

## Insects as Sustainable Protein Source

### Abstract

The growing world population, increasingly demanding consumers, limited amount of agricultural land and commitment towards reduction of the greenhouse gas (GHG) emission created an urgent need to find alternatives to conventional meat products.

Insects are promoted as alternative to conventional meat products and animal feed worldwide. Like most animals, insects are rich in protein and a number of essential amino acids (Kouřimská and Adámková, 2016). The digestibility of protein from insects is higher than proteins from plants and only slightly lower than egg or beef protein (Yada, 2018). They are also source of dietary fiber chitin. The nutritional content of insects can vary greatly by species, stage of growth, and feed (Kouřimská and Adámková, 2016).

The major advantages of insect farming compared to livestock production are: (1) lower land and water usage, (2) reduced GHG emission, (3) high feed conversion efficiency, (4) ability to transform low-value organic by-products into high-quality food or feed and (5) certain insect species can be used as animal feed or aqua feed. For instance, they can replace fish meal, which is becoming increasingly scarce and expensive (Huis and Oonincx, 2017).

The yellow mealworm meal, ŸnMeal™, is a highly digestible product with 70 % of high quality natural protein. Trial conducted on whiteleg shrimp (*Litopenaeus vannamei*) showed that introduction of ŸnMeal™ into the diet, up to 50 %, is beneficial for weight gain. In addition, showed impressive immunostimulant property by increasing the phenol oxidase activity by 400 % and improving the resistance against Early Mortality Syndorm (EMS). In case of rainbow trout (*Oncorhynchus mykiss*) the feed can be fully replaced by ŸnMeal™ reducing the growth time by 33 %. The conducted studies are identifying ŸnMeal™ as a promising replacement of fish meal.

### References

- Huis A, Oonincx DGAB. (2017). The environmental sustainability of insects as food and feed: A Review. *Agron. Sustain. Dev.* 37: 43.
- Kouřimská L., Adámková A. (2016). Nutritional and sensory quality of edible insects. *NSF Journal*, 4: 22-26.
- Yada RY. (2018). *Proteins in Food Processing*. Woodhead Publishing: Cambridge, UK.