

The insect revolution: Too hard to swallow?

Feeding ourselves – and doing so sustainably – are challenges faced around the globe. With the need to find protein alternatives and more options on our doorstep, insects are being touted as a good solution for people, animals and the environment.



As world population increases, so too does the demand for food, especially meat. Unfortunately, traditional livestock production is exasperating water and land resources and will not, experts say, be able to meet future needs. Food scientists are certain that entomophagy – the human consumption of insects – can.

Insects are high in protein, fat and mineral content; they also grow quickly, require minimal space and can be reared on waste streams, including edible by-products from the food industry. And, nearly two billion people around the world – notably in Asia, Africa and Latin America – already consume more than 2,000 different types of insects, most of which are consumed or sold locally in street markets.

Insects are already a natural part of the diet of pigs, poultry and fish, and can, in certain countries, also be used in animal and pet food. This frees up natural resources and diverts more grain to human consumption – good news, given it's estimated that a third of the world's

cereal production is currently fed to animals. Using insects in feed also minimizes fishmeal production and therefore the impact of overfishing. Processed insects also have applications in medicine, cosmetics and alcohol.

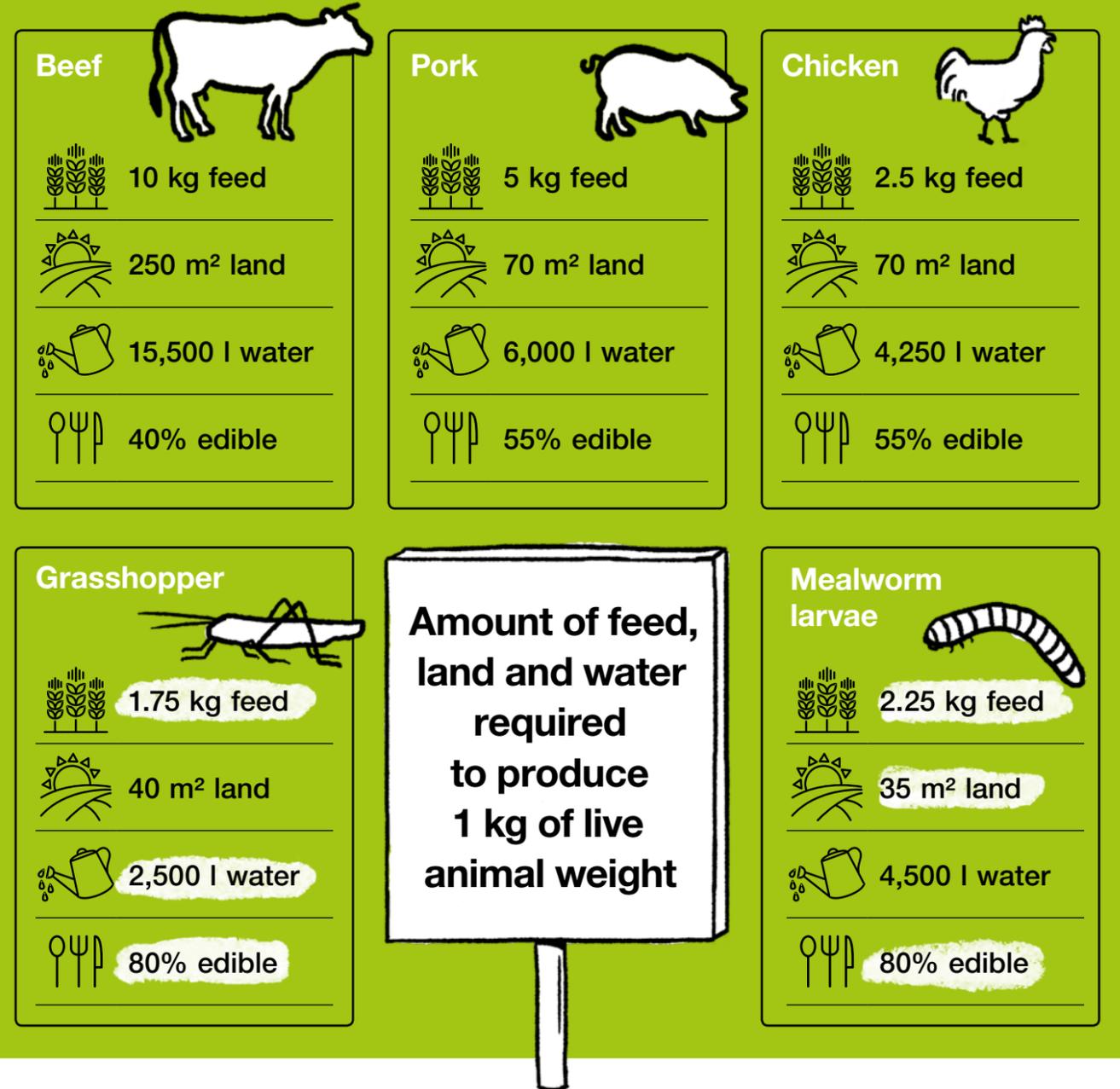
INSECTS AS FOOD

