

Screening of enzymatic hydrolysis of mixed fish by-products

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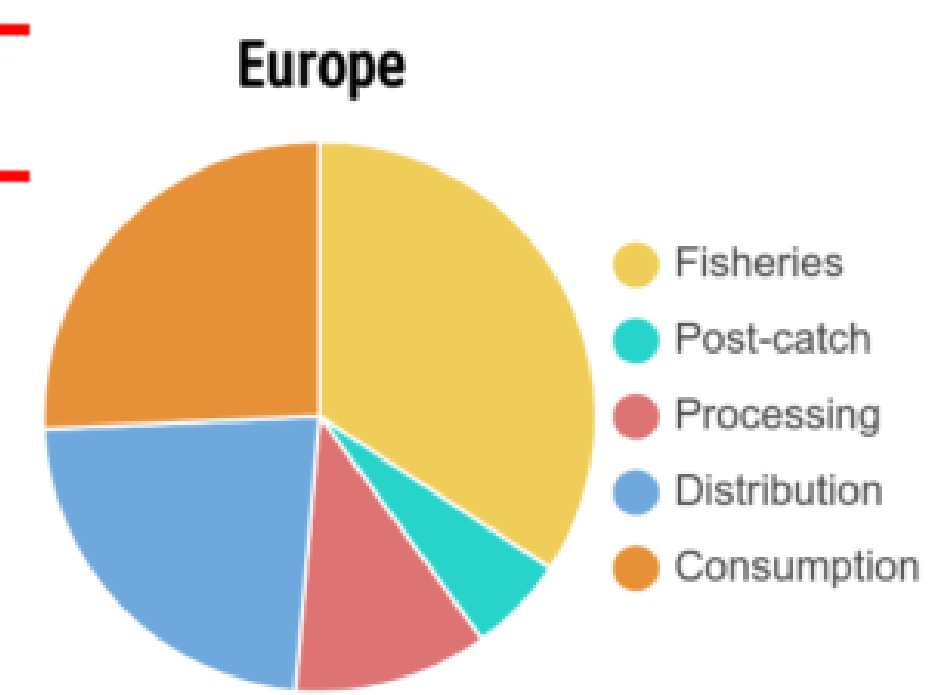
Introduction and Objective

The fish supply chain produces large volumes of by-products and losses [1]. Fish by-products and losses are generated mainly during processing but also in retail [1, 2]. Fish by-products and losses are protein-rich raw materials with bioactive and functional properties with recognised potential. The interest in protein hydrolysates has been rising as promising nutraceuticals with interest in animal health, including pet food markets [3, 4].

The present work aimed to perform an initial investigation (screening) of mixed fish by-product hydrolysate via single-factor analysis.

35%
FISH & SEAFOOD
FOOD LOSSES

This is equal to almost 3 billion Atlantic salmon.



