



# Layman's report

Recycling brewer's spent yeast in innovative industrial applications  
Ref: LIFE16 ENV\_ES\_000158





## Meet the team

Project reference:  
LIFE16 ENV/ES/000158

Project website:  
[lifecycle.com](http://lifecycle.com)

Duration:  
Start date: 01/07/2017  
End date: 31/12/2019

Total Budget: 3,786,356 €  
EU contribution: 1,597,653 €

## Partners

### Coordinator: Bdi Biotechnology

BDI Biotech provides process development and contract production services to the biotech industry to bring complex biological products from bench to reality. Its mission is to create value and innovation for their clients at the insertion of engineering, chemistry and biology.

### Anheuser-Busch InBev

Anheuser-Busch InBev is the leading global brewer and one of the world's top five consumer products companies. Beer, the original social network, has been bringing people together for thousands of years and their portfolio of well over 200 beer brands continues to forge strong connections with consumers.

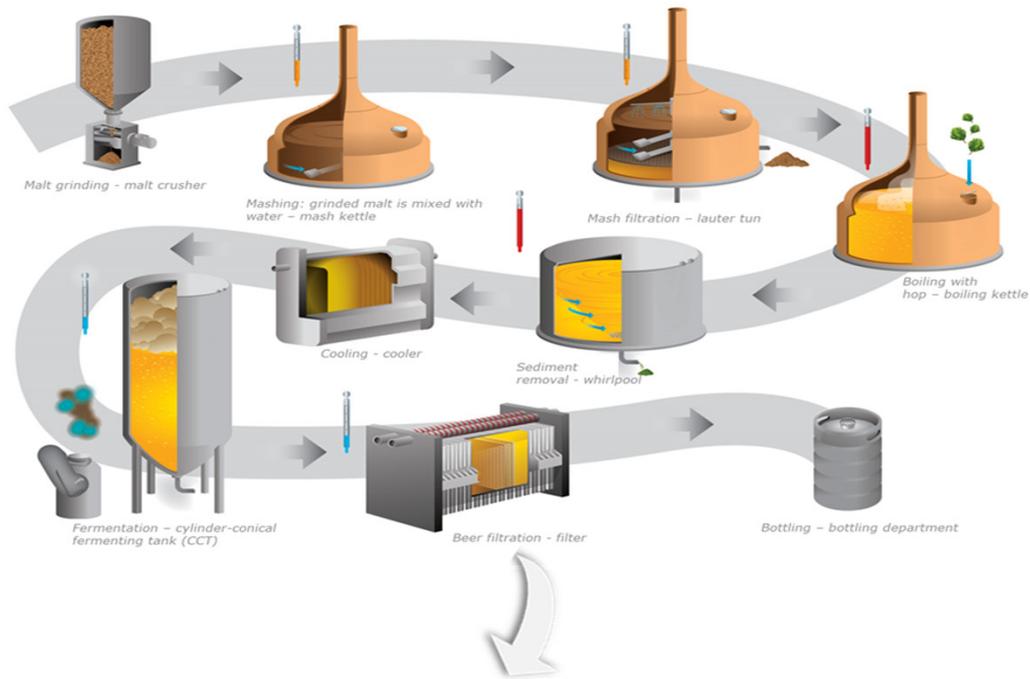
### VLPbio

VLPbio provides first-class technology or the development of biotechnology-based vaccines in the animal health field, with highly improved properties. Their portfolio already contains products against most critical diseases in the veterinary field.



# The star of the project: Brewer's Spent Yeast (BSY)

The brewing process can be summarized as such:



**Co-product: Brewer Spent Yeast (BSY)**

## Quick close up on the fermentation

- During the brewing process, yeast is added to initiate fermentation, converting sugars to alcohol and carbon dioxide. Before full maturation of the beer, the excess yeast is collected and can be re-used in the brewing process up to around six times.
- After this, it becomes Brewer Spent Yeast (BSY). With 15% of the total co-products generated during brewing, BSY is the second biggest co-product of the brewing process. It contains a high level of nutrient, however, to date its industrial utilization is very limited because of the fast contamination and spoilage of BSY as a result of the activity of microorganisms. This has hampered the large-scale use of some technologies for using BSY. Hence spent yeast is mainly sold in its wet form as animal feed to farmers.



