Upgrading pasta waste through lactic acid fermentation

José Pablo López-Gómez[1], Cristina Marzo-Gago[1,2], Joachim Venus[1]

[1]Leibniz Institute for Agricultural Engineering and Bioeconomy, Dept. Microbiome Biotechnology, Max-Eyth-Allee 100, 14476 Potsdam, Germany, pLopezGomez@atb-potsdam.de, cmarzo@atb-potsdam.de, jvenus@atb-potsdam.de
[2]Department of Chemical Engineering and Food Technology, Faculty of Sciences, University of Cádiz, Pol. Río San Pedro S/N, Puerto Real, 11510 Cádiz, Spain, cristina.marzo@uca.es

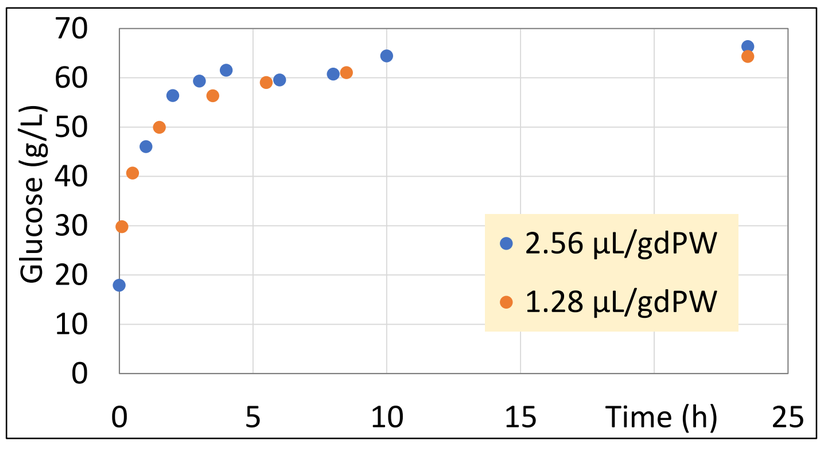
During its production process, every kilogram of pasta manufactured generates about 23 g of pasta wastes (PW). Considering the global pasta production, there are about 376 kilotonnes of PW produced every year. In this work, PW were characterised and used as the substrate in lactic acid (LA) fermentations.

Feedstock composition and hydrolysis

Waste	DM (%)	Organic matter	Crude fat	Sugar	Starch
		% DM			
Pasta (PW)	40.5	98.9	1	0.6	61.6

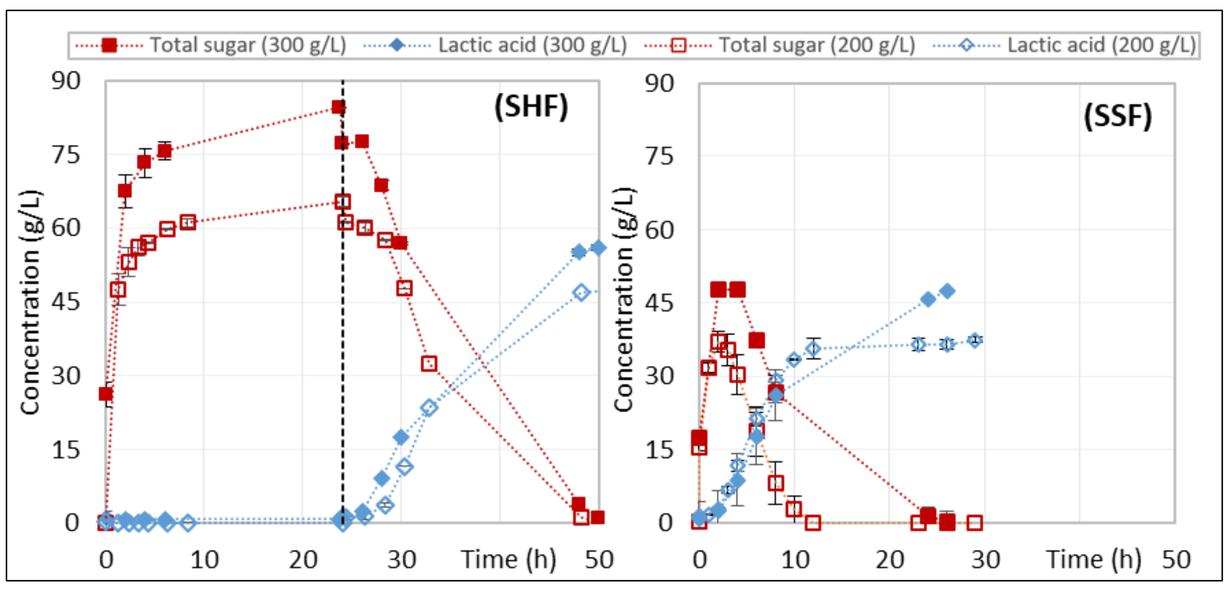
- No impurities
- Easy to treat
- High concentration of sugars (in the form of starch)

