EDIBLE INSECTS

Background

Entomophagy refers to the human consumption of insects or bugs. Humans have harvested the eggs, larvae, pupae and adults of certain insect species from forests or other suitable habitats, for the purpose of eating them, for thousands of years.

The farming of edible insects has traditionally occurred in Asian countries but in recent years, is becoming more common in other parts of the world.

Considering the world's growing population and the increasing demand for production of 'traditional' meat, edible insects may be considered as a more common source of animal protein in the future. Breeding insects could also offer environmental advantages because of low greenhouse gas emissions, water pollution and land use impacts (van Huis et al., 2013).

Insects can be processed and consumed in three ways (van Huis et al., 2013):

1. as whole insects,
2. in ground or paste form, and
3. as an extract of protein, fat or chitin for fortifying food products

The nutritional value of edible insects varies between species, but in general, they are highly nutritious and especially rich in proteins.

Rumpold & Schlüter (2013) compiled nutrient compositions of 236 edible insects and concluded that insects provide satisfactory amounts of energy and protein, are high in monounsaturated and/or polyunsaturated fat, and are rich in vitamins and minerals and, in some cases, folic acid.

However, eating insects could pose a risk of microbiological and/or chemical contamination, and cause an allergic reaction. The risks can be minimised if insects are reared and processed properly, as outlined below.

Import checks

When importing insects for either human consumption or animal feed, the insects must be dead and heat treated. The Department of Agriculture, Water and the Environment (DAWE) is responsible for regulating the import of food into Australia and assesses each application on a case-by-case basis. The main requirements are:

- Insect species are not listed on the CITES list of endangered species http://checklist.cites.org/
- Insects have undergone heat treatment with supporting documentation.

DAWE may require additional information on an import declaration, together with the import permit.

The Biosecurity Import Conditions System (BICON) houses the Australian Government's Biosecurity import conditions database for more than 20,000 plants, animals, minerals and biological products. BICON helps to determine what import conditions exist and if an import permit is required. For more information, visit DAWE's Importing to Australia page at https://bicon.agriculture.gov.au/BiconWeb4.0/

Biosecurity checks

Certain insect species are declared as pests in NSW. Written approval from the NSW Department of Primary Industries (NSW DPI) Biosecurity & Food Safety is required for each proposed live insect species. This is subject to regulations under the *Biosecurity Act 2015.*

A species list (common name, genus, species) must be provided to NSW DPI for approval prior to rearing or processing insects.

The proposed insect species lists must be emailed to biosecurity@dpi.nsw.gov.au for assessment.

Food safety checks

The Food Standards Australia & New Zealand (FSANZ) Advisory Committee on Novel Foods (ACNF) has undertaken an assessment of three insect species for human consumption, as published in the FSANZ Record of Views:

- *Zophobas morio* (super mealworm)
- *Achaeta domestica* (house crickets)
- *Tenebrio molitor* (mealworm beetle).

These insect species were assessed and categorised as non-traditional and not novel foods in Australia and New Zealand. There were no safety concerns for human consumption. However, labelling of the true nature of the food is required.

Insect species not included in this list should be submitted to FSANZ for Novel Foods assessment to ensure they are safe for human consumption. For more information and details of submissions visit www.foodstandards.gov.au/industry/novel.

Rearing and processing checks

Good rearing practices

- Insect rearing must be undertaken in a closed environment where ventilation, lighting, temperature and humidity can be controlled.
- The facility must be sealed and have adequate systems in place to prevent entry of pests and escape of insects.
- Water and feed/substrates must be controlled according to the type of insects.
- Feeding times and type of substrate must be recorded and retained on the premises.
- Full traceability of substrates used is required.

Hygienic practices

- Insects like other animals can carry disease. Therefore, it is important that cleaning schedules and hygienic practices are in place throughout the chain (i.e. rearing, processing, packaging and transport).
- It is important to prevent cross-contamination from air, soil and other sources, and to ensure insect faeces is removed from containment areas on a regular basis.
- Any business processing food for human consumption must comply with Standards 3.2.2 and 3.2.3 of the Australia New Zealand Food Standards Code (the Code).

Effective processing techniques

- Insects may contain pathogenic microorganisms such as bacteria, viruses or fungi. Therefore, insects must undergo validated processing steps to safely reduce their microbial content. This can be achieved by the application of heat.
- Heat treatment has a minimal effect on chemical and physical contamination. Therefore, it is important to make sure that the level of chemical contamination is low to begin with. Chemical contamination may be present in insects because the chemicals exist in the substrates or environment (e.g. heavy metals, mycotoxins, pesticides), or likely to be used during rearing (e.g. antibiotics). The food must also be screened for physical contaminants after harvesting and processing.

