



HAL
open science

Probiotics impact on *Tenebrio molitor* performance, microbial composition and pathogen infection

Christina Nielsen-Leroux, Carlotta Savio

► **To cite this version:**

Christina Nielsen-Leroux, Carlotta Savio. Probiotics impact on *Tenebrio molitor* performance, microbial composition and pathogen infection. EAAP (European Federation of Animal Science, Sep 2022, Porto, Portugal. <hal-04370197>

HAL Id: hal-04370197

<https://hal.inrae.fr/hal-04370197v1>

Submitted on 2 Jan 2024

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



HAL Authorization

Oral presentation onsite

73rd Annual meeting of EAAP (European Federation of Animal Science)
Porto 5th-9th September 2022, Porto, Portugal

Probiotics impact on *Tenebrio molitor* performance, microbial composition and pathogen infection

C. Savio^{1, 5}, P. Herren^{2, 3, 4}, A. Bruun Jensen⁴, J.J.A. van Loon⁵, C. Nielsen-LeRoux¹

1 University of Paris Saclay - INRAE, Jouy en Josas FR | 2 University of Leeds - School of Biology, United Kingdom | 3 UK Centre for Ecology & Hydrology, Wallingford UK | 4 University of Copenhagen - Department of Plant and Environmental Science DK | 5 Wageningen University -Laboratory of Entomology, The Netherlands

The yellow mealworm *Tenebrio molitor* L. (Coleoptera: Tenebrionidae) is an insect model for infection and immunity studies and is mass-produced as feed and food. The industrial rearing of *T. molitor* on agricultural by-products may expose larvae and adults to microbes applied as biocontrol agents, e.g. spores of *Bacillus* bacteria and fungal conidia that could impact the performance of *T. molitor*. The project deals with experiments analyzing different outcomes of single and co-infections of *Bacillus thuringiensis*, and the fungal pathogen *Metarhizium brunneum* on the larval stages of *T. molitor*. Furthermore, as for other animals, the possible benefits of addition of active and tantalized probiotic bacteria to the feed is investigated. The pathogenicity of *B. thuringiensis serovar tenebrionis* (Btt) and *Metarhizium brunneum* KVL 12-30 has first been tested by single infection of *T. molitor* to define LD25 and LD50. Then targeted co-infections were performed to determine additive, synergistic or antagonistic interactions between these pathogens. Alongside infections, growth rate and survival rate are recorded and insect microbiota composition will be analyzed by 16S rRNA Mi-sequencing to measure how the probiotics *Pediococcus pentosaceus* and *Lactobacillus plantarum* and the pathogens modify the microbial composition. The hypotheses are: 1) *M. brunneum* and *Btt* have different mechanisms of infection, therefore dose and timing of pathogen exposure will influence the outcome; 2) the presence of probiotics may help the insect to cope with the infection by improving immunity, by presenting a shorter period for pathogen clearance and by expressing higher performance; 3) the probiotics may help the insect by providing nutrients. Preliminary results show evidence of positive effects of adding a vital probiotics strain to the feed on *T. molitor* performance and survival highlighting the role of probiotic metabolites and microbiota relationship for maintaining host health.