



Biggest German producer of beneficial insects and mites

www.katzbiotech.de

Biological and integrated plant protection



Spin off from KBAG

First company in Europe to master the rearing of BSF in 2005

www.hermetia.de

Producer of insect products derived from fly larvae

Production site Baruth

3.500 m² Greenhouse

3.000 m² Production

Hermetia production, ecotox, insects and mites



ITC – Insect Technology Center

Gradestraße 40 Berlin - Neukölln

800 m² Lab 10 Scientists,

Master – Bachelor – Students, Interns

www.insektentechnologie.de



Production site Paplitz

5.500 m² Greenhouse

insect and mite production



Hermetia R&D Radeland

2 Cubes 12 x 12 x 5,

Approval phase for mass production



Facts about insects

- By far the class of animals with the most species
- About 1.000.000 species described
- Estimates: more than 2 millions species on earth maybe 5 millions or 10 millions not described by now (Prof. van Huis, Wageningen)
- Total weight of all insects = 4 times the weight of all other animals – including mankind – together
- Less than 0,1% dangerous for people

Insect Biotechnology

Three separate production areas

1. Breeding – reproduction cycle
2. Fattening – rearing of the larvae
3. Product manufacturing
 - a. Protein
 - b. Fat / Oil
 - c. Frass
 - d. Chitin

Black soldier fly (*Hermetia illucens*)

- Holometabolic life cycle
- No pest insect, no feed uptake in adult stage
- Degradation and conversion of organic substrates to protein, fat and compost



Nutrient content	(based on 88% dry matter)
Protein	39,2 %
Fat	35,7 %
Ash	9,02 %
Energy content	8342,90 kJ/kg (0,68 kJ/insect)
Calcium	24,07 mg/g

Source: Katz (2012)

Holometabolic life cycle



Mating

Egg-Laying

Search for Mating Partner

Hatching

Egg-Harvesting

Metamorphosis

Egg-Hatching

Pupae

Young Larvae Growth

Pre-Pupae

Larvae Growth



Feed formulation



Larvae processing



Insect protein

- Contains all essential amino acids
- Best replacement product for fish meal known
- Feeding trials with dogs and cats very positive
- Feeding trials with Pigs, Chicken, Turkey and Fish also favorable

Fatty acids

quantity	unit	value
sat. fatty acids	%	78
unsat. fatty acids	%	21
melting point	° C	
iodine number		
saponification number		
peroxide value	meq O2/kg	0.29
acid number		2.14
ffa	%	0.98
tocopherol sum	mg/100g	6.5
Rancimat	h	50.5
oxid. stability Rapid Oxy	min	393
phosphorus	ppm	68 ?
sterin	mg/kg	3557
protein	%	1.1

fatty acids		%
lauric acid	C12:0	48
myristic acid	C14:0	11
palmitic acid	C16:0	16
palmitoleic acid	C16:1	0.1
margaric acid	C17:0	0.1
stearic acid	C18:0	2
oleic acid	C18:1	10
linoleic acid	C18:2	6
linolenic acid	C18:3	0.8
arachidic acid	C20:0	0.1

Insect frass

- Good fertilizer
- Possibility to be certified as organic fertilizer
- Can be used in biogas plant – 50% more Methane output than corn
- No competition to biogas processing,

Why is insect protein not used across the board???

Simple legal reasons

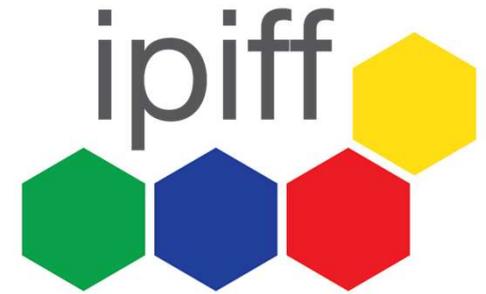
BSE / TSE

Bovine spongiforme Enzephalopathie

Transmissible spongiforme Enzephalopathie

EU 999/2001

... It is forbidden to feed processed animal protein (PAP) to farm animals. The only exception being fishmeal ... another exception is not allowed