Testing

- Feed/subtrates can be tested for heavy metals, pesticides and microbial contamination before being fed to insects.
- The final insect products should also be tested for microbial contamination and/or chemicals in accordance with current practices for other animal products. Testing should include *Escherichia coli* (less than 3

cfu/g), *Listeria monocytogenes* (less than 100 cfu/g) and *Salmonella* (not present in 25g).

Labelling

- The packaged product must comply with the labelling standards detailed in Part 1.2 of the Code.
  Due to the possible presence of allergenic proteins or proteins cross-reacting with allergens, the label should indicate the presence of insect protein and chitin, and that these may have an effect on people who are sensitive to shellfish products. These warning statements and declarations can be made in accordance with Standard 1.2.3 of the Code.

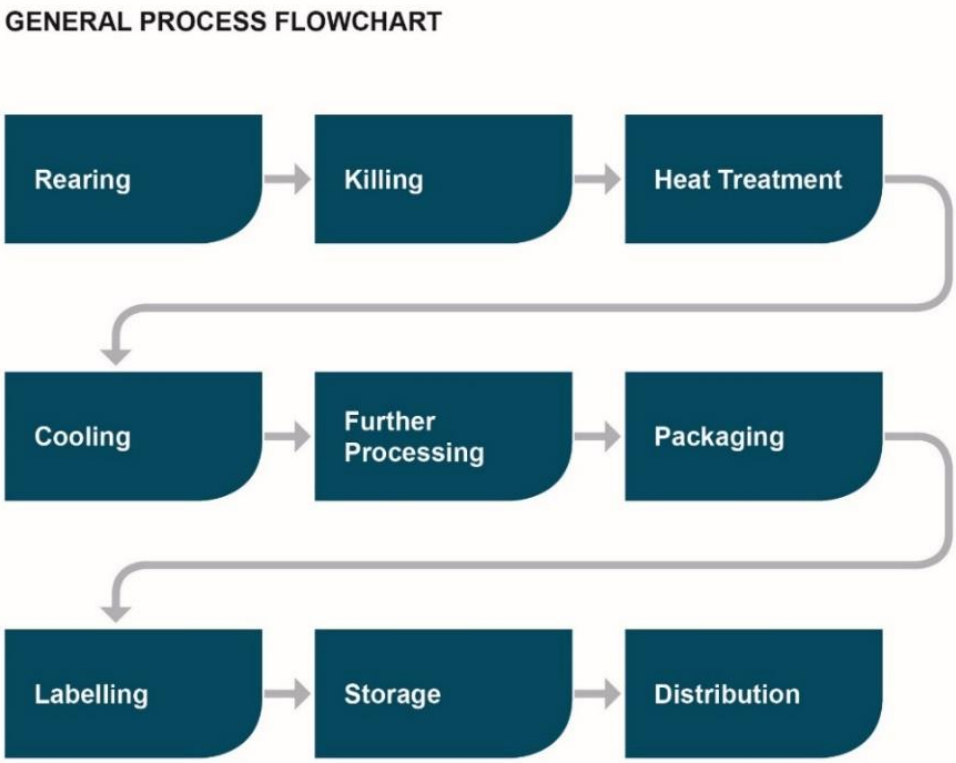
For more information on food processing or labelling requirements visit www.foodstandards.gov.au/

References

Food Standards Australia New Zealand (2017). *Food Standards Code* www.foodstandards.gov.au/code/Pages/default.aspx

Rumpold, B.A & Schlüter, O.K. (2013). Nutritional composition and safety aspects of edible insects. *Molecular Nutrition & Food Research, 57*, 802 – 823.

Van Huis, A., Itterbeeck, J.V., Klunder, H., Mertens, E., Halloran, A. et al. (2013). Food and Agriculture Organization of the United Nations (FAO). *Edible insects future prospects for food and feed security*. Retrieved 4 August 2017 www.fao.org/3/i3253e/i3253e00.htm



About the NSW Food Authority: The NSW Food Authority is the government organisation that helps ensure NSW food is safe and correctly labelled. It works with consumers, industry and other government organisations to minimise food poisoning by providing information about and regulating the safe production, storage, transport, promotion and preparation of food.

Note: This information is a general summary and cannot cover all situations. Food businesses are required to comply with all of the provisions of the Food Standards Code and the *Food Act 2003* (NSW).