

Developing of low-impact diets for the mass rearing of *Acheta domesticus*

C. Jucker^{1*}, S. Belluco², D. Lupii¹, S. Savoldelli¹, L. Bonizzi³, A. Ricci², A. Mascaretti³ and L. Gasco⁴

¹Department of Food, Environmental and Nutritional Sciences, University of Milan, via Celoria 2, 20133 Milan, Italy; ²Istituto Zooprofilattico Sperimentale delle Venezie, Viale dell'Università 10, 35020 Legnaro (PD), Italy ³Department of Biomedical, Surgical and Dental Sciences, University of Milan, via della Commenda 10, 20122 Milano, Italy; ⁴Centro per lo Sviluppo sostenibile, via Daverio 7, 20122 Milan, Italy; ⁵Dipartimento di Scienze Agrarie, Forestali e Alimentari, Università degli Studi di Torino, L. go Braccini 2, 10095 Grugliasco (TO), Italy; costanza.jucker@unimi.it

In the recent framework of insect as sustainable protein source for humans, *Acheta domesticus*, the house cricket, is one of the species of major interest due to its high protein content. This species is reared worldwide and consumed whole or as a meal. Its mass rearing relies on grain feeds, using ingredients in competition with humans and animals, and with a high cost. By-products represent a useful source of feed for insects as they are available in huge quantity, low cost, often have a good nutritional profile and represent a waste for humans. Thus, they contribute to lower the environmental impact of insect production and its cost, that is negatively influenced by the cost of the rearing substrate. Furthermore, the use of waste as growing media contribute to its management and valorisation. In order to identify an optimal feed formulation for crickets, respecting the low environmental costs, in this study (included in the Project MAIC – model for rearing edible insects), we tested different diets formulated with low-cost raw-materials and by-products. Different ingredients were chosen considering the nutritional composition, the cost and the availability on local agro-food industries. Four diets were formulated using different percentage of the selected raw-material and by-products and with different levels of crude proteins, lipids and nitrogen-free extracts. Following by-products were used: brewery waste (trub or brewery' spent grain), maize distiller, rice hulls and soybean hulls. Experimental diets and the control (chicken feed) were provided in triplicates to a group of neonate *A. domesticus* reared at the University of Milan. Different growth parameters, the survival and the efficiency of the conversion of the ingested food were assessed until adult stage was reached. Though a high mortality was observed in all the tested diets influencing the final results, two diets with a protein content between 12 and 16% were identified as more promising and have to be deepen with supplemental trials. This study adds some useful information to the few data available on the identification of an optimal diet, which includes by-products or food waste, for the mass rearing of the house cricket.