Source: FAO, 2012

Methodology



Fish by-product

Addition 20 mM phosphate buffer pH 8.0, Ratio 1:2

Mixing in orbital 50°C 150 RPM

pH Adjustment pH 8.0

Enzymatic Hydrolysis Addition of Alcalase

A) 3.0%
B) 2.0%
C) 1.0%
D) 0.5%

Hourly Sample Collection 0 – 6h

Hydrolysis Inactivation Water bath 95°C 10 min

Separation Centrifugation 6000 RPM, 10 min

SOLIDS OIL
PROTEIN HYDROLYSATE

Results & Discussion

Hydrolysis Degree

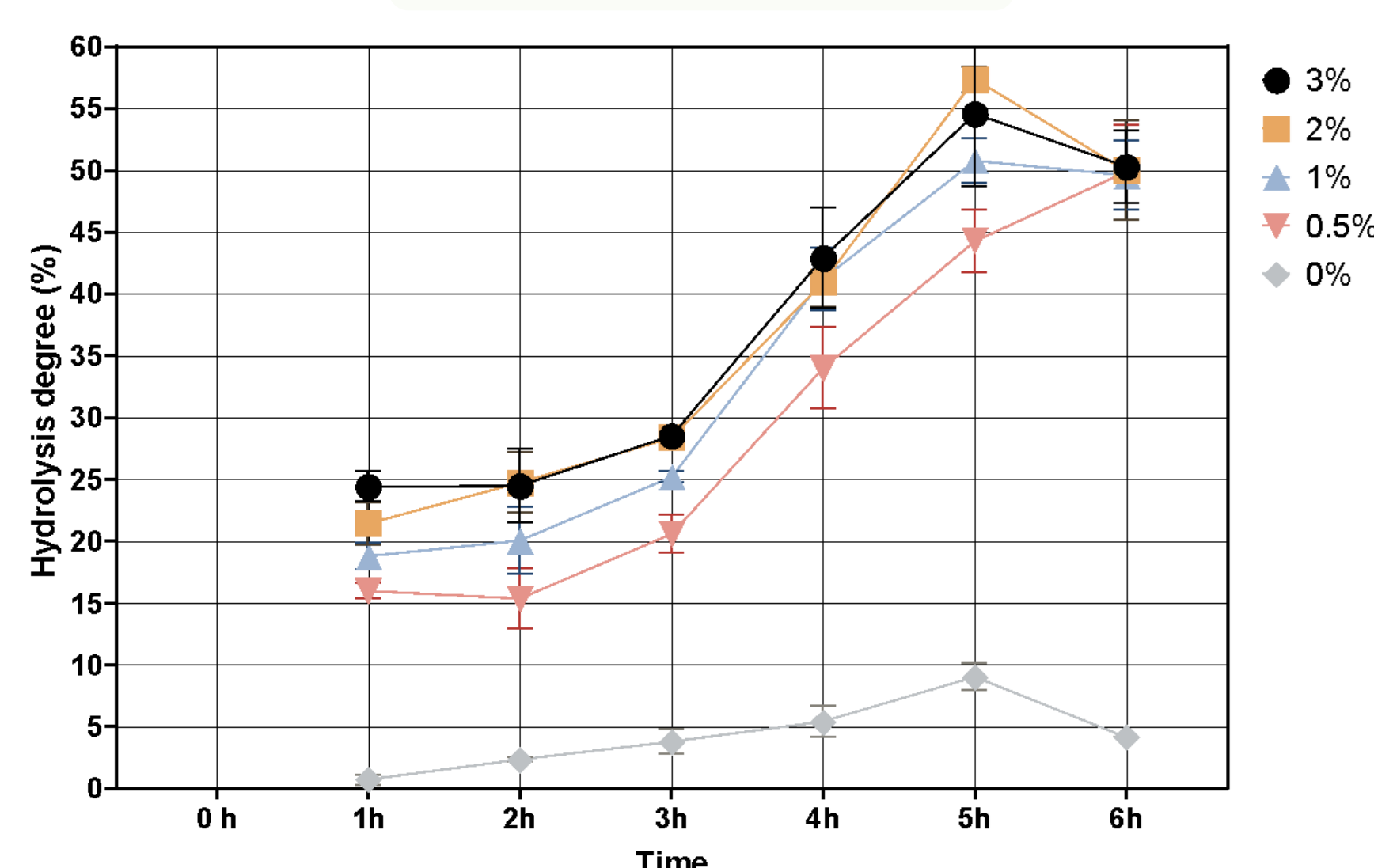


Figure 1 – Hydrolysis degree (%) of hydrolysates obtained at 50°C, pH 8 during 6 hours of enzymatic hydrolysis with Alcalase (3, 2, 1 e 0.5%).