enzymatic hydrolysis



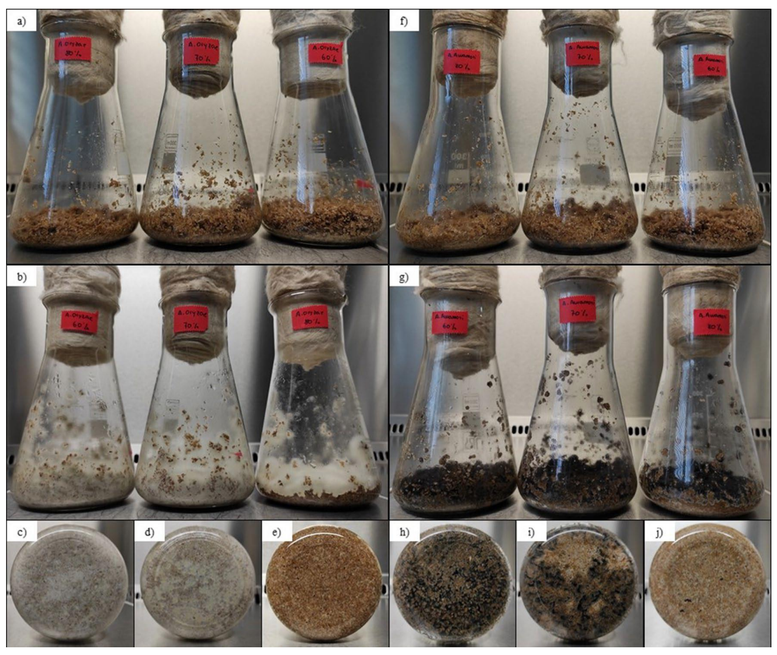
Fermentations

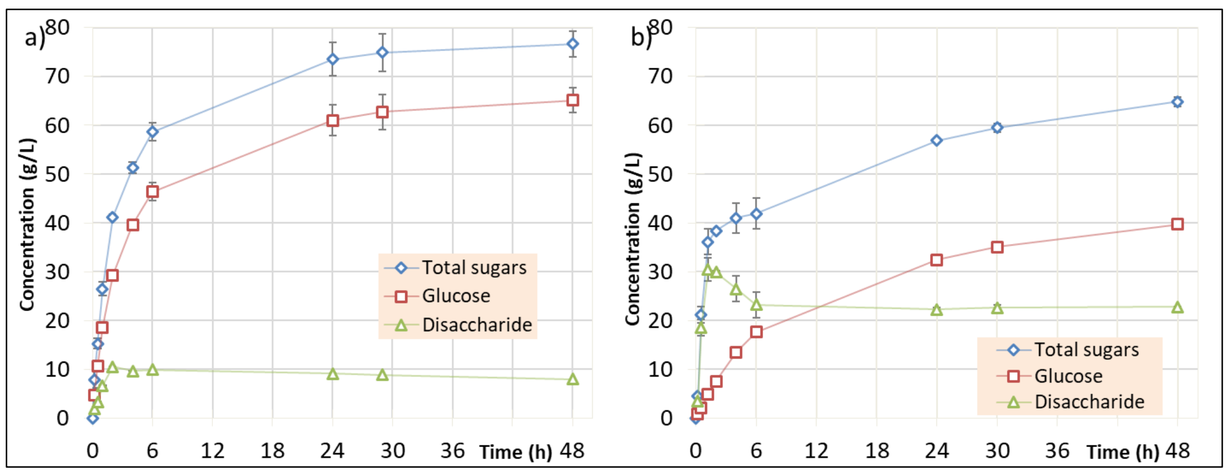
Profile for (SHF) sequential hydrolysis and fermentation and, (SSF) simultaneous saccharification and fermentation of pasta wastes. The graphs show the average concentrations of lactic acid and sugars for experiments using 200 (···◊···,···□···) and 300 g/L (···♦···,···■···) of pasta waste, inoculation time for (SHF) is marked at 24 h (-----)



López-Gómez, J.P.; Unger, P.; Schneider, R.; Pierrard, M.-A.; Venus, J.: Upgrading pasta wastes through lactic acid fermentations, Food and Bioproducts Processing 135 (2022) 135-142
https://doi.org/10.1016/j.fbp.2022.07.010

Replacement of commercial enzymes





Hydrolysis of PW by adding 10 g_{ds} of wheat bran (WB) fermented with the fungus *A. awamori* (a) or *A. Oryzae* (b): concentration of total sugars (◇), glucose (□) and disaccharide (△)

Marzo-Gago, C.; Venus, J.; Lopez-Gomez, J.P.: Production of lactic acid from pasta wastes using a biorefinery approach. Biotechnology for Biofuels and Bioproducts (2022) 15:128, https://doi.org/10.1186/s13068-022-02222-x

The homogeneity of the material and its high starch content provide great conditions for both the hydrolysis and fermentation. Lab scale fermentations showed that a SHF was more efficient than a SSF. To conclude, the production of lactic acid from PW was improved by the addition of enzymes produced through solid-state fermentation.

Results presented here by authors have been carried out in the framework of CAFIPLA project. This project has received funding from the Bio Based Industries Joint Undertaking under the European Union's Horizon 2020 research and innovation program under grant agreement No. 887115.

Horizon 2020 European Union Funding for Research & Innovation
Bio-based Industries Consortium
CAFIPLA
BBI JU
cost EUROPEAN COOPERATION IN SCIENCE & TECHNOLOGY
Funded by the European Union