C3 New alternative sources of animal feed

Summary

The use of insects as an alternative protein source is a solution to the current and forecast future global protein shortage, that will initially impact on animal feed and, subsequently, on human consumption, in a context where demand is estimated to grow by 50 percent by mid-century, reaching 60 million tonnes of protein by 2030. Increasing world populations and changing diets have created an urgent need for the incorporation of protein supplements from sustainable sources into animal feed.
Insects are rich in protein and are a natural component of the diets of carnivorous fish and free-range poultry. Some insects can be reared on a wide range of by-products and provide a potential way of recovering materials discarded by agriculture and the food industry.

Objectives

The C3 project. The main objective of the project to find new alternative sources of animal feed is to study the feasibility of obtaining animal feed and feed products for poultry based on new alternative sources, such as insects.

Description of the actions carried out in the project

Activity 1. Evaluation and selection of by-products as a substrate for insect feed

Activity 2. Producing and rearing the insect *Tenebrio molitor*

Activity 3. Characterisation of the flour/product from *Tenebrio molitor*

Activity 4. Formulating organic feed and producing organic chickens using the formulated feed

Activity 5. Validation of the industrial feasibility of the animal feed production process

Final results and practical recommendations

The C3 project made it possible to explore new sources of protein for poultry feed, which provided similar results to current feed using soy as the main source of protein.
A range of organic by-products was identified that could be used as substrates for feeding *Tenebrio molitor*.
The flow for obtaining transformed animal protein (TAP) from *Tenebrio molitor* was defined and validated.
The flow chart for obtaining hydrolysed protein was studied by investigating two commercial enzymes and identifying yields similar to those for the process of obtaining TAP.
The on-farm pilot study was proposed to cover two critical feeding stages: pullet and fattening stage.
The technical-economic study found that feed and labour are currently the factors that directly impact on the cost of producing larvae. Using plant substrates and automating the process would cut costs, hence feasibility remains to be validated on an industrial scale.

Conclusions

By-products from the food industry need a stabilisation step and are stationary; therefore, a flow and availability diagram should be defined throughout the year.

The conversion rate was obtained for all the formulations tested, with higher values in the case of total protein substitution by TAP (100%).

No apparent differences in meat yield and amino acid profile were identified between any of the groups tested. Therefore, the use of TAP as a protein source for use in feed formulation was validated.

Leader of the Operational Group

ORGANISATION: GRANJAS ECOLOGICAS, SLU

Coordinator of the Operational Group

ORGANISATION: CATALAN MEAT AND ALTERNATIVE PROTEIN CLUSTER (INNOVACC)

Other members of the Operational Group (grant recipients)

ORGANISATION: Splendid Foods, SAU

ORGANISATION: Nutrex Pinsos, SL

Other members of the Operational Group (not recipients of the grant)

ORGANISATION: Iberinsect SCP

ORGANISATION: Eurecat Foundation

ORGANISATION:

ORGANISATION:

Geographical area(s) of application

PROVINCE(S)	REGION(S)
BARCELONA	OSONA
GIRONA	PLA DE L'ESTANY
TARRAGONA	BAIX CAMP

Dissemination of the project (publications, conferences, multimedia, etc.)

Publications in the INNOVACC newsletter:

- INNOVACC November 2019 Newsletter, where a news item on the grant application was published.
- INNOVACC June 2020 Newsletter, where a news item on approval of the project was published.
- INNOVACC August 2021 newsletter, where the news item "Us mostrem els casos d'èxit publicats a la revista anual d'INNOVACC publicada el juny-2021" (Success stories published in the June-2021 INNOVACC annual magazine) about this and other projects was published.

Presentations at the INNOVACC Assemblies:

- Presentation of the project to the Ordinary General Assembly of INNOVACC, on 15 June 2020.
- Presentation of the project to the Extraordinary General Assembly of INNOVACC, on 21 December 2020.
- Presentation of the project to the Ordinary General Assembly of INNOVACC, on 21 June 2021.
- Presentation of the project to the Extraordinary General Assembly of INNOVACC, on 21 December 2021.
- Presentation of the project to the Ordinary General Assembly of INNOVACC, on 20 June 2022.

Links to posts on the INNOVACC website:

https://www.innovacc.cat/2019/11/21/projectes-presentats-en-la-linia-de-grups-operatius-2019-del-darp/
https://www.innovacc.cat/2020/06/29/6-projectes-presentats-en-la-linia-de-grups-operatius-2019-del-darp-obtenen-resolucio-favorable/
https://www.innovacc.cat/2020/09/30/grups-operatius-2019-projecte-c3-noves-fonts-alternatives-dalimentacio-animal/

Links to participants' publications:

https://canduran.com/ca/splendid-foods-i-granjas-ecologicas-participen-al-projecte-sobre-noves-fonts-alternatives-dalimentacio-animal/
https://canduran.com/ca/splendid-foods-i-granjas-ecologicas-participen-al-projecte-sobre-noves-fonts-alternatives-dalimentacio-animal/
https://www.nutrex.es/ca/noticies/nutrex-participa-en-el-projecte-de-recerca-c3/
https://eurecat.org/portfolio-items/projecte-c3/

INNOVACC Magazine:

https://www.innovacc.cat/wp-content/uploads/2021/06/disseny-revista-innovacc-2021_ok.pdf (page 27)
https://www.innovacc.cat/wp-content/uploads/2022/07/disseny-revista-innovacc-2022_BR.pdf (page 15)

Congresses:

- Alternative protein conference organised by the DACC - Mas Bover School (Constantí) (22/09/22)
- Conference on innovation projects coordinated by INNOVACC on the subject of farms (28/09/22)

Project website

https://www.innovacc.cat/2020/09/30/grups-operatius-2019-projecte-c3-noves-fonts-alternatives-dalimentacio-animal/

More information on the project

PROJECT DATES	TOTAL BUDGET
Start date (month-year): July 2020	Total budget: €151,987.92
Completion date (month-year): September 2022	DACC funding: €62,114.31
Current status: Completed	EU funding: €46,858.16
	Own funding: €43,015.45

With funding from:

Project funded through Operation 16.01.01 (Cooperation for Innovation) through the Catalan Rural Development Programme 2014-2022.

Order ARP/133/2017 of 21 June, approving the regulatory bases for grants for cooperation for innovation by promoting the creation of European Association for Innovation operational groups in the areas of agricultural productivity and sustainability and the execution of innovative pilot projects by those groups, and Resolution ARP/1531/2019, of 28 May, announcing the call for the grant.

Generalitat de Catalunya
Departament d'Acció Climàtica, Alimentació i Agenda Rural

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