# LIFE YEAST Project

The objective of this LIFE project is to develop a new and innovative method to use BSY as a raw material. By developing alternative uses of BSY, BDi biotechnology and AB InBev, main partners of the LIFE YEAST project, strive to build a more sustainable brewing process and increase resource efficiency, fully compliant with the circular economy concept. These goals are totally aligned with AB InBev's dream to create a better world. LIFE YEAST aims to contribute to the transition towards a circular economy by:

- 🎯 developing a new methodology to process BSY into valuable constituents that can be used as raw materials in a wide range of industrial applications,
- 🎯 developing new applications for BSY, with an emphasis on technologies that are at or close to market readiness.

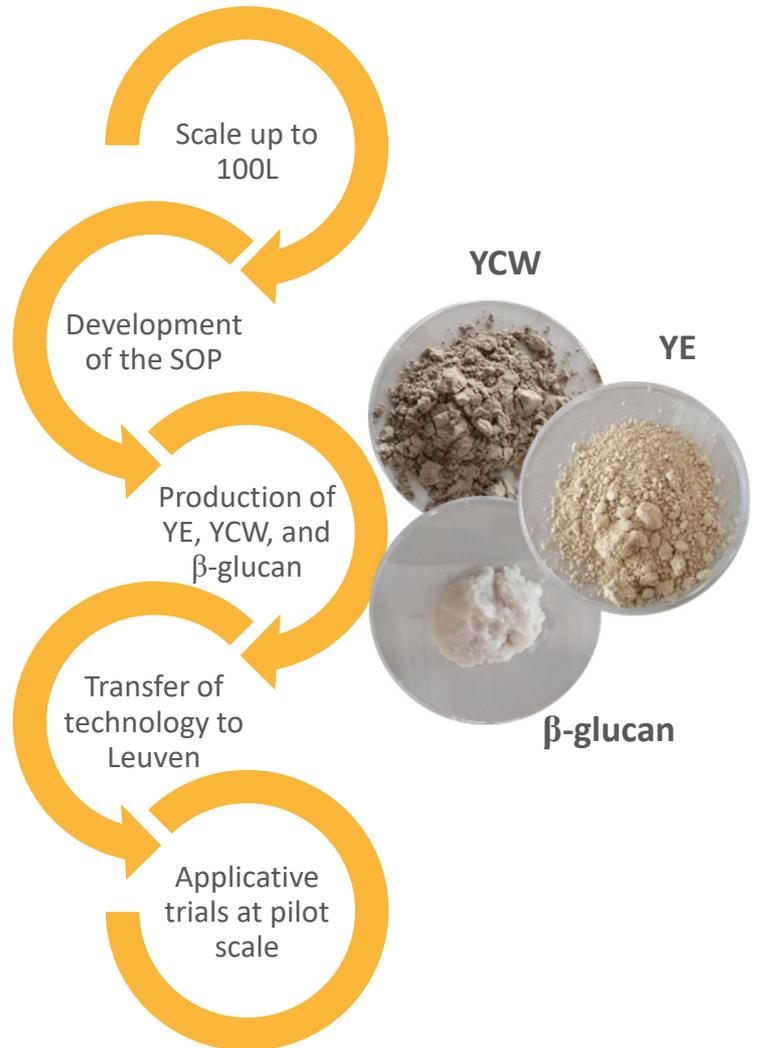


The above mentioned BSY constituents are Yeast Extract (YE), Yeast Cell Wall (YCW), Partially Autolysed Yeast (PAY) and  $\beta$ -glucan.

In the first phase of this project, we focused on the optimization and scale-up of processes to obtain different valuable product streams from BSY. In the second phase, VLPbio and AB InBev demonstrated and validated the use of CYE and YCW in their production processes. Finally, the project is expected to obtain a scalable technology package to be implemented in commercial breweries and to explore new partnerships to valorise these interesting constituents in other industries, such as the food and cosmetic industry for B2B relations.



# Key Achievements



## Evaluation of yeast-derived products in industrial fermentation processes (Valladolid and Leuven)



- ✓ Addition of yeast extract in beer fermentation results in a faster fermentation
- ✓ Yeast extract can be used in alternative fermentation, such as the pharma industry with comparable results as a commercial yeast extract
- ✓ Food prototypes based on yeast extract performed better in tasting sessions and aging tests – 100+ tasters in focus groups



# Optimization and scale up of the extraction process

BDI Biotechnology adapted and optimized a method for the production of BSY constituents at small scale (30L), allowing extraction of yeast extract and yeast cell wall from BSY as well as  $\beta$ -glucan from yeast cell wall.

In May 2018, the final phase of the installation of the microbrewery plant took place at BDI Biotechnology facilities, allowing to produce BSY on site and reduce CO<sub>2</sub> emissions caused by the transport of BSY from the closest AB InBev brewery.

