**New Strategies for Improving the Sustainability of Breweries: Full Waste Recovery for Aquaculture Feed**

Reference: LIFE16 ENV/ES/000160 | Acronym: LIFE-Brewery

**PROJECT DESCRIPTION**

**BACKGROUND**

Brewing involves the production of several by-products that can have a negative environmental impact if they are not managed property. The largest waste by volume is brewers’ spent grain (BSG), followed by brewers’ yeast. Some 70% of BSG is used as feed, but due to its high moisture content and microbial load it has a shelf life of less than 48 hours. Around 10% of spent grain goes to produce biogas, and the remaining 20% is landfilled. Every tonne of BSG in landfill releases 513 kg CO2 equivalent of greenhouse gases. Waste brewers’ yeast is mixed with wastewater and discharged for treatment. As well as being a waste of resources, the effluent generates 83 kg CO2 equivalent for every tonne of waste treated.

Both by-products of the brewing process have circular economy potential, either in food, feed or for pharmaceutical and cosmetic purposes. In order to realise this potential, it is necessary to scale-up pilot technologies into solutions able to cope with large volumes.

**OBJECTIVES**

The objective of the LIFE-Brewery project was to demonstrate an innovative and highly-replicable integrated solution to recover brewery by-products as food and aquaculture-feed ingredients. Demand for such ingredients is growing. The project proposed a first step of an enzymatic hydrolysis to increase the value of these ingredients and a second step of a low-carbon dehydration process. The drying process consisted of an innovative combination of mechanical and thermal technologies for obtaining a sustainable meal from brewery by-products.

Food and feed ingredients have been characterized to quantify their potential value in food and feed application. Aqua-feed formulas would also be optimised to maximise the amount that can be included in the diet of farmed fish.

By adding value to food waste, the project was targeting one of the priority areas of the EU Circular Economy Action Plan. Its goals were also in line with the waste hierarchy established in the Waste Framework Directive. And by helping to reduce the operating costs of fish farmers it would contribute to the EU’s new Common Fisheries Policy. In addition, the use of the fish meal replacement would reduce the need to catch wild fish, contributing to the Marine Strategy Framework Directive.

**RESULTS**

The project demonstrated the technical, environmental and economic feasibility of a new valorisation scheme for the recycling of brewers’ by-products (spent grain and yeast) as food and aquafeed ingredients. The scheme helps meet the increasing demand for alternative new raw materials for food industry and aquafeed production.

The proposed strategy for the upgrading of brewers' by-products as food and aquafeed ingredients combines efficient mechanical dewatering and drying technologies, and an optional hydrolysis pre-treatment to increase nutritional value and digestibility. On the one hand, food ingredients had high potential to be used as savours in food industry. On the other hand, aquafeeds with inclusion levels of at least 20% of spent yeast and 15% of spent grain were tested and validated for three species of fishes – gilthead sea bream (*Sparus aurata*), rainbow trout (*Oncorhynchus mykiss*) and Senegalese sole (*Solea senegalensis*) – which are representative of different aquaculture systems.

Furthermore, the beneficiaries defined the standard functional unit for a valorisation plant, described the main technical specifications of the required equipment, and made environmental and economic feasibility assessments of such an industrial plant. The beneficiaries signed an exploitation agreement and are in contact with a range of breweries and other potential investors for the industrial roll out of valorisation plants. Negotiations are well-advanced with several breweries and waste managers.

**ADMINISTRATIVE DATA**

Reference: LIFE16 ENV/ES/000160   
Acronym: LIFE-Brewery   
Start Date: 01/09/2017   
End Date: 30/06/2021   
Total Budget: 1,551,455 €   
EU Contribution: 874,952 €   
Project Location: Spain

**CONTACT DETAILS**

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**ENVIRONMENTAL ISSUES ADDRESSED**

**THEMES**

* Bio-waste (including food waste)
* Waste recycling
* Food and Beverages

**KEYWORDS**

* waste recycling
* beverage industry

**TARGET EU LEGISLATION**

* Directive 2008/98 - Waste and repealing certain Directives (Waste Framework Directive) (19.11.2008)
* COM(2015)614 - "Closing the loop - An EU action plan for the Circular Economy" (02.12.2015)
* Directive 2008/56 - Framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive) (17.06.2008)

**BENEFICIARIES**

| **Name** | **Type** |
| --- | --- |
| Fundación AZTI - AZTI Fundazioa, Spain | Coordinator |
| THE BREWERS OF EUROPE, Belgium | Participant |
| LKS INGENIERÍA, SOCIEDAD COOPERATIVA, Spain | Participant |
| RIERA NADEU, S.A., Spain | Participant |
| Institut de Recerca i Tecnologia Agroalimentàries (IRTA), Spain | Participant |