

INTRODUCTION

The increasing demand for sustainable agricultural inputs has driven research into innovative ways to valorize animal by-products. This study explores a novel enzymatic process to recover protein from Category 2 porcine by-products (a mixture of muscle, fat, bone, and viscera) for use as biostimulants in agriculture.

OBJECTIVES

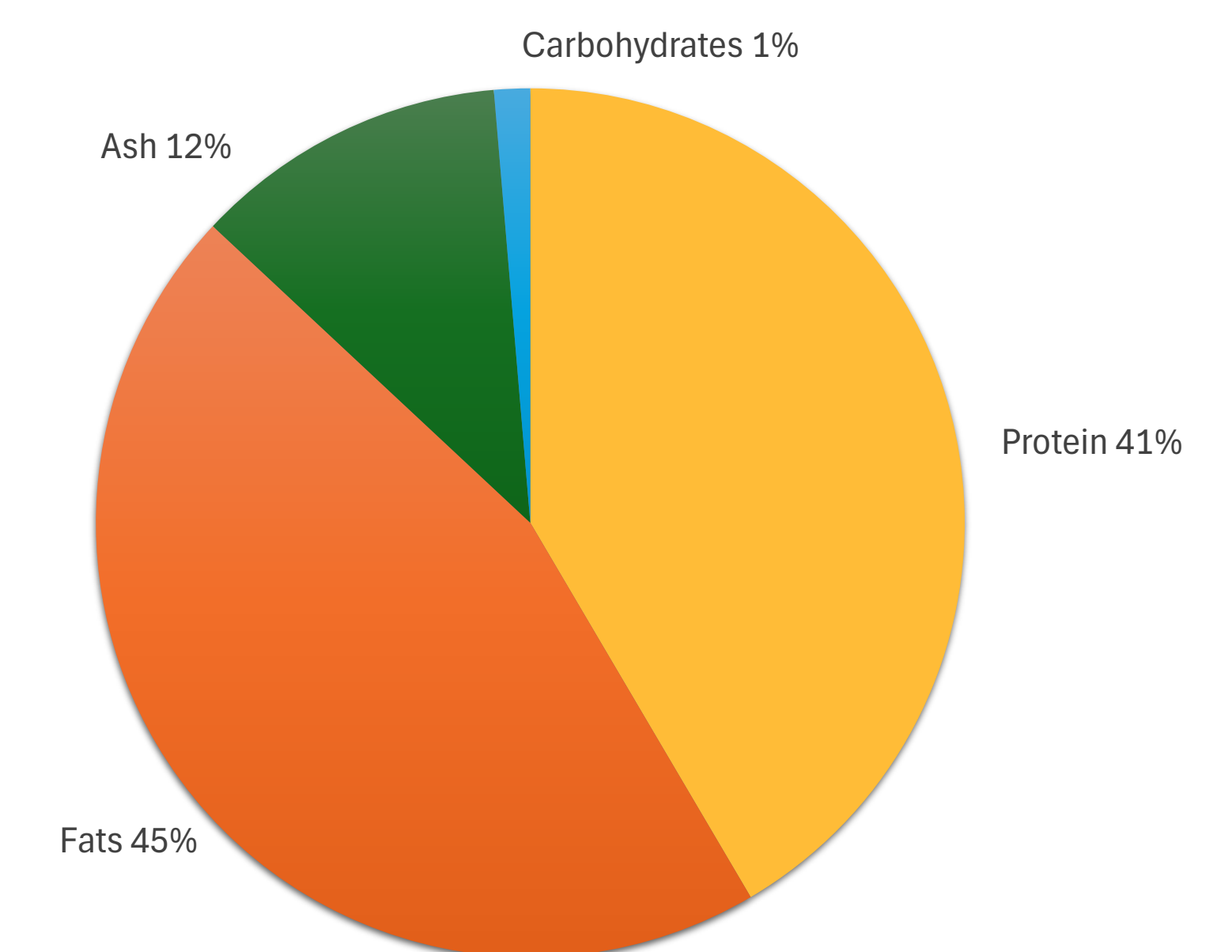
The aim of this work is to recover the protein by applying Microwave (MAE) and Ultrasound-Assisted Extraction (UAE) were evaluated as pre-treatment technologies prior to enzymatic hydrolysis.