Depending where you are, the legal path to bring insect-based foods to market ranges from simple to more complex. In the UK, U.S., Australia, New Zealand and Canada edible insects fall under existing food regulations. In Switzerland, three insect species are approved for use in food. In 1997, the EU adopted the Novel Food Regulation, identifying as “novel” any food or food ingredient which had not been used for human consumption to any significant degree in the EU before May 15, 1997, including “food ingredients isolated from animals.” The vagueness of the language, which for example, made no reference to whole insects or ingredients from whole insects, led to diverse interpretations.

Technologies & solutions for insect-based industries

From devitalization, grinding and separation to drying, processing and packaging, GEA is well-positioned to provide all the necessary technology for processing insects. We're supplying processing equipment to the world's largest fly larvae manufacturer in South Africa to facilitate its expanding high-protein animal feed business and providing support to Australian feed start-up, Future Green Solutions.

GEA is also participating in a project with the Research Institute of Feed Technology in Germany, processing insects for the production of protein and fat.



In 2015 the language was finally clarified to cover whole insects and their parts and defined the standards and authorization procedures for the commercialization of “novel” foods, with the law coming into effect in 2018. As a result, insect-based products, even those previously approved, had to be submitted for a safety review by the end of January 2019 before being placed (or placed again) on the EU market.

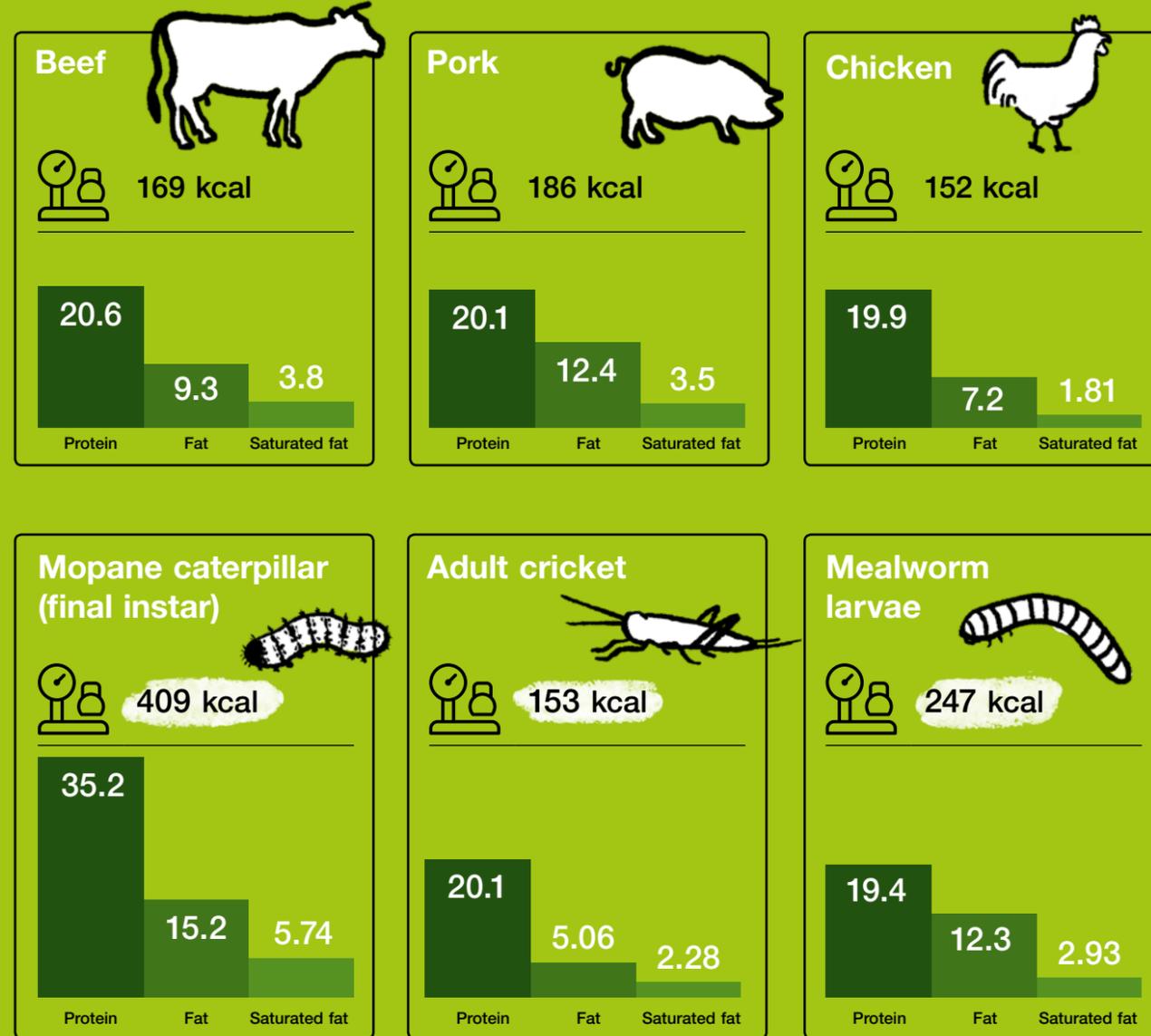
In the meantime, insect-based products (from whole insects to flours) have already found their way onto mainstream European shelves; for example, at global hypermarket Carrefour in Spain, which carries products from Jimini's, a French startup founded in 2012. With its insect-based products now on shelves in France, Belgium,

