

## Bioactive novel foods: A case study employing the use of probiotics in edible insects rearing

**Maria Touraki**

Aristotle University of Thessaloniki, Greece

**S**tatement of the Problem: The steady population increase poses a demand for higher food production on available production systems. The main sources of the most essential nutrient, namely protein, are animal based and include livestock and fish. Livestock requires land, feed and water and emit greenhouse gases and ammonia, while fish populations are declining due to overuse. The tendency towards healthier protein sources to lower disease risk led to the use of novel foods, such as edible insects, that contain high quality protein, suitable for human consumption, or livestock feeds. Since insect consumption might entail risks, the use of probiotics was recommend (Grau et al., 2017). The purpose of this study is to examine the effects of the incorporation of probiotic bacteria on growth performance and nutritional value of the yellow mealworm, *Tenebrio molitor* to be used as feed. Methodology & Theoretical Orientation: Three probiotic bacteria, were immobilized on wet feed and administrated to mealworms. Growth in terms of body weight, length gain and time until pupation were recorded. Nutritional quality was evaluated in terms of protein, lipids, carbohydrates, ash content and fatty acid analysis. Findings: The results showed that probiotics resulted in weight and length gain and a significantly shorter time until pupation. Regarding nutritional value, probiotics resulted in higher protein and dry matter content, lower fat content, while palmitic and myristic acid significantly decreased and stearic levels increased in all bacterial treatments. Conclusion & Significance: The inclusion of probiotic bacteria in the insects' diet, resulted in significantly improvement of growth and of the nutritional profile of mealworms. The results of our study combined with insect processing by freeze drying, may provide insect industry a means towards the production of nutritious insect-powders enriched with probiotics, to cover current and future food market demands.



## Recent Publications

1. EFSA Panel on Nutrition, Novel Foods and Food Allergens (NDA), Turck, D., Castenmiller, J., De Henauw, S., Hirsch-Ernst, K. I., Kearney, J., Maciuk, A., Mangelsdorf, I., McArdle, H. J., Naska, A., Pelaez, C., Pentieva, K., Siani, A., Thies, F., Tsabouri, S., Vinceti, M., Cubadda, F., Frenzel, T., Heinonen, M., Marchelli, R., ... Knutsen, H.K. (2021). Safety of dried yellow mealworm (*Tenebrio molitor* larva) as a novel food pursuant to Regulation (EU) 2015/2283. *EFSA journal*, 19(1), e06343. <https://doi.org/10.2903/j.efsa.2021.6343>
2. Grau, T., Vilcinskis, A., & Joop, G. (2017). Sustainable farming of the mealworm *Tenebrio molitor* for the production of food and feed. *Zeitschrift für Naturforschung*, 1–13. <https://doi.org/10.1515/znc-2017-0033>
3. Iggman, D. & Risérus, U. (2011). Role of different dietary saturated fatty acids for cardiometabolic risk. *Clinical Lipidology*, 6(2), 209–223. <https://doi.org/10.2217/clp.11.7>
4. Caparros Megido, R., Poelaert, C., Ernens, M., Liotta, M., Blecker, C., Danthine, S., Tyteca, E., Haubruge, E., Alabi, T., Bindelle, J., & Francis, F. (2018). Effect of household cooking techniques on the microbiological load and the nutritional quality of mealworms (*Tenebrio molitor* L. 1758). *Food Research International*, 106, 503– 508. <https://doi.org/10.1016/j.foodres.2018.01.002>
5. Dreassi, E., Cito, A., Zanfini, A., Materozzi, L., Botta, M., & Francardi, V. (2017). Dietary fatty acids influence the growth and fatty acid composition of the yellow mealworm *Tenebrio molitor* (Coleoptera: Tenebrionidae). *Lipids*, 52(3), 285–294. <https://doi.org/10.1007/s11745-016-4220-3>

## Biography

Maria Touraki is a chemistry and biology graduate with a PhD in biology, and is currently an ass. professor at the Department of Biology, School of Sciences, in the Aristotle University of Thessaloniki, Greece. She has been working on in improving the health and wellbeing of humans and animals through environmentally friendly treatments as well as on the development of analytical methods for the determination of antibiotics residues in animal tissues.