

## WHEY – from waste to 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 demand for local, quality and innovative products means that companies, in this case cheese makers, are considering developing new products to add value to milk and milk by-products in order to open up new sales markets, both nationally and internationally.

Currently, whey is a dairy by-product of cheese-making with high nutritional value, which is mainly composed of soluble protein fraction (whey proteins), residual fat, lactose, minerals and vitamins. In most dairies this by-product is currently discarded as waste, the cost of destruction being very high as it contains a significant load of organic matter (COD 70-80 g/l). The non-revaluation of this by-product by the dairies is a significant loss in economic, nutritional and environmental value. This problem is not exclusive to Catalan cheese dairies, but is a fact that exists on a global level.

In the case of whey from cow's milk, there is a standardised titration for serum protein as part of infant formula to replace breast milk or for inclusion in sports nutrition. However, in the case of sheep or goat whey, these recovery routes do not exist, due to the small amount of whey produced globally.

Given these facts, the operational group formed by QUESERÍA MONTBRÚ SA and the dairy products company NAVIDOS joined forces to develop two innovative products where the main ingredient is a by-product from cheese production: whey.

### Objectives

The main objective of this project was to develop two products (fermented drink and kefir drink) with the incorporation, as the main ingredient, of the by-product obtained from the manufacture of goat's cheese (whey). These developments are intended to reduce the environmental and economic impact of using this whey, which until now has been treated as waste. In this way, it will become an essential ingredient for the manufacture of these two products and thus generate 0 waste in the cheese factories.

### Description of the actions carried out in the project

In order to achieve this objective, several actions were carried out, as described below:

#### **Activity 1. Research and Development of a whey-based dairy product.**

A search was carried out using the MINTEL database to see which whey-based fermented beverages had been developed worldwide and could be of interest to the project. Based on the information generated, the technicians of QUESERÍAS MONTBRÚ SA and IRTA established the guidelines for its design.

Different types of whey from QUESERÍAS MONTBRÚ SA were selected and analysed physico-chemically and microbiologically. The choice of the type of whey to be used in future tests was based on the analytical results obtained and the amount of production of each whey.

The pilot plant tests resulted in:

- Select formulation and types of starter to use.
- Select the production parameters (pasteurisation temperature, homogenisation P, etc.).
- Select the fruit preparations to be added to the fermented beverage.
- Carry out physico-chemical and microbiological monitoring of the fermented beverage developed.
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### Activity 2. Whey kefir development.

A search was carried out using the MINTEL database to see which whey-based kefir had been developed worldwide and could be of interest to the project in the last 5 years. On the basis of the information generated, the technicians of QUESERÍAS MONTBRÚ SA, PRODUCTOS DEL MOIANÉS SL and IRTA, established the guidelines for its design.

The pilot plant and industrial trials resulted in:

- Select formulation and types of starter to use.
- Use the production parameters selected in the previous activity.
- Select the fruit preparations to be added to the kefir.
- Physico-chemical and microbiological monitoring of the developed kefir.

With the two products developed, a shelf-life study was carried out, which analysed physico-chemical parameters such as: pH, viscosity and total solids, and microbiological ones such as: total mesophilic aerobes, lactic acid bacteria, anaerobic spores, and fungi and yeasts.

In the case of the fermented beverage, a challenge test was carried out to find out the behaviour of some pathogens with this product. Strains of *Listeria monocytogenes* (LM) and *Bacillus cereus* (BC), were inoculated, observing that in the case of LM contamination, LM was not inhibited at 120 h, while BC was inhibited to values below the detection limit of the method.

### Activity 3. Dissemination of the results.

Es van realitzar tres jornades PATT per tal de transferir la innovació obtinguda, es va elaborar un vídeo divulgatiu ([Grup operatiu Xerigot - YouTube](#)), es va realitzar una jornada de disseminació per a públic en formació y es va divulgar el projecte en varis mitjans de comunicació: premsa escrita (« [Montbrú i l'IRTA estan enllestitint una nova beguda per valoritzar el xerigot de les petites formatgeries | EL9NOU.CAT](#)») i premsa digital (2 aparicions; exemple: [L'IRTA converteix el xerigot de les formatgeries en beguda per a esportistes i quefir \(viurealspirineus.cat\)](#)) i radio (3 aparicions; exemple: [MeteoMauri - Vehicles de policia elèctrics, un carril bici pels túnels de Vallvidrera i com valoritzar el xerigot \(ccma.cat\)](#)).

## Final results and practical recommendations

The main results obtained were the design and development of the two whey-based products. First the fermented beverage and second the kefir. Both products had a natural and a fruit-based version.



In case of industrialisation of the process, it is recommended to validate and verify the technological parameters of the facilities to ensure the food safety of the product.

## Conclusions

One of the main conclusions obtained has been the valorisation of whey from cheese dairies into two innovative products, where 94% of their formulation is composed of this by-product. The production of these two products means that dairies can generate 0 waste.

## Leader of the Operational Group

ORGANISATION: IRTA - Institute of Agrifood Research and Technology

## Other members of the Operational Group (grant recipients)

ORGANISATION: PRODUCTES DEL MOIANÈS, SL

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

ORGANISATION: ACREFA - Catalan Association of Cattle Breeders and Artisan Cheese Makers.

## Geographical area(s) of application

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

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

The dissemination of the project has allowed QUESERÍAS MONTBRÚ SA to make visible to the general and specialised public the importance of innovating in the field of waste generated in the food industry. In activity 3 of this sheet, the dissemination carried out throughout the project has been presented.

## Project website

MONTBRÚ: <https://montbru.com/en/blog/news/montbru-is-working-with-the-irta-to-create-new-whey-based-products>

NÀDOLS: <https://nadols.bio/sobre-nosotros/>

IRTA: <https://www.irta.cat/ca/projecte/xerigot-de-residu-a-suplement-alimentari/>

### 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	DACC funding: €51,550.80
Current status: Completed	EU funding: €38,889.20
	Own funding: €35,700.00

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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.*

