

INNOLEG - Innovative systems for obtaining LegHemoglobin for meat analogue products**Summary**

There is currently a market shortage of vegetable protein-based products with the characteristics of as many types of meat as possible. These products are known as meat analogues, and their main characteristic is that the consumer can use them as a substitute for the meat products that they are consuming.

The most obvious example is a beef burger. A meat analogue for this product would be a dish based on vegetable protein, such as soy, which would be cooked just like a beef burger and have the same appearance, flavour and colour.

The texture of this type of product is now quite effective, as many analogues have a consistency that is very similar to meat products. However, what is lacking is a solution that provides meat's typical flavour and colour, especially while the products are cooking.

LegHemoglobin, a vegetable protein derived from soybean nodules, provides the colour and basic flavour of meat for use in vegetable by-products, and in mixtures of meat and vegetables. This protein is obtained by modifying a yeast that secretes it, and it is subsequently purified for use in industry as an ingredient for vegetarian applications.

No company in Europe is currently able to produce this ingredient, and this project aims to develop a method to obtain it. Being pioneers in its development would enhance the competitiveness of Catalan companies.

Objectives

The project presented here aims to develop a process for obtaining LegHemoglobin in *Saccharomyces cerevisiae* yeast, as obtaining its original source - infected nodules of soybean root - is not feasible in large quantities. It also aims to study the industrial viability of this process, and to evaluate the use of protein for improving plant preparations intended for human consumption.

Description of the measures planned in the project

- Activity 1. Redesign and synthesise the sequence to be expressed to optimise its production.
- Activity 2. Develop vectors that enable its expression and secretion in the culture medium.
- Activity 3. Identify and eliminate bottlenecks in production on the laboratory scale, redesigning strains if necessary.
- Activity 4. Carry out production tests in 5 L scale bioreactors in a pilot plant, and design protein purification processes.
- Activity 5. Carry out production tests in 50 L scale bioreactors in a pilot plant, and design protein purification processes.
- Activity 6. Perform protein addition assays in the end products, and evaluation of the characteristics conferred.
- Activity 7. Dissemination of the project by all the participants in the project. INNOVACC is responsible for a significant part of the dissemination of the project, as it uses various channels such as its website, monthly newsletter, assemblies and seminars.

Expected results and practical recommendations

The expected results of this project are obtaining LegHemoglobin of sufficient purity in quantities appropriate for its industrial use and at a reasonable cost. It is expected that this product will be used to supplement various plant preparations, as this molecule will improve the characteristics of products by giving them characteristics of preparations from animal sources. It is therefore to be anticipated that new products will appear on the market as a result of the project. A growing global market has been identified for plant-based foods.

This project is also expected to contribute to environmental improvement, as meat products – and beef in particular – have a major impact on the emission of greenhouse gases into the atmosphere (carbon footprint), as well as high levels of water consumption throughout the process involved in obtaining the end product. The meat analogue products (either 100% vegetable or mixed vegetable-meat) that are produced as a result of this project will have a smaller carbon footprint and water footprint.

Leader of the Operational Group

ORGANISATION: ESTEBAN ESPUÑA, SA

CONTACT E-MAIL: info@espuna.es

Coordinator of the Operational Group

ORGANISATION: INNOVACC

CONTACT E-MAIL: innovacc@olot.cat

Other members of the Operational Group (grant recipients)

ORGANISATION: COOPECARN GIRONA, SLU

CONTACT E-MAIL: nibanez@coopecarn.com

Subject area(s) of application

- Agricultural production system
- Agricultural practice
- Agricultural equipment and machinery
- Livestock farming and animal welfare
- Vegetable production and horticulture
- Landscape / Territorial management
- Pest and disease control
- Fertilisation and nutrient management
- Soil management
- Genetic resources
- Forestry
- Water management
- Climate and Climate Change
- Energy management
- Waste and by-product management
- Biodiversity and environmental management
- Food quality/processing and nutrition
- Supply chain, marketing and consumption
- Competitiveness and agricultural and forestry diversification
- General

Geographical area(s) of application

PROVINCE(S)	REGION(S)
GIRONA	GARROTXA GIRONÈS

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

<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/>

Project website

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More information on the project

PROJECT DATES	TOTAL BUDGET
Start date (month-year): July 2020	Total budget: €212,000.00
Completion date (month-year)	DARP funding: €86,640.00
Current status: Underway	EU funding: €65,360.00
	Own funding: €60,000.00

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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'Agricultura,
Ramaderia, Pesca i Alimentació



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