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Mealworm: A promising alternative protein source for animal nutrition

Global food production system is facing challenges to meet the growing demand for quality animal products due to rising incomes, urbanisation, environment and nutritional concerns and other anthropogenic pressures. As the world population rises, the global food system faces an impending crisis and a major component of this crisis is the forecast that the livestock sector is growing at a rate that is deemed unsustainable. Insect consumption by humans has always been a worldwide practice. The practice of eating these six-legged creatures known as insects is called entomophagy, which is derived from the word "*ento-*", meaning insect, and "*-phagy*," meaning to eat. Insects are already used as food to sustain millions of people around the world, and have been for centuries. This food habit dates back to prehistory and is still traditional in many countries especially where food is in short supply but also where food security is not a major concern. 11 countries around the world had established commercial insect harvesting operations in the wild, from Australia to Vietnam, India, and beyond. In Europe and the US, we have been slower to catch on to this growing trend. But in recent years, budding entrepreneurs have heard the buzz and pioneered a suite of new technologies and methodologies to allow sustainable production of insects. Nutrition value of mealworm has been used as a protein source for domestic animals and even further for human consumption. Therefore, we must look to alternative sources of protein that can be produced on a viable and sustainable commercial scale, and in recent years edible insects have been proposed as one potential 'new' protein source for animals. The main reason for this is that many insects can be farmed at relatively low economic and environmental costs; farming insects use up to 50–90% less land per kg protein, 40–80% less feed per kg edible weight and produces 1000–2700 g less GHGEs (Greenhouse gas emissions) per kg mass gain than conventional livestock. Insects at all life stages are rich sources of animal protein. Until now, the main research efforts have focussed on the larvae of the Black soldier fly (*Hermetia illucens*), the maggot and pupae of the housefly (*Musca domestica*), the larvae of the mealworm (*Tenebrio molitor*), and insect families belonging to the order Orthoptera including locusts, grasshoppers, crickets and katylids. However, insects of the order Blattodea, like American, German, and Asian cockroach are also interesting candidates. A 2014 review by FAO scientists of feeding trials conducted on catfish, tilapia, rainbow trout, and several other fish species, as well as crustaceans, chickens, and pigs, concluded that insect meal could replace between 25% and 100% of soymeal or fishmeal in the animals' diets with no adverse effects. The nutritional profile of mealworms is comparable to other protein sources currently used in poultry feeds, especially fishmeal. On a dry matter basis, mealworms contain 44-69% protein, 23-47% fat than fishmeal contain 61-77% protein, 11-17% fat. Currently, mealworm are known in Indonesia as "*ulat hong kong*"which has been used widely as feed for pigs, poultry and fish.

Biography

Yusuf L Henuk is a Professor in the Department of Animal Science, Faculty of Agriculture at University of Sumatera Utara (USU), Medan, North Sumatera, Indonesia. He received a Bachelor's degree from the Faculty of Animal Science, the University of Nusa Cendana from 1980-1984. He obtained Master's in Rural Science (M.Rur.Sc.) from the University of New England 1991 – 1995 and continued Doctor of Philosophy (PhD) from the University of Queensland 1998 – 2001. He was a Visiting Professor to the Department of Poultry Science, Texas A&M University, USA (September – December 2010 & 2017). He was a prolific writer and has published many articles in international journal and mainly poultry science.

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