PORCINE BY-PRODUCTS CHARACTERISATION

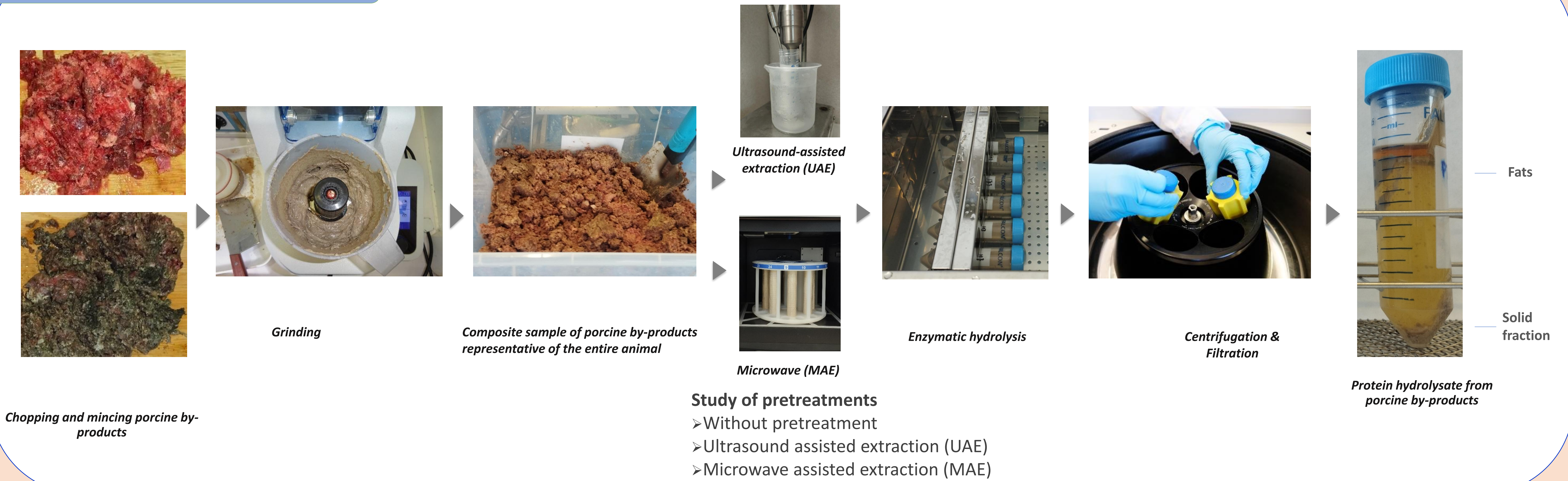


Composite sample of porcine by-products representative of the entire animal

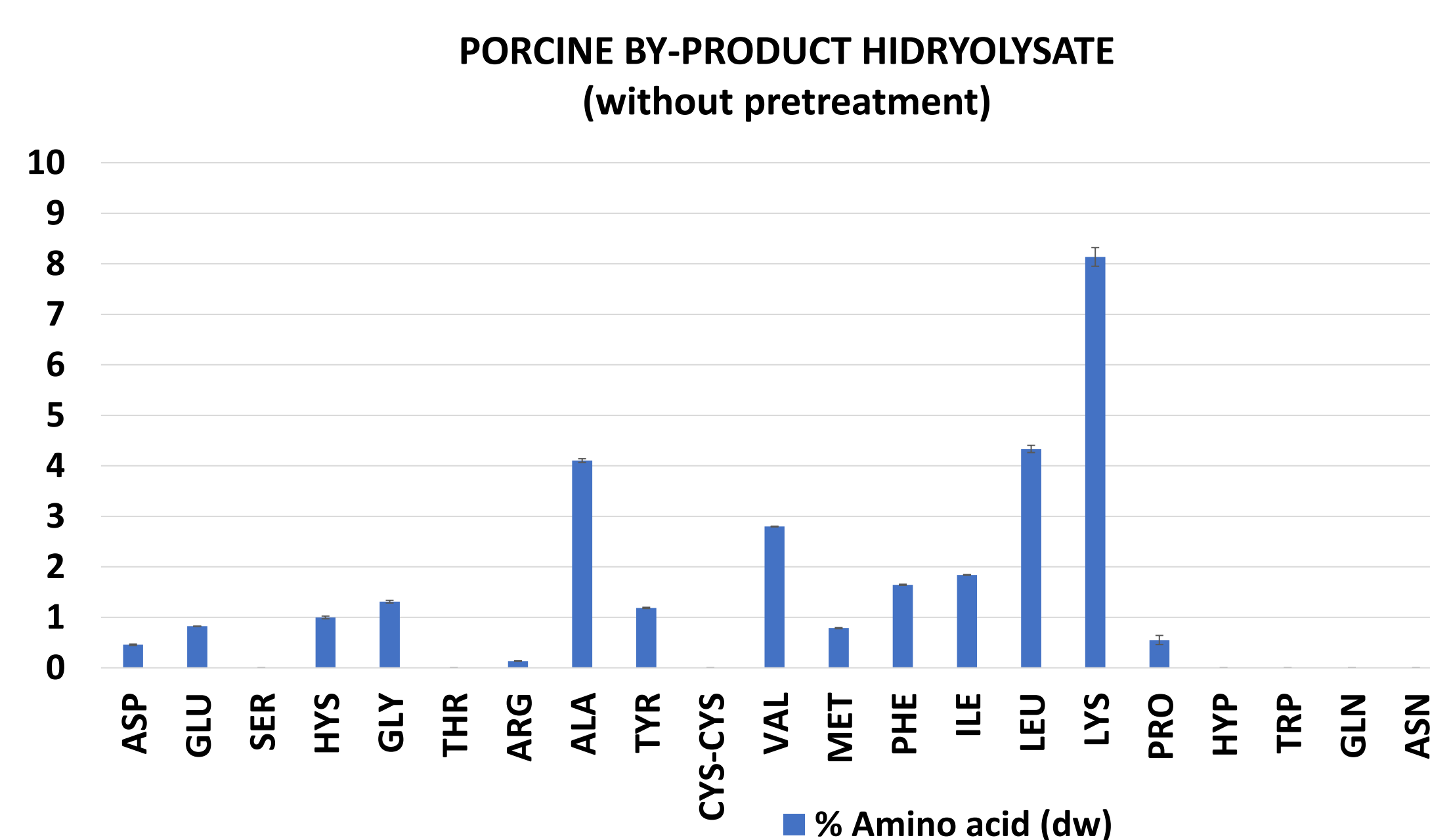
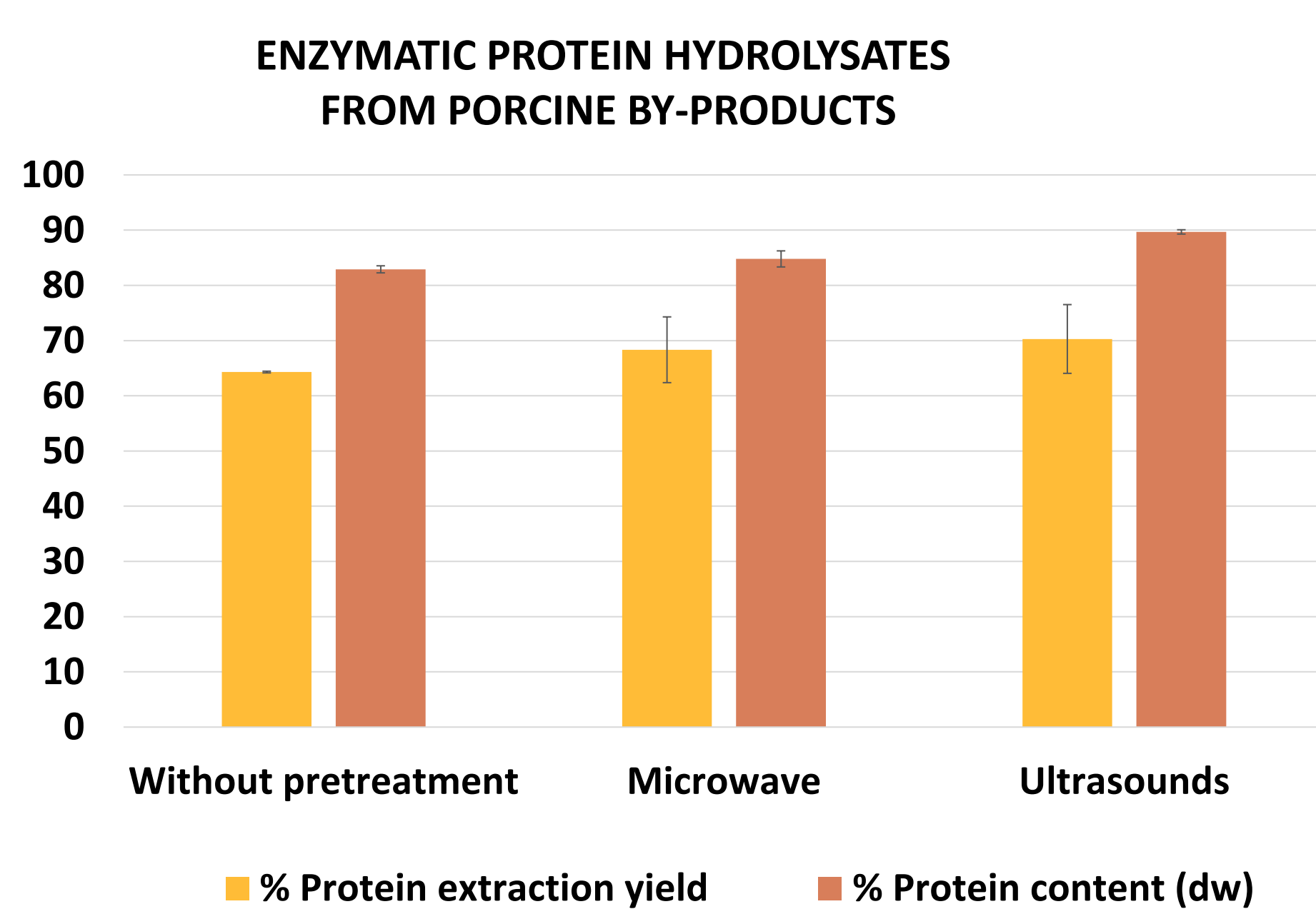
Characterisation of composite sample of porcine by-products representative of the entire animal (% w/w, dry basis)



EXPERIMENTAL DEVELOPMENT



RESULTS



PORCINE BY-PRODUCT HIDRYOLYSATE (without pretreatment)

Nitrogen	0.6% f.w. (12% d.w.)
Protein	3.8% f.w. (78% d.w.) high degree of hydrolysis > 30%
Free amino acids	1.4% f.w. (29% d.w.) most abundant amino acids: LEU ALA VAL PHE LYS ILE representing 1% f.w. (23% d.w)

- ✓ The results proved **64% protein extraction yield** and **83% protein content** (dry weight) in the protein hydrolysate obtained by enzymatic hydrolysis without pre-treatment.
- ✓ UAE enhanced fat removal, which increased the protein content from 83% to 90%.

CONCLUSIONS

- The protein hydrolysate fulfilled the physicochemical and microbiological characteristics for fertilising products for Product Functional Categories PFC3 (Soil improver), also for PFC6 (Plant biostimulant).
- The product can be concentrated or dried to reach 29% d.w. free amino acids.
- In conclusion, enzymatic treatment presents a promising approach for transforming Category 2 porcine by-products into valuable protein hydrolysates for agricultural applications. This research was conducted within the framework of the European Project Waste4Soil.



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