TUM

3rd HEZagrar PhD Symposium
April 25th 2017

Hans Eisenmann-Zentrum for Agricultural Sciences (HEZ)

&

Graduiertenzentrum Weihenstephan (GZW)

Programme

Time	
9:00	**Welcome** (Prof. W. Windisch)
Ecology/Soil Science	
9:15	**talk 1**: B. Cania Effects of tillage on microbial potential to produce soil structure-stabilizing agents
9:30	**talk 2**: M. Grafe Microbial P transformation in agricultural soils
9:45	**Elevator Pitches:** Poster 1 to 8
10:15	**Coffee break**
10:30	**talk 3**: E. Pihlap Development of soil organic matter in an agricultural managed chronosequence on recultivated loess
Plant Sciences & Forestry	
10:45	**talk 4:** N.Metz Fight against Blight
11:00	Elevator Pitches (2 min each): Poster 9 to 15
11:30	**Postersession + Lunch break**
13:00	**talk 5**: M. Lang Arable plants for Bavaria's cultural landscape – Integrating rare and threatened plant species into arable production
13:15	**talk 6**: K. Messerer Robust portfolio optimization for forest management.
Animal Sciences	
13:30	**talk 7:** R. Hellmich Analyzing the role of gamma/delta T-cells in chicken by reverse genetics
13:45	**talk 8**: K. Lengyel The role of androgen receptor in avian sexual development
14:00	**talk 9**: D. Hoffmann Establishing a near infrared spectroscopy (NIRS) system to control feed quality of soy cake based on feed value assessments in-vitro
14:15	**Coffee break** + poster session + evaluation of posters und elevator pitches
14:45	**talk 10**: M. Zielasko Practical experience of an innovative process in catfish-aquaculture: Stress-free, autonomous movement from holding facility to slaughter
Economics	
15:00	**talk 11**: F. Frick Product innovation and efficiency in German dairy processing
15:15	**talk 12**: M. Kizil Innovative potential of the Bundesgartenschau: development of an evaluation models
15:30	Evaluation of talks
15:50	**Awards** for best elevator pitch, best poster and best talk

Short Abstracts

Talks

T1   Cania, Barbara
HelmholtzZentrum München, Research Unit Comparative Microbiome Analysis

Effects of tillage on microbial potential to produce soil structure-stabilizing agents
Good soil structure, which improves crop growth and prevents erosion, requires the presence of stable soil aggregates. Aggregate formation is driven by microorganisms. They produce exopolysaccharides (EPS) and lipopolysaccharides (LPS) which "glue" soil particles together. Thus, we used a metagenomic approach to investigate if conventional tillage compared to reduced tillage increases the microbial potential to produce EPS/LPS as soil structure is repeatedly destroyed.

T 2   Grafe, Martin
HelmholtzZentrum München, Research Unit Comparative Microbiome Analysis

Microbial P transformation in agricultural soils
The future availability of phosphorus (P) and environmental impact is disputed. Microorganisms take on a central function in the turnover of P in soil, thus making it available to plants. It is well known that fertilization can have an impact on microbial diversity and P mobilization. We are investigating how fertilizer can stimulate microbes and increase P availability for plants by using a metagenomic approach.

T3   Pihlap, Evelin
TUM, Soil Science

Development of soil organic matter in an agriculturally managed chronosequence on recultivated loess
Soil organic matter (SOM) and aggregation are important characteristics for designating soil physical, chemical and biological properties like water holding capacity, carbon stabilization and microbial habitat. We used a chronosequence approach in the recultivated open-cast mining area near Cologne, Germany to elucidate the development of soil organic matter during initial soil formation in a loess material. We selected six plots with different ages of agricultural management after recultivation (0, 1, 3, 6, 12, and 24 years after first seeding). In each plot 12 spatially independent locations were sampled with stainless steel cylinders (100 cm3) at three depths representing the topsoil (1-5 cm), the plough layer (16-20 cm), and the management-unaffected parent material (41-45 cm). From soil carbon content measurements, the concentration increased during the chronosequence and showed highest variability from 2,3 mgC/g to 18,7 mgC/g in the 3 years old field, which shows the beginning of the interaction between soil and biota, and carbon input.

T4   Metz, Nicole
TUM, Phytopathology

Fight against Blight
The importance of early blight on potato (solanum tuberosum L.), caused by the soil-borne fungal Alternaria solani, is increasing in the European countries in the last few years. The heavy use of the two main fungicide groups against A. solani leads to a higher risk of resistance development. Therefore, a deeper knowledge regarding the biology of the pathogen and the occurrence of mutations is needed to slow down the development of resistance against these fungicides. But also other ways to control early blight need to be analyzed in more details, e.g. biologicals or the reduction of the soil inoculum.

