

WHEY - from waste to a food supplement

Summary

The dairy sector is a strategic sector in the Catalan agrifood industry, due to both its economic importance and its contribution to the development and attachment of the rural population, which has been in a crisis since the end of the dairy quotas system, leading to the closure, transformation and diversification of several companies in the sector.

The increase in the demand for locally produced, high-quality innovative products means that cheese producers are considering developing new products to add value to milk and dairy products to open up new markets for sales, both in Spain and internationally.

Whey is at present a dairy by-product from cheese with high nutritional value, which mainly consists of a soluble protein fraction (whey protein), and residual fat, lactose, minerals and vitamins. This by-product is currently discarded as waste in most dairies, and it is very expensive to destroy, as it contains a significant proportion of organic matter (COD of 70-80 g/l). The absence of valorisation of this by-product by cheesemakers leads to significant losses in economic, nutritional and environmental terms. This problem is not exclusive to Catalan cheesemakers, but applies on a global scale.

In the case of whey from cow's milk, there is a standardised valorisation procedure for whey proteins for its use in formulas for babies as a substitute for breast milk, or as inclusion in food for athletes. These valorisation methods do not exist for whey from sheep and goats due to the small amount of whey produced globally.

MONTBRÚ, a livestock farming company and producer of goat's milk and dairy products in the Moianès region, has gone a step further in the development of innovative products. Taking the whey from the cheeses they produce as the starting point, their idea is to develop two products: one would be a whey-based dairy drink for athletes, and the other a whey-based kefir.

They will undertake a series of activities to meet these challenges in order to develop these two products and transfer the main results to the sector. In the development stage, it will initially be necessary to determine the physical-chemical composition of the different types of whey, to select the most suitable type for each case and carry out the necessary tests to obtain the two products (the drink for athletes and kefir).

Objectives

The main objective of this project is to eliminate whey as waste and turn it into a by-product. The whey produced at the Formatgeria Montbrú cheese dairy would be used to develop two products: one would be a drink, and the other a kefir.

These developments aim to reduce the environmental and economic impact of the use of this waste by making it a by-product (generating zero waste).

The plan to fulfil this objective involves classifying the waste, studying its composition and creating new drinks as by-products:

- The development of a whey-based dairy product for athletes.
- And the development of a whey-based kefir.

The intrinsic aims are:

- Valorisation of whey as a by-product of cheese to produce new products for human consumption with added value.
- Diversification of business in small cheese-producing establishments with no need to make a large investment.
- Added value for livestock farming and cheese production establishments.
- Reduced environmental impact in these types of establishments.
- Obtain results transferable to the traditional dairy sector.

Description of the measures planned in the project

Activity 1. Research and development of a whey-based dairy product for athletes.

Task 1.1. State of the art: Products, patents and ingredients.

Documentation review and search for information, products, current patents and ingredients worldwide.

Task 1.2. Characterisation of the whey in the preparation of various cheese products.

Physical-chemical characterisation (fat, protein, lactose, minerals, acidity, dry extract and pH) and microbiological characterisation of various types of whey from the manufacture of goat cheeses at the Formatgeria Montbrú cheese producers.

Task 1.3. Pilot plant tests to determine the action of heat treatments on whey from cheese production. Obtain the pilot product.

Product development in pilot tests using the whey or mixture of wheys analysed in task 1.2.

One product will be chosen from all those made, and its shelf life will be studied.

Task 1.4. Study to increase the functional qualities of the whey.

A laboratory-scale study of the base product obtained in task 1.3. will be carried out to develop a product with new functional qualities (for athletes), for which a shelf life study will be undertaken.

Activity 2. Development of whey-based kefir.

Task 2.1. State of the art: products, patents and ingredients.

Documentation review, search for information, current patents and products and ingredients.

Task 2.2. Development of a new whey-based kefir product.

Development of the kefir product on a laboratory scale by determining the fermentation control parameters (t, T°C, types of microbial flora).

Physical-chemical (fat, protein, lactose, dry extract), microbiological and sensory analyses of the whey-based kefir developed.

Task 2.3. Study of the shelf life of the product selected.

One product will be selected from all those developed in task 2.2., when the shelf life will be studied in 3 areas (physical-chemical, microbiological and sensory analysis).

Activity 3. Dissemination of the results.

Production of a video and informative seminars by IRTA in order to transfer the most important results and to raise awareness of the benefits obtained to related agents in the cheese production world, promoting:

- Improved competitiveness: product diversification.
- Maintained or possibly increased employment due to the diversification and expansion of the range of products to be developed.
- Improved environmental sustainability due to reducing the impact of eutrophication in ecosystems due to whey dumping or shortcomings in its recycling as waste.
- Compliance with legislation.
- Reduced cost of dumping and possible fines.

Expected results and practical recommendations

The results anticipated are as follows:

- Obtaining a whey-based dairy product (base product).
- Obtaining a product for athletes from the base product obtained previously.
- Obtaining a whey-based kefir.

Leader of the Operational Group

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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

<input type="checkbox"/>	Soil management
<input type="checkbox"/>	Genetic resources
<input type="checkbox"/>	Forestry
<input type="checkbox"/>	Water management
<input type="checkbox"/>	Climate and Climate Change
<input type="checkbox"/>	Energy management
<input checked="" type="checkbox"/>	Waste and by-product management
<input type="checkbox"/>	Biodiversity and environmental management
<input checked="" type="checkbox"/>	Food quality/processing and nutrition
<input type="checkbox"/>	Supply chain, marketing and consumption
<input type="checkbox"/>	Competitiveness and agricultural and forestry diversification
<input type="checkbox"/>	General

Geographical area(s) of application

PROVINCE(S)	REGION(S)
Barcelona Girona	Moianès Baix Empordà / Ripollès

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

The dissemination plan for the project is presented below.

- Presentation of the project, its objectives and follow-up of the anticipated results on the digital media of all members of the Operational Group.
- Organisation of various Annual Technology Transfer Plan seminars, presenting the starting point, the basic cornerstones and the results obtained from the project.
- Presentation of the project, follow-up and its results at the general assemblies of the FoodService and Gourmet Clusters.
- Explanation of the project during the Cheese Production Course held annually at the IRTA-Torre Marimon.
- Two dissemination/demonstration seminars for trainees.
- Updated websites of each member, and social media (LinkedIn, Twitter and Facebook) for sharing experiences, photos and results.
- Production of an information video in Catalan and subtitled in Spanish and English for the YouTube platform.

Project website

No project-specific website is planned. However, all the participating members will update their websites with information on the project and its participants.

More information on the project

PROJECT DATES	TOTAL BUDGET
Start date (month-year): July 2020	Total budget: €126,140.00

Completion date (month-year): September 2022	DARP funding: €51,550.80
Current status: Underway	EU funding: €38,889.20
	Own funding: €35,700.00

With funding from:

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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.

