

# Edible insects

## - Instead of stepping on bugs, maybe we should be eating them?

Claudia Clarkson, University of Otago

This article was awarded first prize in the Food Tech Solutions NZIFST Undergraduate Writing Competition 2017. The annual competition is open to undergraduate food science and food technology students who are invited to write on any technical subject or latest development in the food-science and technology field that may be important to the consumer.

Insects are commonly seen as pests that people want to get out of their homes but these days people are looking at ways to get them into the kitchens of homes worldwide. Consumption of edible insects, also known as entomophagy, often arouses feelings of fear or disgust in many western consumers. However, over two billion people in mostly African, Asian, and Latin American countries eat insects as a routine part of their diet. With over 1,900 edible species, entomophagy is a growing area in the food industry with huge possibilities (Van Huis et al., 2014).

### Why do we need meat alternatives?

The world population is growing rapidly, with estimates that by 2030 the population will reach 8.5 billion and a staggering 9.7 billion by 2050 (UN, 2015). The demand for meat is also rapidly increasing in both developed and developing countries. Livestock farming takes up 70% of agricultural land use, and with high greenhouse emissions, the effect on the environment will continue to rise (Van Huis et al., 2014). As the global food crisis becomes more prevalent, the need for alternative meat options is becoming more crucial.

### Sustainability of insects

Insects are everywhere, making up over 90% of all animal life forms (Van Huis et al., 2014). However many people are unaware of the advantages in producing and distributing insects for human consumption. Rearing insects is a very sustainable practice compared to livestock farming, as they require significantly less feed, land, and water. For example, beef requires 12 times more feed than crickets. Moreover, crickets only require 1.5 litres of water to make one kg of protein, whereas beef requires an astonishing 3,400 litres (Van Huis et al., 2014). Crickets don't produce any green house gas, require significantly less land to rear, and produce minimal amounts of ammonia gas (Yen, 2009). Production of sustainable meat alternatives such as cricket flour could decrease the demand for meat and fish worldwide. This would in turn alleviate some of the stress livestock farming has on the environment.

### Nutritional benefits of insects

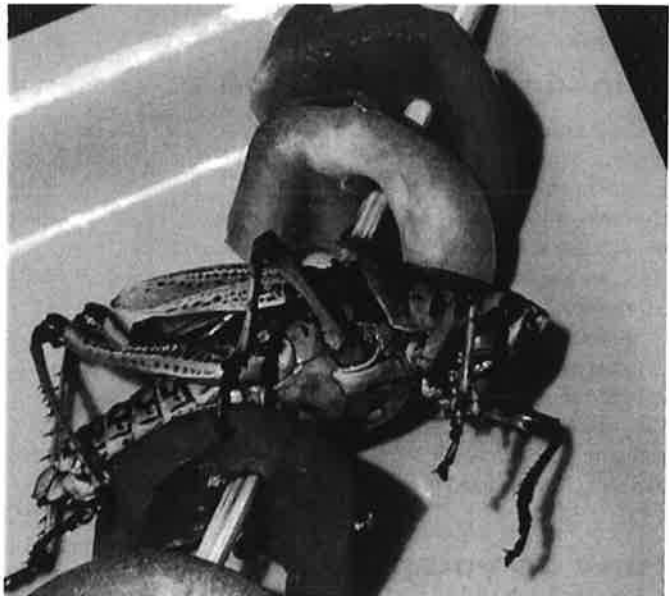
Producing insect products is not only sustainable, but can be very beneficial in terms of nutrition. Studies have looked into the compositions of a considerable array of species. Each varies largely

**FOOD TECH  
SOLUTIONS**  
www.fts.co.nz

The 2017 Student essay competition was sponsored by Food Tech Solutions, your supplier with a focus to food safety... An indispensable partnership to improve quality and reduce risk.

Products for:

Antibiotic detection | Wine and food analysis | Allergens and rapid microbiology | Residue and sterility checks | Textural and physical profiling | In-process rapid hygiene testing.



due to their habitat, diet, metamorphic stage and processing (Van Huis et al., 2014).

