Cheese manufacture in the Basque region of Spain results in the production of some 25 million litres/yr of the waste by-product whey. Whey is the liquid remaining after milk has been curdled and strained. It has a high nutrient content, which can result in environmental problems if it is disposed of inappropriately. However, the high content of serum proteins also gives whey considerable potential to be processed for commercial uses, including in food products, animal feed and biogas. One of the main challenges for achieving this in regions such as the Basque Country is that much of its production is carried out in small and medium-sized dairies scattered throughout the area. The technical knowledge and high costs of investment needed to deal with this waste product mean that most dairies cannot successfully implement the necessary processes alone.

Objectives

The objective of the VALORLACT project was to formulate an Action Plan and demonstrate an innovative methodology for the recovery of whey, a by-product of the dairy sector, and its transformation into new food products, animal feed and biogas. The aim was to design a collection and processing system for whey that involves a sufficient number of Basque dairies to make one or more processing plants economically viable. The project expected to contribute to
improvements in the overall environmental performance of the dairy sector, and to achieve a recycling rate of more than 80% of the generated whey (over 18 000 000 litres of whey per year), using a methodology that can be easily transferred to other European countries.

Results

The VALORLACT project produced a comprehensive Action Plan for the management and valorisation of whey, along with a Road Map for its implementation in the near future. The Action Plan proposes several feasible scenarios for whey management, based on a combination of solutions at farm level and centralised management options. The project team defined methods of storage, treatment, manufacture, transport and logistics, and concluded that the optimisation of collection routes for whey was a key factor in ensuring the successful implementation of the Action Plan.

The Action Plan focused on the use of whey for human food (processed whey) and animal feed (directly or as a formulated fodder). Following preliminary studies at semi-industrial scale, the option of producing biogas through the anaerobic digestion of whey was considered technically and economically unfeasible, due to the highly unstable nature of the process, and it was not included in the final Action Plan. However, valuable information was obtained for the further development of renewable biogas energy in combination with additional co-substrates, such as slurry.

In particular, the project tested a range of solutions that could be adapted to each dairy, with special attention being paid to small dairies that encounter technical and economic difficulties when properly managing whey. Innovative solutions included the use of whey from the milk of Latxa sheep (a breed native to the Basque Country) for the development of new high added-value foods; improved technologies for drying whey with lower energy consumption; and the optimisation of whey collection routes, in combination with milk collection routes, around the spatially-dispersed dairies.

Concerning the processing of whey, the project’s new methodology was tested in a pilot plant aiming to valorise the whey components into a range of new food and feed products:

- Four food products to be labelled as "source of protein": processed cheese stick, soluble flavoured product in powdered form (cocoa powder substitute), a whey-fruit juice beverage, and cheese-flavoured sauce; and
- Nine different formulations of fodder, with whey and permeate (protein concentrate), that proved to have high nutritional value.

If commercialised these new products would help increase both the sustainability and profitability of the dairy sector.

Environmental benefits arise from the collection and valorisation of more than 80% of the whey generated in the Basque Country, which reduces the possibility of inappropriate disposal. The project demonstrated how this waste by-product can be recovered using an innovative methodology, and transformed in a hygienic manner into valuable products. The project’s solution is particularly aimed at whey producers in the Basque Country, where there are a few large
dairies and many small and medium-sized dairies and farms. Indeed, four cheesemakers of the Basque Country have already showed great interest in introducing the new food and feed products formulated within the framework of the project on the market, thereby expanding their business niche.


The implementation of the project’s Action Plan will help improve the profitability of traditional cheese production and, thereby, ensure the future of many small dairies in the Basque Country and their associated jobs, in what is a potentially risky sector. The generation of new products using whey may also help to diversify dairy activities and open up new business opportunities. The project therefore contributes to improving the competitiveness and profitability of cheesemakers, especially by reducing the costs of waste management and wastewater treatment.

Further information on the project can be found in the project's layman report and After-LIFE Communication Plan (see "Read more" section).

Top

Environmental issues addressed:

Themes

Industry-Production - Food and Beverages
Waste - Bio-waste (including food waste)

Keywords

food production, waste management, waste recycling

Target EU Legislation

- Water
- Waste
Natura 2000 sites

Not applicable

**Beneficiaries:**

**Coordinator**

Dirección de Calidad e Industrias Alimentarias

**Type of organisation**

Regional authority

**Description**

The Directorate for Food Innovation and Industry is part of the Department of the Environment, Land Planning, Agriculture and Fishing of the regional government of the Basque Country in Spain.

**Partners**

Fundación Azti Tecnalia Bioingenieria

Medioambiental S.L. Institut De Recerca i Tecnologia Agroalimentàries Equipamientos Y Proyectos Iberlact, S.L.

**Administrative data:**

**Project reference**

LIFE11 ENV/ES/000639

**Duration**

01-JUL-2012 to 31-DEC-2015

**Total budget**

1,727,071.00 €

**EU contribution**

773,530.00 €

**Project location**

País Vasco (España)

**Read more:**

**Project web site**

[Project's website]

**Publication: After-LIFE Communication Plan**

Title: After-LIFE Communication Plan No of pages: 9

**Publication: After-LIFE Communication Plan**

Title: Plan de comunicación post-LIFE No of pages: 9
Title: "Suplementación con lactosuero en polvo y concentrado protéico De lactosuero en dietas de iniciación de broilers: efectos sobre el Redimiento productivo" (70.6 KB)
Author: Pineda-Quiroga C, Atxaerandio R, Ruiz R, [et al]
Year: 2015
Editor: AIDA, XVI Jornadas sobre Producción Animal
No of pages: 3

Title: "Efecto de la suplementación con lactosuero en polvo, pediococcus acidilacti y su mezcla sobre el rendimiento productivo de gallinas ponedoras" (88.7 KB)
Author: Pineda-Quiroga C, Atxaerandio R, Zubiria I, [et al]
Year: 2015
Editor: AIDA, XVI Jornadas sobre Producción Animal
No of pages: 3

Title: "Development of new food products for cheese whey valorization" (52.1 KB)
Author: C. Bald, M. Renteria, I. Hernández [et al]
Year: 2015
Editor: 3rd International Conference. Waste
No of pages: 3

Title: "Full use of the whey produced by the dairy industry - Valorlact" (1.17 MB)
Author: M. Cebrian, M. Renteria, D. San Martín, [et al]
Year: 2013
Editor: 2nd International Conference. Waste
No of pages: 6

Title: Layman report (Spanish version)
No of pages: 13

Title: Layman report
No of pages: 13

Title: Layman report (Euskadi version)
No of pages: 13

Title: Project's Final technical report
Year: 2016
Editor: Departamento de Desarrollo Económico y Competitivi
No of pages: 59

"Valorlact whey to future" (7'15)
"Valorlact whey to future [Basque]" (7'16)
"Valorlact whey to future" (7'15)