the Netherlands, Finland and Denmark, Jimini's owners expect acceptance to take time, but believe insects will be adopted faster than say, raw fish or sushi. Their estimate: less than 15 years.

Recent studies however, still reveal low acceptance across Europe, with “disgust” and neophobia clear barriers. Emeritus professor, Arnold van Huis, University of Wageningen, the Netherlands, who helped launch the topic of edible insects globally with his work for the FAO in 2013, believes that processed insects are the way to go for insect newbies. Dirk Sindermann, Head of Process Technology – Renewable Resources at GEA agrees: “If you can process insects or insect larvae in such a way that you get a neutral protein source in terms of taste,

How insects stack up to traditional livestock

Figures represent averages as species and diet all affect the nutrition profile; Nutrient content per 100g edible portion.



appearance, color and smell, then acceptance will be much higher. Only when they're processed will we see more widespread interest and insect-based foods becoming a sustainable industry."

According to Meticulous Research, even in the face of consumer trepidation, the global edible insect industry is expected to be worth nearly US\$1.2 million by 2023 with a 23.8 percent compound annual growth rate from 2018 – with the U.S and Canada predicted to deliver the highest growth. So who are these insect enthusiasts?

The target audiences are generally categorized as: adventurous eaters, health-conscious consumers or sustainability-minded eaters, often between the ages of 18-35, with children aged 4-8 also showing significant interest.

INSECTS AS FEED

On the feed side, momentum is also building. The EU permitted the use of insect protein as fish feed in 2017, an important step given fishmeal uses about 10 percent of the global fish haul, is expensive and difficult to source,

"Bon appétit!"

Tempura coated insect "nuggets," processed, formed and cooked with GEA equipment coming down the line at the GEA Food Processing Technology Center in Bakel, the Netherlands. Both burgers and these nuggets – made with ground mealworms – were served to enthusiastic participants at a customer seminar in 2016.



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due in part to overfishing. In the U.S., individual states decide if insects can be used in animal feed, whereas in Canada, insects are already approved for fish and poultry feed. The EU doesn't allow insects to be used in feed for poultry or pigs, due to historical problems with bovine spongiform encephalopathy (BSE) – mad cow disease – although it is allowed to feed live insects and fat derived from insects to farm animals. If the EU feed laws are relaxed, it's likely this market will explode, as companies are already geared up to produce tons a day if necessary.

Given the slow adoption of edible insects, it seems likely that the feed side will move more quickly. However, learnings around rearing, processing and supply can be transferred to the food side, explains Sindermann: "Nearly all of the know-how we are getting from the feed industry we can apply to the food industry." Adding that, "We believe in investing in innovative and future-oriented technologies and industries, even if we're not 100 percent sure they will succeed."

THE ROAD AHEAD

For insects to deliver the greatest impact, several things will need to happen. First, stakeholders want to see more data, not only when it comes to nutritional performance and safety, but also around solutions for increasing

automatization and lowering production costs. Secondly, once the data is available, legislation must be forthcoming and industry will need to scale up quickly to meet demand.

To maximize their sustainability, insects will need to play a critical role in the circular economy by being reared on leftover crops, food, food by-products and other kinds of waste (e.g. manure). Where countries land on the pre- and post-consumer waste continuum remains to be seen and will no doubt be hotly debated, but it will help "offset" the relatively high energy used during rearing, which depends on warm, ambient temperatures.

Lastly, increasing urbanization and the mimicking of "Western" values has caused some people to give up the practice of eating insects. A concerted effort is required to keep existing insect-eating traditions alive while continuing to promote it elsewhere – ensuring that early adopters have a positive experience. Changes in production and supply chain strategies will need to be explored to ensure new urbanites still have access to insect-based foods. Other watch-outs include: overexploitation, pollution, the use of pesticides and deforestation which need to be mitigated globally to safeguard existing insect populations.