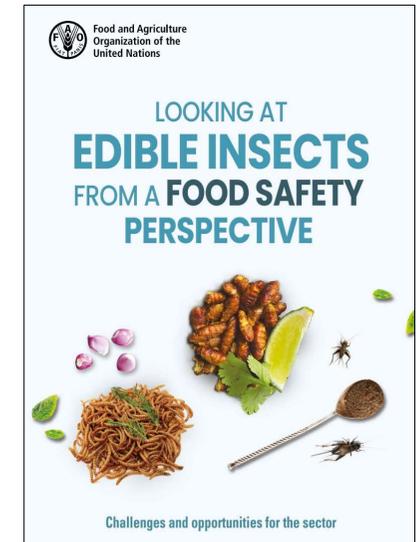


IPIFF

International Platform of Insects
for Food and Feed

www.ipiff.org

Circular farming systems have great potential to contribute to global challenges



Supporting the EU 'Farm to Fork' Strategy

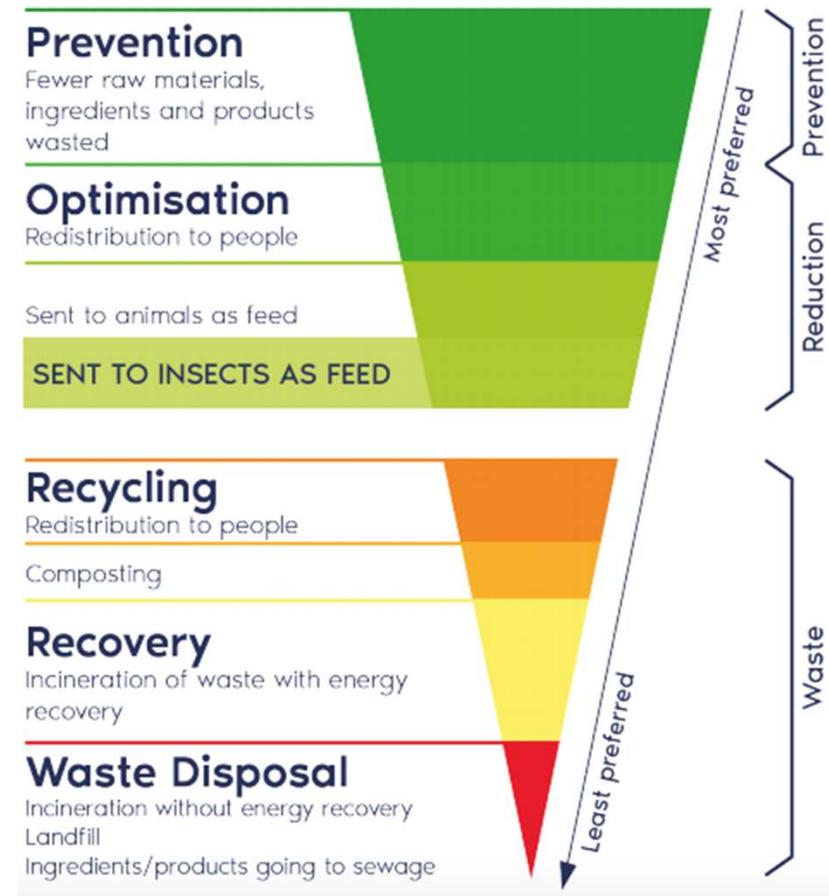
- The EU 'Farm to Fork' strategy (published in May 2020) aims to make Europe the global **pioneer of a food system that is fair, healthy and environmentally-friendly**.
- The strategy lays down the following **targets**:
 - ➔ Reducing the use of **fertilizers** by **20%** by **2030**;
 - ➔ Reducing food waste by **50%** by **2030**;
 - ➔ Reducing **nutrient loss** by at least **50%** by **2030**;
 - ➔ Ensuring that **25%** of agricultural land is under organic farming by **2030**
- ➔ ...'fostering EU-grown plant proteins as well as alternative *feed materials such as insects*' ...;
- ➔ A *key area of research* will relate to (...) increasing the availability and source of alternative proteins such as plant, microbial, marine and *insect-based proteins*.' ...;



A: Delivering on the objective to 'halve food waste by 2030'

