An overview of the European market of insects as feed

01 | Insect farming is a growing industry in Europe

The production of insects for animal feed[1] and pet food is growing rapidly across the world. In the European Union (EU), innovative businesses - newly established, or previously active in biocontrol activities or the production of feed for niche markets[2] - diversified their operations by targeting the pet food market. Gradually, following the EU authorisation of insect processed animal proteins (PAPs) in aquaculture feed (i.e. July 2017), the aquafeed market became the main animal feed market for the producers of insects as feed.

In light of the recent discussions on the authorisation of insect PAPs for poultry and pig nutrition (April 2021), this factsheet presents an overview of the current status of the market for insects as feed and its forecasted growth by 2030. Concurrently, this document includes a couple of scenarios, which take into account recent projections published by reputable entities in the field of economic and modelling research[3] - as well a recently conducted survey which included the majority of the insects as feed operators active in Europe[4].

Facts & figures

IPIFF insect as feed operators presently employ about **1 000 FTEs** and are active in more than 20 countries. The sector may generate **25 000 jobs by 2030**;

More than **1 billion euros** have been invested in this sector since its establishment – this figure is expected to reach **3 billion euros** until 2025;

The total turnover of insect feed operators is expected to exceed **2 billion euros** per year by the end of the decade.

The regulatory framework will facilitate the development of the insects as feed sector

With several thousand tonnes of insect PAPs produced in 2020, the production of insects for feed is expected to increase rapidly in the coming years. Building on the total investment raised by the mid-2020s, the sector may reach a total turnover of circa 2 billion euros/year by the end of the decade[5]. This growth will materialise following the construction of new facilities (1 - logistical considerations). Subsequently, the production capacity of the sector may also be increased thanks to new legislative developments (2 - regulatory context), as well as consumer readiness (3 - awareness raising).

1 In this document, 'animal feed' refers to feed for food-producing animals (i.e. aquaculture, poultry and swine species).
2 Such as zoo and circus animals, reptiles, wild birds, etc.
3 'No Longer Crawling: Insect Protein to Come of Age in the 2020s' - Rabobank, 2021; 'EU Agricultural Outlook Report 2020-2030' - European Commission, 2020.
4 In addition to the IPIFF feed operators active in Europe, four non-European IPIFF members contributed to this questionnaire. While the latter category has a direct economic interest in the EU market, most of their products are presently targeting the international market (i.e. non-EU/non-EFTA countries).
5 According to a report of Meticulous Research, the net worth of the insect sector may reach 8 billion USD by 2030.

