

AUSTRIA

Greenhouse gas & ammonia emissions

Location
Wien

Programming period
2014 – 2020

Priority
P5 - Resource efficiency & climate

Measure
M16 - Cooperation

Funding (EUR)
Total budget 435 235
EAFRD 274 198
National/Regional 161 037

Project duration
2018 – 2021

Project promoter*
Umweltforschungsinstitut
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An EIP operational group investigated the use of insect larvae in fish, chicken, and pig feed as an environmentally friendly substitute for imported soy and fishmeal.

Summary

This innovation project was focused on whether the use of insect larvae in fish, chicken and pig feed would be more environmentally friendly than current, widely used yet ecologically problematic, protein sources such as imported soy and fishmeal.



To respond to this question, a transdisciplinary team worked for three years to investigate several aspects of the challenge. Black soldier fly larvae (*Hermetia illucens* L.) were fed by-products from food production (also called source substrate), and then used to produce substitutes that were added to compound feeds used in pig, chicken, and fish farming. Their nutritional properties, their economic efficiency, and their impact on GHG emissions were then tested.

Results

- The Operational Group mapped the effectiveness of a wide variety of residues and by-products. The resulting feed products (larvae meal and larvae fat) are very effective and the remaining substrate can be used as a valuable fertiliser.
- Larval protein from Austria was found, under certain production conditions, to be more environmentally sustainable than, for example, soybean meal from South America. Larvae meal from Austria produces between two to five kg CO₂-eq per kilogram, while a soybean meal from Brazil produces between six to eight kg CO₂-eq per kilogram.

Lessons & Recommendations

- The current legislation needs to be made more flexible in order to support practical innovation in this field.
- Standardised communication and dissemination requirements for funded activities are not necessarily appropriate for R&D projects.
- The inclusion of an individual overhead cost item for each project partner within the overall project budget is recommended.

* The Project promoter/beneficiary is an EIP-AGRI Operational Group (<https://ec.europa.eu/eip/agriculture/en>)

Context

European protein feed imports cause various problems. European livestock farming is highly dependent on world markets, and the import of soy and fishmeal contributes to negative ecological consequences, such as greenhouse gases, loss of biodiversity in the countries of origin, and overfishing of the oceans.

Austria is currently focusing on establishing and promoting a protein supply based on local sources within the country. Using insect larvae bred in Austria and processed into animal feed will help to achieve this, while adding value and promoting a resource-efficient circular economy.

The Operational Group set up comprised the independent environmental protection organisation GLOBAL 2000, two farmers, Bioforschung Austria, the agricultural research centre Raumberg-Gumpenstein, a fish farm, the Federal Institute for Water Management and the University of Natural Resources and Life Sciences.

Objectives

This EIP Operational Group aimed to:

- Use regional residues from Austrian agriculture or the agricultural value chain.
- Develop an efficient processing technology for making feed out of larval protein and larval oil.
- Test the suitability of the newly developed feed on fish and terrestrial monogastric animals and ensure the economic competitiveness of the final product (insect larvae as feed).
- Increase stakeholder knowledge concerning protein production from larvae.

Activities

During the project, black soldier fly larvae (*Hermetia illucens* L.) were fed by-products from food production (also called source substrate). The Operational Group organised larvae feeding trials to refine the process technology and to test the different compositions of various wastes and feedstocks that could be used to achieve sufficient quality and growth in the larvae.

Trials also examined whether the larvae could be preserved via the low-energy form of ensiling

The operational group investigated if and how mixed feed could be produced from the whole larvae and the individual components of the produced feed (either containing protein or defatted) and larval fat. Various combinations were tested for different outcomes / needs;

fish feed, for example, must not only have the right nutrient distribution but also certain sinking properties so that the fish respond to it.

Once the feeds had been successfully produced, the project team started feeding trials. In broilers, the trials were accompanied by measurements of odor and ammonia emissions, and on pigs, the focus was on the phosphorus digestibility of the larvae. The results were positive and allow for a reduction in the quantity of mineral phosphorus in feed rations. The Federal Institute for Water Management in Scharfling will implement the fish feeding trials in 2022.

To check whether this new feed is truly more environmentally sustainable than some of the common imported protein feeds (such as soy and fish meal) the project team conducted a life cycle analysis. This was conducted alongside an economic analysis and, as its final activity, the operational group disseminated the results amongst the relevant target groups.

Main results

- The Operational Group mapped the effectiveness of a wide variety of residues and by-products (e.g. brewer's grains and bioethanol stillage) that are used as substrates in larvae feeding. They also examined the production and composition of the larvae and the residual substrate.
- The resulting feed products (larvae meal and larvae fat) are very effective and the remaining substrate can be used as a valuable fertiliser.
- Larval protein from Austria was found, under certain production conditions, to be more environmentally sustainable than, for example, soybean meal from South America. Larvae meal from Austria produces between two to five kg CO₂-eq per kilogram, while a soybean meal from Brazil produces between six to eight kg CO₂-eq per kilogram.

Key lessons

- The current legislation needs to be made more flexible in order to support practical innovation in this field.
- The standardised communication and dissemination requirements for funded activities are not necessarily appropriate for research and development projects. 'Going public' with unfinished results may be counterproductive.
- Every partner is likely to incur a tangible amount of overhead costs due to day-to-day project administration. The inclusion of an individual overhead cost item for each project partner within the overall budget is recommended.