

Edible Insects and the Future of Food

Some experts think that edible insects could be a good option for sustainable protein production and consumption, and one of the keys to global food security in a world of nine billion people or more. We used the methods of Foresight to explore the potential of insect-eating within four different future scenarios. Interestingly, edible insects featured as a plausible part of all four imagined futures. This suggests that eating insects might become mainstream in a few decades. However, questions remain about the economic viability and food safety of insect-based foods. Research into these questions is necessary and justified.

There are more than 1,900 species of insect that feature in human diets around the world. With the challenge of feeding a rising global population more sustainably, some experts think that edible insects could contribute significantly to human food security in the future.

Edible insects contain protein with a little fat and dietary fibre, as well as some important micronutrients. Being cold-blooded, they are able to convert their feed into edible meat more efficiently than chickens, pigs and cattle, while producing fewer greenhouse gas emissions and requiring less land and water.

Edible insects are already being developed as an alternative feed for conventional livestock and farmed fish, in place of grain crops and fishmeal. A few insect products for human consumption are available from specialist retailers in Western countries and can even be found on the shelves in some branches of major supermarket chains in Belgium and the Netherlands.

Using Foresight to imagine scenarios for the future

We used the tools of Foresight to think about the potential of edible insects to contribute to human food security in a future global food system. Foresight offers a tool box of approaches and methods for thinking about the future in a methodical, deliberative way.

Foresight methods can be used to anticipate (not predict) plausible future developments, which can help society to prepare to meet future challenges or

even think about how to steer towards desired futures and avoid negative outcomes.

We convened an online discussion and a Foresight scenario workshop involving people with relevant expertise in fields such as entomophagy (insect-eating), nutrition, food security, public health and regulation.

In the scenario workshop the participants identified major trends and drivers of change, which they expected to play significant roles in shaping the future of global food and nutrition security. They used these as building blocks for four scenarios with different properties, as follows:

Scenario 1: A gated world

The 'gated world' scenario imagined a future characterised by a concentration of wealth and economic power with intensified resource constraints. It featured vertically integrated, socioeconomically segmented food systems. Big corporations produced edible insects in large quantities, and they were incorporated into highly processed foods. Conventional meat and fish become high-status foods consumed primarily by rich people, who were ready to pay for a high-quality, organic, 'natural' product. For the mass of the population, conventional meat became a rare treat.

Scenario 2: New Asia

Characterised by distributed economic power and intensified resource constraints many people developed a positive preference for edible insects in the 'New Asia' scenario. Conventional meat and

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fish became relatively expensive luxuries, frowned upon by some consumers. People ate many of their meals outside the home and developed cosmopolitan tastes. Many kinds of insect-based foods became common foods within a diverse food system. A few people reared their own edible insects at home.

Scenario 3: Mundus middle-class

In this scenario, economic power was more evenly distributed and resource constraints were substantially eased compared to today. The latter change was driven by technological breakthroughs in energy generation and storage, the rise of the sharing economy and a reduction in consumerist behaviour. Conventional agriculture became more environmentally benign, with insects being fed to livestock, while some consumers chose to eat insects in preference to conventional meat products. But insects were just one food among many available on the market and many people continued to eat meat.

Scenario 4: Bread and circuses

The final scenario was characterised by concentrated economic power and eased resource constraints. It was a highly unequal world in which the rich were able to enjoy a diverse diet of tastefully prepared foods while the food most

people ate was in the form of heavily processed food products manufactured and sold by big 'nutrition services' companies. Elites would eat whole insects occasionally as an exotic treat, but most people ate insect protein regularly, incorporated into baked goods, burgers, pies, and so on.

Insects could be the future

It is notable that edible insects featured in all four scenarios, suggesting that some kind of edible insect sector producing human food and animal feed is quite likely to emerge. This suggests that funding for research into production technologies and safety issues would be legitimate.

In all four cases the edible insects sector was envisaged as bifurcated into a fine foods concept at one pole and a mass-produced protein substitute at the other, but the relative size and importance of these two segments varied between the different scenarios.

The relevance of insect-based feeds in each scenario depended largely on whether conventional meat products remained an affordable and socially accepted option for consumers. Where conventional meat-eating remained an option, insect-based feeds could help to make conventional livestock production more sustainable.

Policy recommendations

A future of widespread entomophagy is plausible but many challenges would need to be addressed before the industry could emerge on a substantial, even global, scale:

- **Research is needed into production and processing technologies and food safety issues.** The economic viability of a future edible insect sector is substantially uncertain at present. It will depend on the size of the eventual market for edible insects as well as the scale economies of insect production and processing.
- **The reality of human insect-eating could increase the availability and affordability of healthy protein in the developing world.** Countries in tropical regions where insect-eating is already established may be in the best position to expand this market and companies in these regions may have a competitive advantage in serving it.
- **As developing countries become wealthier, insect-based foods may offer a more sustainable way to meet future protein requirements than conventional meat.** However, the assumption that it will be easier to persuade consumers to eat insects than convince them to eat less meat should be tested, and it is possible that other meat alternatives (such as lab-cultured meat or vegetable and algal proteins) may be as sustainable and marketable, or more so, than insect-based foods.



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Further reading

van Huis, A. (2013) 'Potential of Insects as Food and Feed in Assuring Food Security', *Annual Review of Entomology* 58.1: 563–83

van Huis, A.; van Itterbeeck, J.; Klunder, H.; Mertens, E.; Halloran, A.; Muir, G. and Vantomme, P. (2013) *Edible Insects: Future Prospects for Food and Feed Security*, FAO Forestry Paper 171, Rome: Food and Agriculture Organization of the United Nations

Credits

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