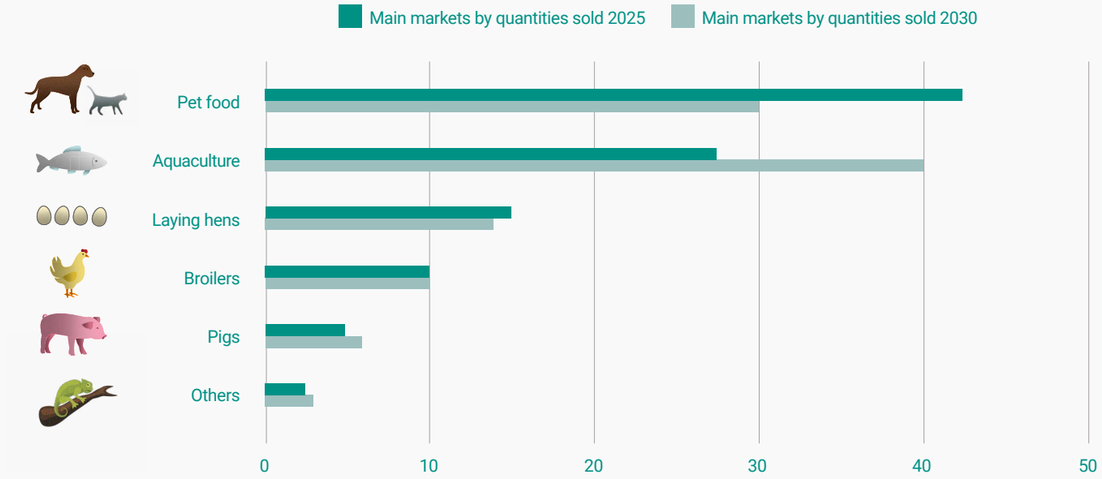
02 | Key economic figures

A. Main markets targeted by insect Feed Business Operators (FBOs)

The market of insects as feed is dynamic and depends on a series of factors. Among these, the regulatory context played an important role in the European Union. Notably, following the authorisation of insect PAPs in aquaculture, the aquafeed market became the main target for FBOs. According to IPIFF members, the authorisation of insect PAPs in poultry and pig feed will offer new opportunities - starting with the incorporation of such ingredients into the diet of such animals, the subsequent use of insects in organically farmed chicken and pigs, implicitly strengthening partnerships between insect and animal farms.

Such trends will also be stimulated by consumer choice (e.g. growing consumption of lower footprint animal-derived products, such as eggs, fish, chicken or pig), the growth of certain niche markets (e.g. free-range poultry, organic production value chains, etc.). The graph below indicates the expected growth of the main markets targeted by FBOs. In addition, this visual reflects a possible distribution of these markets by 2025 and 2030.

More specifically, by the middle of the decade, most of the demand for insect meal will lie in the pet food sector (circa 40-50% of the insect meal produced). Subsequently, the trend noticed after the authorisation of insect PAPs in aquaculture feed will continue - leading to a steady increase (reaching 25-35% in terms of share), stimulated by a growing demand for aquaculture products, such as carnivorous fish (e.g. trout, salmon). According to forecasts, the next relevant market for insects as feed operators in terms of quantities of insect meal sold will be the poultry (20-30%) and pig markets (5-15%) - that will see a rapid increase following the entry into force of the approval of insect PAPs this year.



By the end of the decade, new regulatory developments (e.g. authorisation of new substrates) are expected to play a key role in upscaling the production of insects and their derived ingredients - implicitly leading to a decrease in prices. However, the share of the different markets targeted by insect as feed operators presented in this visual may also depend on how the legislation will progress (e.g. which markets may open first – as mentioned in the section b **Production forecasts**). Such factors will make insect-derived products more attractive for certain markets: by 2030, the share of insect meal used in aquaculture is likely to surpass the pet food market (reaching 30-40% - in contrast to a slower increase of the pet food market, that will represent 30-35%). According to IPIFF members, the use of insect meal used in poultry and pig feed will increase gradually by 2030 - representing a similar market share to the one from 2025. While the poultry and pig markets are well established in the European Union, the quantities of insect-derived ingredients used in aquaculture also depends on how quickly EU fish farming will be upscaled. This sector is expected to continue its rapid growth across the globe and the EU Commission indicated that its success may contribute to lowering the footprint of EU's food systems: '*Aquatic production should double and the use of feed from insects and algae should increase*'[6].

At the time when this document was drafted, it is worth noting that these forecasts reflect the current agri-food trends with respect to consumer demand (e.g. growing demand for lower-footprint meat products), relevant EU initiatives (e.g. 'Farm to Fork' strategy, Organic Action Plan), as well as latest scientific and industrial developments (e.g. insect farming technologies, animal nutrition formulations).

6 'Recipe for change: An agenda for a climate-smart and sustainable food system for a healthy Europe' - European Commission, 2018.

B. Production forecasts - reaching 1 million tonnes of insect meal by 2030

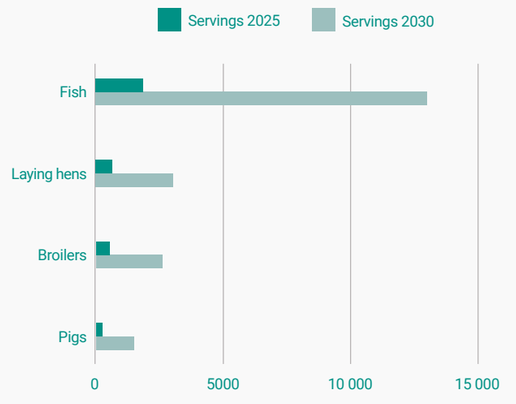
Until present, several reports developed forecasts or models that aim at anticipating the future capacity of the insect sector. Such analyses take into account market demand and economic indicators (i.e. Rabobank report), or projections that assess the possible technical limitations (e.g. the quantity of substrates that may be bioconverted by insects, as presented in the EU Agricultural Outlook report). This factsheet incorporates economic indicators and technical considerations, as reported by IPIFF members. However, we acknowledge that the main limitation of this approach is the absence of a precise timeline for upcoming regulatory developments (e.g. authorisation of new substrates). Subsequently, these forecasts do not assess the possible competition for substrates and the fact that some categories of these possible feedstocks may have a restricted application (i.e. specific to certain end-markets). As an aspirational target, we acknowledge that the total production capacity of the European insect sector may reach 1 million tonnes of insect meal by 2030 (i.e. including food-producing animals and other applications), if the appropriate conditions will be met (e.g. regulatory developments).