T5   Lang, Marion
TUM, Restoration Ecology

Arable plants for Bavaria's cultural landscape - Integrating rare and threatened plant species into arable production
The arable flora plays an important role in agro-ecosystems, but is considered to be currently one of the most threatened plant groups on this continent. The research project "Arable plants for Bavaria´s cultural landscape" aims to promote low competitive arable plant species by seed collecting, propagation and re-establishment on extensively managed fields. In the first study year seeds were collected from 51 rare species on 93 arable fields within five natural regions covering large parts of Bavaria. Seed provenance effects on the fitness of the study species are addressed in scientific investigations.

T6   Messerer, Katharina
TUM, Forest Management

Robust Portfolio Optimization for forest management
The idea of this new approach is to avoid limitations of stochastic optimization by choosing a non-stochastic portfolio optimization model. The economic output of forest stands with different tree species and age classes is optimized by combining the different management options. Uncertainties of input parameter are included and thus risk aversion of forest owners can be adjusted. This approach tends to show effects of forest management options in an uncertain surrounding of continuous cover forestry.

T7   Hellmich, Romina
TUM, Reproductive Biotechnology

Analyzing the role of gamma/delta T-cells in chicken by reverse genetics
T cells represent an important effector of the adaptive immune system and are divided into two subpopulations depending on their surface receptor: $\alpha\beta$ and $\gamma\delta$ T cells. Eventhough $\gamma\delta$ T cells represent the major T cell population in chickens, their role in the adaptive immune response is still poorly understood. In order to analyze the function of these cells, we generated chickens with a knockout of the γ chain constant region which will cause the deletion of $\gamma\delta$ T cells in vivo. Challenge experiments of $\gamma\delta$ T cells deficient birds with Eimeria spp. will give insights into the role of this T cell population in chickens.

T8   Lengyel, Kamila
TUM, Reproduktive Biotechnology; MPI Seewiesen

The role of androgen receptor in avian sexual development
Androgens are steroid hormones, which play an essential role in male sexual development and maturation. They act via binding to the androgen receptor (AR). The expression of the AR in chickens has previously been studied. However, its exact role is still poorly understood. The goal of our study is to generate androgen receptor knock-out chicken. Our strategy will provide the possibility to examine the role of the AR in chicken sexual development.

T9   Hoffmann, Dominik
TUM, Animal Nutrition
LfL Institute for Agricultural Engineering and Animal Husbandry

Establishing a near infrared spectroscopy (NIRS) system to control feed quality of soy cake based on feed value assessments in-vitro
When harvested from the field, soybeans and products contain significant amounts of antinutritive substances. In order to reduce those antinutritive substances to a tolerable minimum for monogastric livestock feeding, heat treatment is the most common method. Exposing the soybean to an over treatment with heat results in a reduction of utilizable amino acids and therefore reduces the quality of the feed. The project's goal is to optimize the heat treatment process using near infrared spectroscopy calibrations based on field trials and laboratory analyses.

T10   Zielasko, Marcus
LFL, Institute for Fishery

Practical experience of an innovative process in catfish-aquaculture: Stress-free, autonomous movement from holding facility to slaughter
The aim of the presented project was the development of a technical solution for the reduction or even avoidance of stress caused by catch of European catfish from holding tanks. Usually, this is done by netting, which goes along with singling the fish out of the water. This action causes a considerable amount of stress for the catfish. An innovative fish tank combined with a stunning unit was built for the experiments. By means of various stress- and flesh quality parameters the novel method was compared with the conventional method. Preliminary results will be presented.

T11   Frick, Fabian
TUM, Agricultural Production and Resource Economics

Product Innovation and Efficiency in German Dairy Processing
We examine the influence of product innovation output on technical efficiency of dairy processors in the German market. As a product innovation output indicator, we use the number of new products listed in yearly reviews conducted by an industry journal. A production frontierm is estimated with the use of publicly available financial data. We find a positive effect of product innovation on technical efficiency.

T 12   Kizil, Michael
TUM, Economics of Horticulture and Landscaping

Innovative potential of the Bundesgartenschau: Development of an evaluation model
The Bundesgartenschau has been held since 1951 in a two-year cycle. Over the past 10 years, it has been a tool for sustainable urban development. The aim is to develop a holistic evaluation model, taking into account not only economics, but also environmental and social factors. A significant role in this context is the aspect of digitization, which enables automated data collection and analysis.