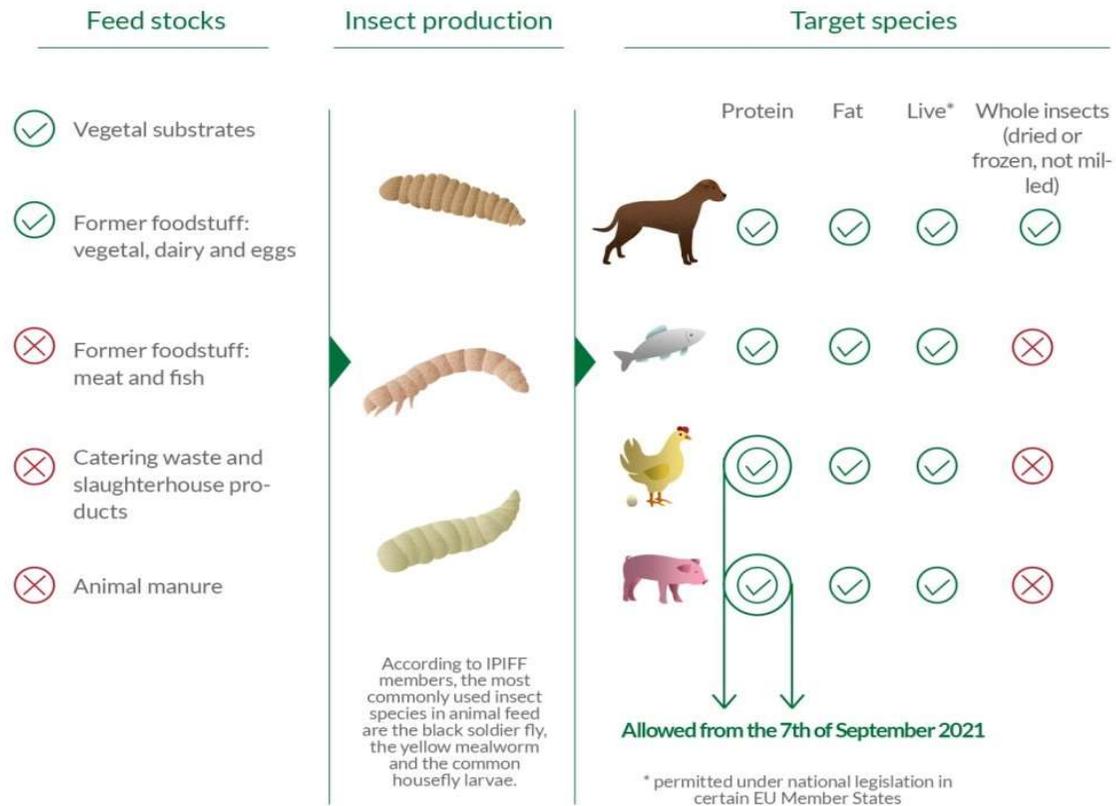
→ Through a circular approach, insects can reintroduce valuable nutrients into the animal feed chain.

→ From the total 88 million tonnes of food waste generated in the EU, about **30 million t.** of former foodstuff containing meat and fish and other agri-food co-/by- products could be upcycled through insect bioconversion – **contributing to reducing EU's food waste by a third.**



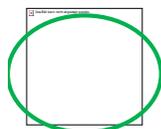
Source: [IPIFF Vision Paper](#) – IPIFF (December 2019)

EU rules applicable today: insect substrates and the use of insects in animal feed



Source: *IPIFF Regulatory Brochure – IPIFF (20 May 2022) design updated*

Connecting local agricultural supply chains



Farmed insects **generate highly nutritional** products, using local untapped resources, that can ultimately **improve EU's self-sufficiency** in terms of high protein feed materials and **improve circularity** in agriculture



Insect farming has a **low environmental footprint**, especially in terms of **land** and **water** use, and has **positive impact** on the preservation of **biodiversity**, by reducing the use of traditional protein sources, which have damaging consequences on our ecosystems



By connecting agricultural supply chains and bringing **diverse opportunities** for **farmers** involved in animal husbandry and crop cultivation alike and contribute to **boosting rural economies**.

Edible insects have the potential to reconnect the agri-food chains - from 'farm to fork' and beyond

01 Farmed insects not only reduce the dependency on imported sources of protein - they generate local products, using local underutilised resources.

02 Insect farms aim at diminishing the burden of food waste - in line with the waste hierarchy.

03 Insects are highly versatile, feeding on a wide spectrum of products - thus, by optimising the use of former foodstuffs as animal feed, insects can safely recycle materials that are not suitable for poultry, swine or ruminant species.

The European insect sector is committed to reducing EU's food waste burden. In order to maximise the circularity potential of insects, IPIFF aims at...

- facilitating the wider use of former foodstuffs
- diversifying the spectrum of substituted former foodstuffs
- further exploring the added value of valuing waste

By further recycling products that are not suitable for human consumption, insects can offer a sustainable and circular solution to the problem of food waste. Insects can be used as animal feed, as a source of protein, and as a source of chitin, which is a valuable material, with various applications.

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By-products from insect farming activities, such as insect frass, could play a key role in providing local solutions to improving soil fertility.

The best application of insect frass is consistent with circular economy principles: by reintroducing valuable materials into the food production cycle as alternative to fertilisers, while offering sustainable solutions to European farmers and/or gardeners.

Source: IPIFF Contribution Paper on Frass.

Out of the 90 million tonnes of food wasted annually in the EU, circa 1/3 could be safely upcycled through insect bioconversion.

Scale up to meet EU's ambitions.

