Effect of an *Aspergillus oryzae* derived postbiotic on heat stress in *Drosophila melanogaster* and dairy cows

Yvonne Seidler (Institute of Human Nutrition and Food Science, University of Kiel, Kiel 24118, Germany), César Ocasio-Vega (BioZyme Inc., St Joseph, MO 64504, USA), Agustín. Rius (Department of Animal Science, University of Tennessee, Knoxville, TN 37996, USA), Kai Lüersen (Institute of Human Nutrition and Food Science, University of Kiel, Kiel 24118, Germany), Gerald Rimbach (Institute of Human Nutrition and Food Science, University of Kiel, Kiel 24118, Germany), Ignacio Ipharraguerre (Institute of Human Nutrition and Food Science, University of Kiel, Kiel 24118, Germany).

Introduction: *Drosophila melanogaster* (DM) has been increasingly applied in nutrition research in the past years. Due to its characteristics in its nutritional physiology and molecular targets, findings in DM could be relevant for livestock like dairy cows. Heat stress has been shown to impair cellular function and performance in animals. Thus, we tested the efficacy of a postbiotic derived from *Aspergillus oryzae* (AOP) to modulate thermal tolerance in ectothermic fruit flies and endothermic dairy cows.

Methods: Two DM strains were cultivated for 24h in a standard culture sucrose-yeast or same culture with 5% (v/v) AOP. Bodyweight and composition, metabolic rate, and heat stress (HS) tolerance (39°C,75 min) was measured. For 36 d, 48 lactating dairy cows were fed 0 (C), 3 (L), 6 (M) or 18 g/d (H) AOP in a TMR (41:59; F:C). Cows were in summer heat for 10 d with heat abetment. On d 11, heat abetment was removed. Intake, milk yield, body temperature, respiration rate and inflammation were evaluated.

Results: Feeding AOP improved survivability of HS flies compared to the control (58% vs. 25%, respectively). This response was associated with downregulation of genes associated with modulation of oxidative stress and immunity. In dairy cows, AOP reduced circulating acute phase proteins and expression of IL-6 expression in white blood cells. Additionally, AOP increased energy-corrected milk yield and its components, suggesting improved lactogenesis and metabolic efficiency.

Discussion: Collectively, our data demonstrate that a postbiotic from *Apergillus oryzae* significantly enhances thermal tolerance and performance both in Drosophila melanogaster as well as in lactating dairy cows. *Drosophila melanogaster* is as a versatile model organism which can be applied to get mechanistic insights by which postbiotics relevant to animal nutrition modulate heat related stress response.