Poster

- ***Plant Sciences & Forestry***

P1   Prey, Lukas
TUM, Plant Nutrition

Spectral phenotyping for grain yield prediction in winter wheat
Spectral reflectance measurements have been shown to be useful indirect selection tools in plant breeding for estimation grain yield during the vegetation period. We are evaluating spectral vegetation indices as well as multivariate approaches for the application in early grain yield prediction in winter wheat. The results can contribute to developing optimized spectral traits for the use in different growth stages.

- ***Animal Sciences***

P2   Kiel, Sina
LfL, Inst. für Tierernährung und Futterwirtschaft;
LMU, Veterinary Medicine

Deduction of prediction areas for parameters in blood and urine from dairy cows
Due to increased milk productivity and intensified feeding , dairy cows are exposed to increased risk for metabolic disorders . Thus, aim of this study is to establish a metabolic profile and to standardize blood sampling. Subsequently, this should facilitate detection of metabolic stress in subclinical conditions. The blood samples, used for this study derive from the project "optiKuh", a national consortium of 15 partners of science and industry.

P3   Ammermüller, Simon
TUM, Animal Breeding

Big data analysis for pinpointing a small but harmful mutation in a small breed
Twenty-five calves with the recessive painful skin disease epidermolysis bullosa were noticed in the local German Vorderwald cattle population.
Whole-genome haplotype based association testing and the analysis of whole genome re-sequencing data of 1686 animals revealed a nonsense mutation in the COL7A1 gene that segregated with the disease. This findings enable the detection of carriers to avoid matings between them and thereby preventing the birth of calves that suffer from a painful disease.

P4   Floßmann, Gabriele
TUM, Animal Breeding

Animal breeding by allelic design
Traditional animal breeding relies on existing variation. We evaluate an approach to stabilizing litter size in swine based on the design of novels alleles and genome editing.

P5   Laparidou, Maria
TUM, Reproductive Biotechnology

Analysis of the role of CXCR4 and CXCL12 in the colonization of the bursa of Fabricius during B cell development in the chicken embryo
Though the pathway of B cell development in the chicken is well studied, the mechanisms regulating the migration process need to be further examined. We consider the chemokine receptor, CXCR4, and

its ligand, CXCL12, as likely candidates to regulate the migration of B cell progenitors from the spleen, where they are first localized, into the bursa where they proliferate and mature. The significance of CXCR4 and CXCL12 was examined in the chicken embryo by inhibiting their interaction and examining the effects of the inhibition on the B cell migration and the colonization of the bursa.

P6   Sid, Hicham
TUM, Reproductive Biotechnology

Generation of an interferon type 1 receptor knockpout cell line for the investigation of Chicken IFNλ
The innate immune response mediated by interferons (IFNs) represents the first line of defense against different viral pathogens. To date, no specific assay for the investigation of chicken (ch) IFNλ is available. Using CRISPR/Cas9 and the retroviral vector system RCAS, we generated an IFNλ receptor knockout in DF-1 cells that expresses the cognate receptor of chIFNλ (IL-28RA). The established cell line may provide a valid assay for the exclusive investigation of chIFNλ in the future.

P7   Schlattl, Maria
TUM, Animal Nutrition

Experimental modelling of subclinical Zn deficiency in ruminants
The ruminant organism remains a "black box" regarding its Zn metabolism. This is due to the fact that the experimental modulation of the Zn homeostasis is quite complicated due to the complex interactions between the ruminal microbiome, the diet as well as the host. This PhD project aims in establishing a reproducible approach to induce subclinical Zn deficiency under practical feeding conditions.

P 8   Kirchner, Benedikt
TUM, Animal Physiology and Immunology

MicroRNA in native and processed cow's milk and its implication for the farm milk effect on asthma
Consumption of unprocessed milk reduces the risk of asthma and atopic sensitization by 30 - 50 %. Already in the first year of life, consumption of unprocessed milk protects from respiratory infections. However, consumption of raw milk is no solution as it bears a risk of potentially life-threatening infections. Hence, there is a need to identify those components of native cow's milk that carry the asthma- and allergy protective as well as the anti-infectious effect. A candidate molecule class with relation to immune functions are the micro RNAs (miRNAs), which have been described in cow's milk and in human breast milk.

