorption coefficient was measured with spectrophotometer at 405 and 655 nm. The mechanical properties of strawberry tissue were measured using the calibrated Texture Analyzer. The differences in cell size distribution of strawberries was analyzed and the differences in volumetric cell size frequency have an impact on fruit tissue mechanics was investigated.

Distributive conflicts and institutional change: the role of power in biogas development in Germany

Hyunjin Park

Faced with environmental and efficiency concerns, biogas plant operators in Germany have been increasingly asked to reorganize energy production in a way that is compatible with environmental, social, and economic sustainability. I investigate the strategies of different actors to influence the Renewable Energy Act since 2013 and the role of power in this process. With position paper analysis and expert interviews, I highlight how biogas actors stick to the previous settings, adapt themselves to the new conditions, and find new markets to survive in the energy transition. Finally, the paper shows how difficult it is to achieve long-term, sustainable inclusion of actors.

Unpacking barriers to circular business models in the food industry: A Fuzzy-DEMATEL analysis of cause-and-effect relationships

Davit Markosyan

Transition towards circular business models in the food industry is complex and the pathway encounters unique challenges. This paper has an objective to find out the interdependencies between the barriers and develop their hierarchy according to their significance. The cause-and-effect relationships among barriers by the fuzzy decision making-trial and evaluation laboratory analysis (Fuzzy DEMATEL) technique are quantified by two-stage interviews with the enterprises and circular economy experts. Through the findings of the paper, policy recommendations will

be elaborated for government authorities, as well as managerial strategies for practitioners involved in circular business model innovations.

Impact assessment of livestock production on water scarcity in a watershed located in southern Brazil

Sofia Helena Zanella Carra

Increasing agriculture and livestock water productivity is crucial, along with integrated management and governance of water resources. This study presents the assessment of water scarcity associated with livestock production in a watershed in southern Brazil where 115 farms are located. The methods AWARE and BWSI were applied monthly, and the characterization factors were regionalized in five scenarios assessed. Low water scarcity was observed in all scenarios assessed for both methods applied. Despite it is a non-alarming scenario, the insight gained from this study may support decision-makers, businesses and farmers to make better decisions in the watershed.

Changes in the physical and mechanical properties of hemp during retting and the challenges of measurement of tensile properties of hemp fibres

Angulu Morris

The physical and mechanical properties of fibre materials determine their suitability for application in any given area. Apart from the growth and retting conditions that directly affect the properties of the fibre, the method of measurement and the physical dimensions also influence the properties of bast fibres. This presentation will explore the changes in the material properties during the retting period and what they tell us about the stage of retting, the challenges in measurement of physical and mechanical properties of hemp fibres, and suggest alternative methods for evaluation of mechanical properties of hemp fibres and bast fibres in general.