Rumpold and Schlüter (2013) collated the nutritional composition of 236 edible insects from various literatures. The protein content is significant, with levels (based on dry matter) reaching up to 71%. The house cricket (*Acheta domesticus*) had 66% protein, containing all the essential amino acids. Lipids are the second most abundant nutrient in edible insects. Lipid composition ranges from lower values found in crickets (13%) to higher values in caterpillars



(77%). The most abundant is polyunsaturated fatty acid followed by saturated and monounsaturated (Raksakantong, Meeso, Kubola, & Siriamornpun, 2010). Moreover Bukkens (2005) stated that some insects have comparatively high iron when compared to beef. This is promising as many people lack this mineral in their diet, especially in some developing countries where meat is less readily available. Moreover high percentages of magnesium, zinc, and phosphorous were identified. Folic acid, riboflavin (B2) and B12 are also reasonably abundant, especially in cricket species (Rumpold and Schluter, 2013). The high protein, lipid, and mineral content of edible insects such as crickets, illustrate the possibilities as a meat alternative in the market.

## Consumer acceptance

In order to successfully introduce such a controversial and innovative product, it must be accepted by the end users. Although entomophagy is not uncommon in some Asian, African, and Latin American countries, it is widely unacceptable in others. Most attitudes towards the idea are disgust, fear or curiosity (Yen, 2009). Cultural beliefs and views are a significant barrier towards the acceptance of entomophagy. As most countries historically had access to larger animals as a source of protein, the domestication and consumption of insects was not considered. Therefore cultures developed norms of eating animals as a source of protein, and viewing insects as pests (Van Huis et al., 2014). Due to the limited knowledge, perceived risks and cultural taboos, eating insects is meeting with resistance in many western societies, including New Zealand (Pascucci and de-Magistris, 2013).

## How do you promote edible insects?

Due to the attitudinal barriers, the promotion of entomophagy needs to be tailored to increase knowledge of the benefits, lower the perceived risk, and normalise the behaviour. As Pascucci and de-Magistris (2013) outlined, there are two very different approaches to promote human entomophagy in western societies. First being a 'novel' food, which is aimed to excite and challenge consumers to try a new product. Second is promoting edible insects as a sustainable, nutrient rich ingredient that benefits specific target market needs. At this time, most consumers view eating insects as either disgusting or interesting, however

changing cultural norms and eating behaviours have happened before. For example, consumption of raw fish was not accepted thirty years ago, but now sushi shops are on most main streets in New Zealand (Van Huis et al., 2014). Educational strategies such as bug banquets have exposed interested consumers to the benefits and possibilities of eating insects as part of their normal diet. A Dunedin restaurant called Vault 21 has hosted such events and even sells locust products and meals to their diners (New Zealand Herald, 2016). Furthermore, the number of online stores for the purchase of edible insects is increasing in New Zealand. Brands such as Crawlers and Live Longer are distributing various products such as insect protein bars and flours. As numbers of environmentally and health conscious consumers increase (Colmar Brunton, 2016), there is potential for edible insects to be in kitchen pantries worldwide in the near future.

## References

- Bukkens, S. G. F. (1997). The nutritional value of edible insects. *Ecology of Food and Nutrition* 36(2-4), 287-319.
- Colmar Brunton. (2016). Better Futures Report 2016 Edition. Retrieved from <https://www.colmarbrunton.co.nz/news/better-futures-report/>
- NZ Herald. (2016). Locusts take city by swarm. Retrieved from <http://www.nzherald.co.nz>
- Pascucci, S and de-Magistris, T. (2013). Information bias condemning radical food innovators? The case of insect-based products in the Netherlands. *International Food and Agribusiness Management Review*, 16(3), 1-16.
- Raksakantong, P, Meeso N, Kubola J, Siriamornpun, S. (2010). Fatty acids and proximate composition of eight Thai edible terricolous insects. *Food Research International*, 43, 350–355.
- Rumpold, B. A and Schluter, O. K. (2013). Nutritional composition and safety aspects of edible insects. *Mol. Nutr. Food Res*, 57, 802-823.
- United Nations. (2015). World population Prospects: The 2015 revision. New York, America.
- Van Huis, A., Van Isterbeek, J., Klunder, H., Mertens, E., Halloran, A., Muir, A., and Vantomme, P. (2013). Edible insects: Future prospects for food and feed security. Rome, Italy: Food and Agriculture organisation of the United Nations.
- Yen, A L., (2009). Edible insects: Traditional knowledge or western phobia? *Entomological research*, 39, 289-298.