Source: IPIFF factsheet 'Connecting local agricultural supply chains through insect farming' (February 2020)

Current state of development of the European insect sector

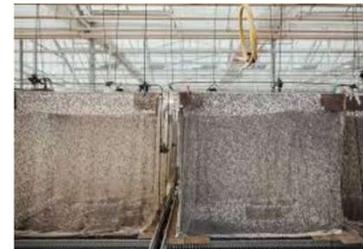
- More than **EUR 1,5 bln investments** until now: the sector is predominantly composed of **SMEs**.
- The sector has passed a **critical threshold** and has set its mark to **be commercially interesting**.
- **Production is scaling up** to meet the needs of food-feed-plants markets, while building up **know-how**.
- **Diversity in types of farms, operational sizes and production models** (e.g. 'full liners' vs. decentralized models)
- **Higher level of integration** with several other **production systems** (e.g. 'colocation' with agro-industries, partnerships with farmers)
- **3,5 thousands jobs created until today** (incl. above 1,000 direct jobs).

Insect feed producing companies' profiles and employment

Insect feed producing companies by size (in 2023)



(Source: IPIFF questionnaire - February 2023)



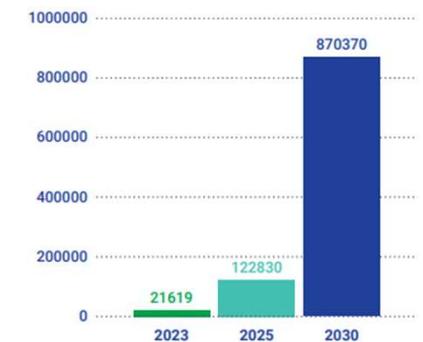
Perspectives on the development of the European insect sector towards 2030

The recent evolutions experienced by European insect producing companies are now shaping their ability contributing to **addressing the current deficit in EU domestic protein production** (both for food and animal feed).

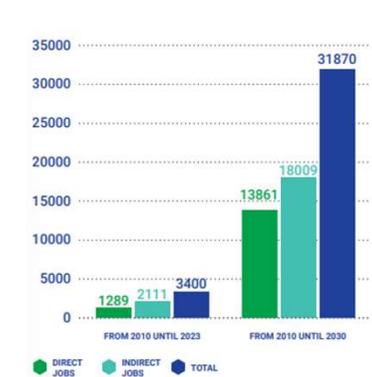
- by the end of the decade, there will be a significant spike in the **number of insect farms producing above 10,000 tonnes per annum**, thereby developing large-scale operations;
- The number of **European livestock farmers, who decide to diversify their commercial activities towards insect production**, will be increasing.



EVOLUTION OF ALL INSECT-DERIVED FEED PRODUCTS



TONNES OF INSECT PROTEINS PRODUCED BY IPIFF MEMBERS IN 2022

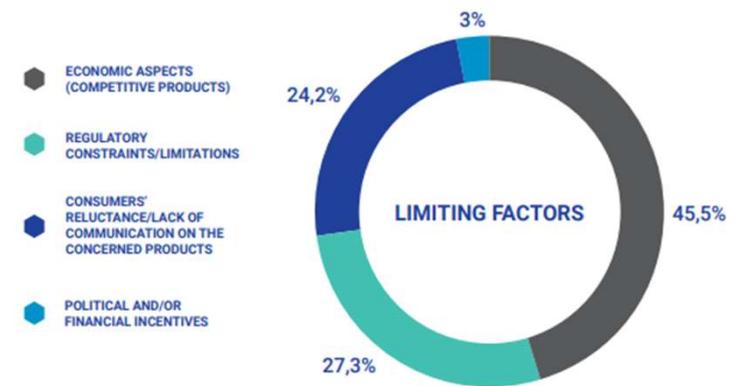


JOBS (I.E. DIRECT & INDIRECT JOBS) CREATED BY INSECT-PRODUCING COMPANIES SINCE THEIR INCEPTION AND FORECASTS FOR 2030

(Source: IPIFF Questionnaire—February 2023)

Main challenges ahead of the sector

- **Scaling up of production** remains the **main challenge of the insect sector** at the moment.
 - Economy of scale shall be fuelled through substantial investments in breeding and processing technologies
- Efforts to **document** and **communicate on insect production credentials** should be stepped up.
 - Such efforts would provide an incentive for European feed manufacturers, farmers and consumers to prioritise the use of such food or feed sources.
- **Regulatory constrains (...)**



(Source: IPIFF Questionnaire—February 2023)

Summary

Hermetia project

- Important element in circular economy
- Fishmeal is an ecological and economical critical resource
 - overfishing of the seas
 - environmentally problematic
 - dramatically rising prices
- Hermetia meal is a proven ecological and economical alternative to fishmeal as animal nutrition
- Global demand for good food and therefore for feeding stuff is rising
- Supports solution of certain waste problems
- Creation of technical products out of waste
- Production technology is available

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