P 9   Mussack, Veronika
TUM, Animal Physiology and Immunology

Excursion: Detection of autologous blood doping on the miRNA in a human study
The use of growth promoting and performance enhancing substances and methods is common in livestock farming as well as in elite sport. While many of the illicit activities are already detectable, there is still no reliable method to detect autologous blood doping in high-performance sports. Thus, it is aimed to detect variations in the miRNA profile in biofluids upon autologous blood doping in a human study.
In future, these variations might be used as a biomarker set in doping controls – single or in combination with other hematological markers.

P 10   Huber, Daniela Barbara
TUM, Livestock Biotechnology

Porcine models of cardiovascular disease
Cardiovascular diseases (CVDs) are a class of disorders of the heart and blood vessels and are the most common cause of death globally. Modelling of age-related cardiac changes and of hereditary cardiac diseases in representative animal models would be powerful tools for cardiovascular biology and could help to reveal novel forms of therapy. We are generating genetically modified pigs that model age-related cardiac changes, based on cardiac-specific ERCC1 gene dysfunction. Furthermore, we want to generate a pig model for the hereditary disease Hypertrophic cardiomyopathy (HCM).

P11   Rieblinger, Beate
TUM, Livestock Biotechnology

Gene stacking at the porcine ROSA26 locus
Xenotransplantation from pigs could alleviate the severe shortage of human organs available for transplantation. Multiple genetic modifications are however necessary to overcome rejection mechanisms and species incompatibilities. To avoid transgene segregation during breeding of xenodonor animals and to ensure a ready supply of organs and tissues for transplantation, transgenes are best grouped at a single genomic locus. We adopted a 'gene stacking' approach to place several transgenes into the porcine ROSA26 locus by sequential gene targeting and to generate pigs carrying important xenoprotective modifications.

P12   Wander, Carolin
TUM, Livestock Biotechnology

Characterization and analysis of a porcine model for colorectal cancer
Colorectal cancer is the fourth most common cancer world wide. Animal models are essential to better understand this very lethal disease. Genetically engineered mice are very useful for basic studies but do not always replicate the human phenotype. We generated gene targeted cloned cloned pigs carrying the nonsense mutation, APC1311 that is orthologous to a human mutation associated with a very severe phenotype of colorectal cancer and the inherited condition familial adenomatous polyposis (FAP). The characterisation, analysis and optimisation of this model shall emphasise its potential for translational biomedical research.

P13   Schäffler, Andrea M.
TUM, Livestock Biotechnology

The ´smart graft´ strategy - Cytokine-inducible promoters for dynamic transgene expression
Cell-mediated rejection is a major obstacle to long-term graft survival in pig-to-primate xenotransplantation. To combat this we are pursuing a 'smart graft' strategy, equipping grafted porcine organs with T cell regulatory (e.g. galectin 9, PDL-1) and anti-inflammatory transgenes (e.g. TGFb, IL-10). Because constitutive expression of such constructs could lead to immuno-deficiency in the donor animals, expression is designed to respond to incipient rejection – characterized by inflammation and tissue injury – using NF-κB-dependent promoters to drive the transgenes.

■ *Economics*

P 14   Mack, Christina / Brem, Johannes
TUM, Agricultural Production and Resource Economics;
LfL Ernährungswirtschaft und Märkte

Optimization of agricultural supply chains through collaboration - Empirical policy recommendations for Bavaria
Depending on the theoretical perspective referred to, collaboration may yield a number of benefits including the reduction of transaction costs, gaining bargaining power, economies of scale, or increasing social capital to name a few (Halldorsson et al. 2007; Ireland and Webb 2007; Ketchen and Hult 2007; Van Dijk 1997). In the agricultural sector, a number of different types of collaborations exist, including for instance machinery sharing arrangements or producer organizations. While they have been adopted to different degrees by farmers, it is expected that there is still potential to increase collaboration in Bavaria and Germany for the benefit of the farmers. Therefore, the aim ot the project is to assess the different types of benefits collaborations provide to its participants. Besides this, to actually be able to deliver policy recommendations to increase collaborations (if appropriate), it is necessary to understand farmers motives such as incentives, perception, and doubts. In particular, six supply chains have been chosen to be research focus.

P15   Gerullis, Maria K.
TUM, Agricultural Production and Resource Economics

The Economics of Wheat Breeding
I assume that genetic diversity is the underlying resource stock for the social-ecological system of any plant breeding system. The contribution is looking at the flow of genetic material through the wheat breeding system. Basic economic incentive mechanisms are identified and analyzed.