Afterward, BDI demonstrated that the optimized process developed at small scale was scalable to a semi-industrial scale (100L) and validated it at this scale.



The technology was then transferred to the AB InBev brewery of Leuven, Belgium. The same process conditions were used while the drying of the extract could be optimized. The yeast extract produced in Leuven met the characteristics of commercial yeast extracts!



# Applications and industry relevance

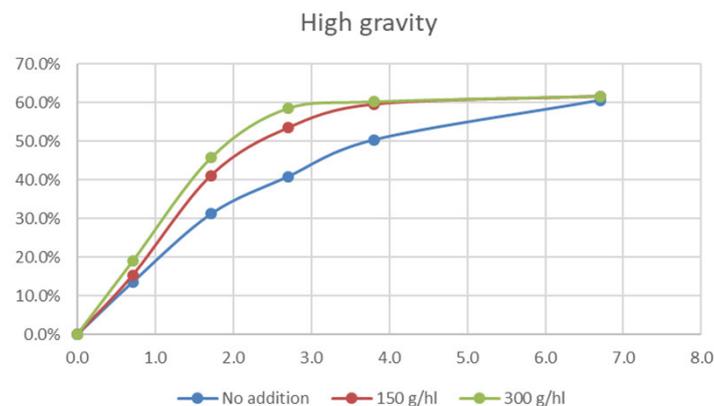
## Use of yeast extract in pharma fermentations

VLPbio demonstrated the use of the LIFE yeast extract as a nitrogen source for fermentation in the pharma industry. The study measured the production of VLP and found that using the LIFE yeast extract gave the same results as commercial yeast extract.



## Yeast extract and brewing

The use of yeast extract was also tested in the scope of industrial brewing operations, as a free amino nitrogen (FAN) booster for high gravity fermentations. An addition of yeast extract proved to increase the speed of fermentation:



## Food ingredients

Finally, several food prototypes have been produced using yeast extract, including crackers, hot and cold beverages and bouillon cubes. Those prototypes have been tested with consumers.

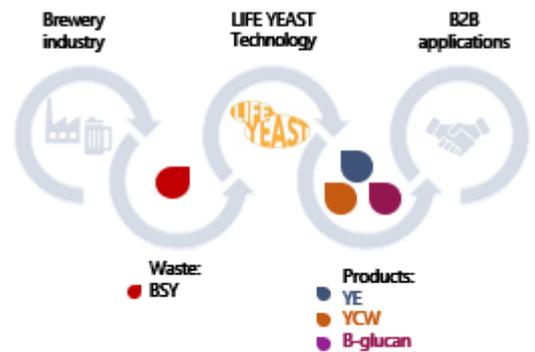
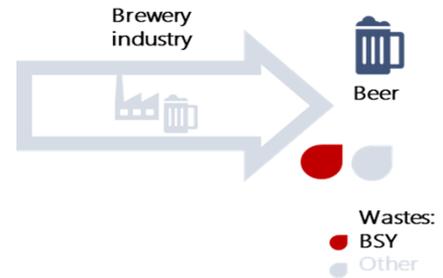


# Environmental Impact Assessment

BDI conducted a Life Cycle Assessment (LCA) for the LIFE Yeast project comparing three scenarios for the use of brewer's spent yeast (BSY). The BSY can be completely used as animal feed (base case).

In the second scenario, 70% of the BSY can be further processed into yeast extract and beta-glucans to be sold as food ingredients to other businesses. This scenario decreases the transport impact, as less water is shipped to the customer.

Finally, a more circular scenario was investigated, in which yeast extract was used directly within the brewery. This scenario completely eliminates the need of transport of the co-product, and was therefore the preferred option.



The use of yeast extract within the brewing operations should lead to a reduction of the carbon emission of the brewery of up to 23%.



# Dissemination and networking



Participation in conferences



Pilot demonstration event



Networking activities



On-site visits:  
Students, project team

## Project materials for dissemination

Brochures | Notice boards | Technical poster | Articles | Press releases



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[lifeyeast.com](http://lifeyeast.com)



Start date: 01/07/2017

End date: 31/12/2019

## Aknowledgements:

LIFE YEAST project is financed by the LIFE+ program, the EU'S financial instrument supporting environmental, nature conservation and climate action projects throughout the EU.

Special thanks to the partners BDI Biotech, AB InBev and VLPbio, to the team members and staff for their involvement and enthusiastic contribution to this project.