To remedy these limitations, three scenarios were developed:

Scenario 1
Diversifying the spectrum of authorised substrates before the middle of the decade

The diversification of the inputs authorised as insect substrates is seen as a catalyst in upscaling insect farming. Notably, up to a third of the food waste generated presently in the EU may be used as insect substrate - before it is classified as 'waste'. Specific examples of such products are former foodstuffs containing meat and fish or catering waste, that could be safely bioconverted by insects into protein and lipids - as well as insect frass. The approval of such substrates in insects farming establishments producing insects for the feed markets - before the mid-2020s - would play a key role in accelerating the growth of the sector. More specifically such developments could materialise through a fast-track process – that would include the diversification of new substrates for the insects intended for animal feed, pet food or technical applications – or by authorising such new inputs for insects intended for non-food-producing animals first (e.g. non-food producing animals - as mentioned in ***Scenario 2***), presumably followed by the approval of such new inputs in food-producing animals at a later stage.

Achieving the 'Farm to Fork' objectives - one plate at a time



The unit used in these graphs is 'million of servings'. Please note that the figures presented here are the result of approximate calculations, that are based on averages representative for the consumption patterns of EU citizens.

By the end of the decade:

- more than 10% of the fish consumed in the EU (the equivalent of circa 30 servings for each European) will be derived from fish farms that use insect protein in their aqua feed formulations;
- 1 in 40 eggs consumed in the EU will be derived from insect-fed laying hens;
- 1 in 50 chicken meat servings consumed in the EU will be derived from insect-fed broilers;
- 1 in 100 pigmeat servings consumed in the EU will be derived from insect-fed pigs.

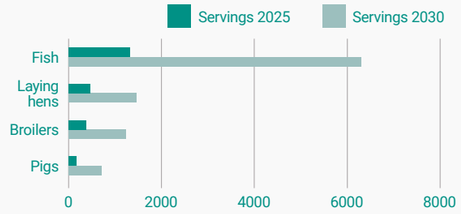
Scenario 2
Authorising the use of new substrates for non-food producing animals

At the time this was document was drafted, it is plausible that an intermediary step in approving new inputs in insect farming would be the authorisation of former foodstuffs containing meat and fish and catering waste for non-food producing animals and technical applications (e.g. biofuel production, bio-based applications, etc)[7]. More specifically, such developments could play a major role in upscaling the production capacity of the insect sector. Concretely, the share of the pet food market relative to the other animal feed sectors is expected to grow, however, without significant consequences on the quantities of insects as feed produced for the animal feed markets. Concurrently, the quantities of products derived from animals fed with insect-based feed are expected to remain comparable to those mentioned in ***Scenario 3***.

7 This scenario may materialise following an opinion of the European Food Safety Authority on the safety of the substrates that are presently not authorised for insects intended to be used in feed for non-food-producing animals and technical uses.

Scenario 3
Business-as-usual

The rapid upscaling of European insect farming following the authorisation of insect PAPs in aquaculture and non-ruminant livestock will result in a gradual increase in production capacity. Following the construction of new facilities, reaching this capacity will depend on the substrates available locally, as well as on the partnerships with different stakeholders involved in food or feed production (e.g. generating co-/by-products that would otherwise be downcycled). In contrast to ***Scenario 1*** and ***Scenario 2***, this scenario forecasts a slower growth of the sector's production capacity.



