

Insects as a source of protein for aquaculture and animal feed

Recent research projects and studies have concluded that insects may have the potential to serve as a sustainable source of protein for aquaculture and animal feed. For this potential to be pursued further, changes would be required in the current EU regulatory framework.

Background

The EU is highly dependent on the import of protein-rich animal feed (around 70%), mainly based on soya bean meal ([EIP Focus Group on Protein Crops](#), 2014). This dependency, including the associated risks, was also noted in 2011 in a European Parliament [resolution](#) on the EU's protein deficit. In the context of an increasing global population and rising per capita meat consumption, there is a growing demand for animal-based protein sources. This raises questions concerning future sources of feed protein in respect of their availability and suitability. For example, how feasible is it to increase yields from EU soya production? How realistic is it to expect alternative sources, such as aquatic biomass (algae and duckweed), vegetables or insects, to make the EU self-sufficient in feed protein? With UN [Food and Agriculture Organization](#) (FAO) reported increases in fishmeal prices (in a study carried out in 2013, hereafter referred to as the 'FAO 2013 study'), a number of research projects have been examining the use of insects as a sustainable source of protein for animal feed as well as food (with regard to the latter, see a recent [EPRS publication on insect food](#)). The findings from the research on insects as a source of feed highlight potential benefits that could be derived from this use of insects, as well as the barriers to such a development.

Potential benefits

In terms of potential benefits, some key points which emerge from research studies indicate that insects:

- have a number of features which make them well-suited for use in animal feed. Flies are a **natural food source** for pigs, poultry and many species of fish (see the [PROteINSECT](#) project, 2016);
- have a **high protein content** and are rich in other beneficial nutrients such as fats, minerals and vitamins (2013 FAO study; [Wageningen UR Livestock Research](#), 2012);
- are more efficient at converting feed into body mass, benefitting from a **higher feed conversion rate** (2013 FAO study);
- are reported to emit fewer greenhouse gases and less ammonia than cattle or pigs and require significantly less land and water than cattle rearing. As these findings are based on small-scale laboratory experiments, the 2013 FAO study advises that caution should be exercised in making comparison with large-scale pork and beef production.

The most promising insect species for large-scale production were found to be the larvae of the black soldier fly, the common housefly and the yellow mealworm.

A [survey](#) undertaken in 2015 by Ghent University provides an insight into attitudes, beliefs and perceptions regarding insect-based animal feed. With the survey involving a sample of 415 farmers, agricultural sector stakeholders and citizens in Flanders, Belgium, its results showed that two thirds of the participants were willing to accept the use of insects in animal feed, and only 17% rejected the idea. Compared to stakeholders and citizens, farmers were more critical towards using insects in animal feed. However, a majority of the farmers were receptive to the idea, with one quarter indicating that they would be willing to consider the rearing of insects on their own farm. Insect-based feed was perceived to be more sustainable and to have a better nutritional value but lower microbiological safety, compared to conventional feed. Overall, the



perceived benefits of using insects in animal feed related mainly to lowering the dependency on protein imports and obtaining the best value out of organic waste.

Barriers

A number of barriers to the development and commercialisation of insects as animal feed can be identified from these studies and the wider literature. These include:

- [safety considerations](#) associated with the use of insects in feed, including limited published data on the risks of using them and how they can be managed;
- current production processes for insect protein which are labour-intensive and require further development. If the wide-scale adoption of such an approach is to occur, the development of sustainable and economically viable insect production methodologies becomes essential;
- the current EU regulatory framework, in particular [Regulation \(EC\) No 999/2001](#) (also referred to as the 'TSE Regulation'), which was adopted to control, prevent and eradicate certain transmissible spongiform encephalopathies arising from poor control of meat and bone meal in animal feed during the 1980s and 1990s. The TSE Regulation imposed a general ban on the use of processed animal proteins (PAPs) in the feeding of both ruminating (such as cattle and sheep) and non-ruminant animals, including fish and other animal species used in aquaculture. In 2013, [Commission Regulation \(EU\) No 56/2013](#) came into force, allowing PAPs derived from non-ruminant animals (such as pigs and poultry) to be used in aquaculture feed. However this relaxation did not extend to insect PAPs which are still covered by the ban.

Outlook

There will be a continuing need for further research to provide evidence on quality and safety issues including performance trials of animals fed on insects as well as on the rearing of insect protein on organic waste sources such as manure. These points are reinforced by the conclusions of a [risk profile](#) published in October 2015 by the [European Food Safety Authority](#) (EFSA) concerning the production and consumption of insects as food and feed. [EFSA concluded](#) that when currently allowed feed materials are used to feed insects, 'the possible occurrence of microbiological hazards is expected to be comparable to their occurrence in other non-processed sources of protein of animal origin' ([EFSA](#)). The agency recommended better assessment of the microbiological and chemical risks from insects as food and feed, including further studies on the occurrence of hazards when using sources of food from an organism (or substrate) such as food waste and manure.

The output of a very recent research study entitled '[Insect protein – Feed for the Future](#)', has identified the need for updating the existing relevant EU legislation, which, as it explains, was designed for traditional protein sources. This would involve amending Regulation (EU) No 999/2001 to allow insect PAP to come potentially from Member State-approved processing stations or establishments, though the insect PAP would be limited to aquaculture.

This conclusion has been welcomed by the [International Platform of Insects for Food and Feed](#) (IPIFF) – an organisation representing the interests of private players in the insect industry. In a [position paper](#), it explains that despite insects being non-ruminant animals, insect proteins are not yet allowed in aquaculture feeds as the insects cannot be slaughtered in registered EU slaughterhouses. IPIFF is advocating the removal of this 'slaughterhouse requirement' from the TSE Regulation, as well as for the possibility of allowing insect PAPs to be used in pig and poultry feed.