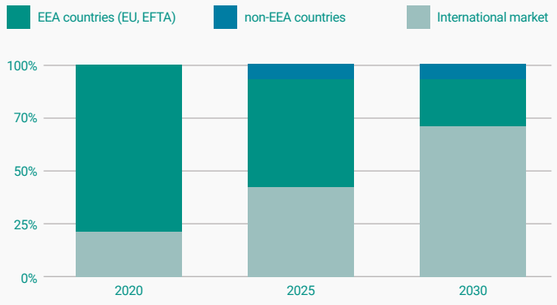
The unit used in these graphs is 'million of servings'. Please note that the figures presented here are the result of approximate calculations, that are based on averages representative for the consumption patterns of EU citizens.

By the end of the decade:

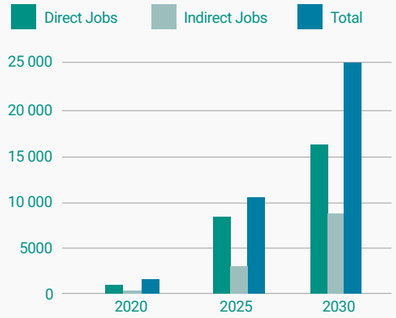
- more than 5% of the fish consumed in the EU (the equivalent of circa 15 servings for each European) will be derived from fish farms that use insect protein in their aqua feed formulations;
- 1 in 80 eggs consumed in the EU will be derived from insect-fed laying hens;
- 1 in 100 chicken meat servings consumed in the EU will be derived from insect-fed broilers;

03 | Geographic segmentation

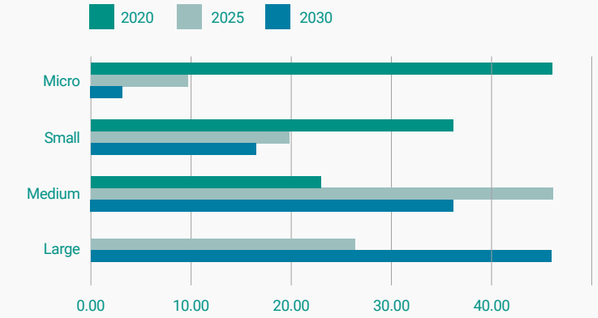
The vast majority of the actors consulted are presently active on a national level, where they run production facilities or pilot plants. In 2020, the majority of the IPIFF members producing insects for feed (4/5 of the respondents) were also targeting the EEA market. By the end of the decade, numerous insects as feed operators intend to expand outside Europe. Implicitly, this may also have an impact on the markets they will target – by 2030, the international market may become the main target market (2/3 of the respondents indicated).



04 | Employment



Insect feed business operators by company size



According to IPIFF members, the number of jobs generated by FBOs will increase gradually. Notably, an eight-fold increase in the number of direct jobs is expected by 2025 - and this figure may double by the end of the decade, exceeding 16000 jobs. A visible increase in the number of indirect jobs is also noted - by the end of the decade, indirect jobs will represent circa 1 out of the 3 jobs generated by FBOs (from 1 out of 4 in 2020). Insects as feed operators will generate more than 25 000 direct and indirect jobs by 2030.

The increase in the number of full-time equivalent employees will have an impact on the classification of the surveyed FBOs. Presently, most of the FBOs are SMEs (e.g. small enterprises, with 10 to 50 employees or medium enterprises, with 50 to 250 employees). Micro enterprises (1 to 10 employees) also represent more than 40% of the companies active in feed production. By the end of the decade, it is expected that almost 1 out of 2 FBOs will be a large enterprise - with over 250 employees. However, this proportion only reflects the status of the surveyed companies, since it does not take into account the emergence of new actors - either companies active in insect farming activities (e.g. insect food business operators) or other agri-food activities.

Data source: IPIFF survey on the market of insects as feed - Q1 2021

IPIFF developed a survey in early 2021 in order to evaluate a series of market indicators (e.g. current production capacity, economic or employment indicators) and develop plausible forecasts on the expected growth of the insects as feed sector. The respondents (32) are IPIFF members involved in feed production activities - mostly active in the European Union (4 non-European stakeholders were included in this survey, as they also intend to/will focus on the European market). All respondents of our study participated voluntarily. The companies represent key players and are among the most relevant actors on European, as well as global level. According to the respondents' inputs, the main species of insects covered were black soldier fly (*Hermetia illucens*) and yellow mealworm (*Tenebrio molitor*) as well as other species targeting niche markets.

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