Yield

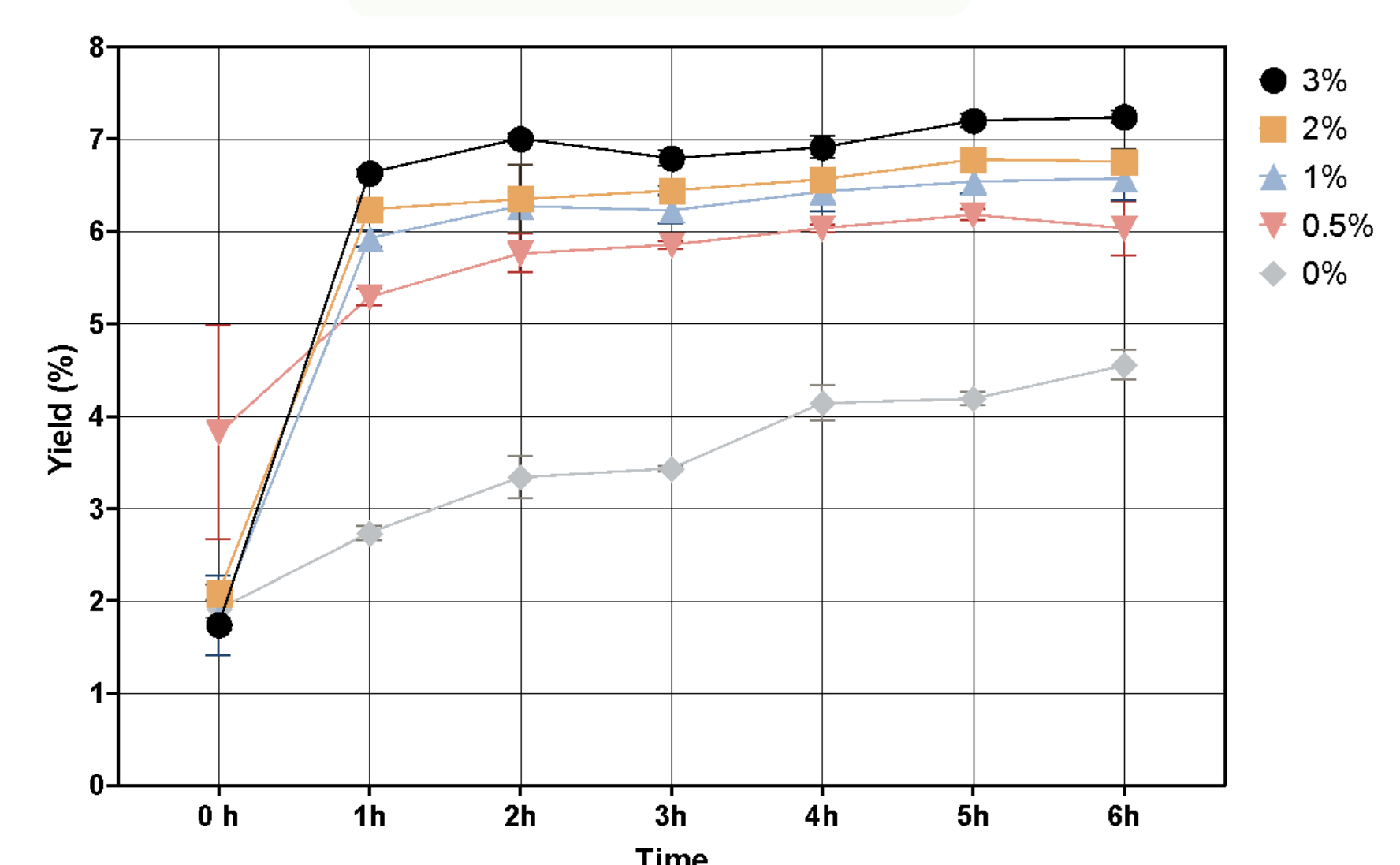


Figure 2 – Yield (%) of hydrolysates obtained at 50°C, pH 8 during 6 hours of enzymatic hydrolysis with Alcalase (3, 2, 1 e 0.5%).

Peptide Profile

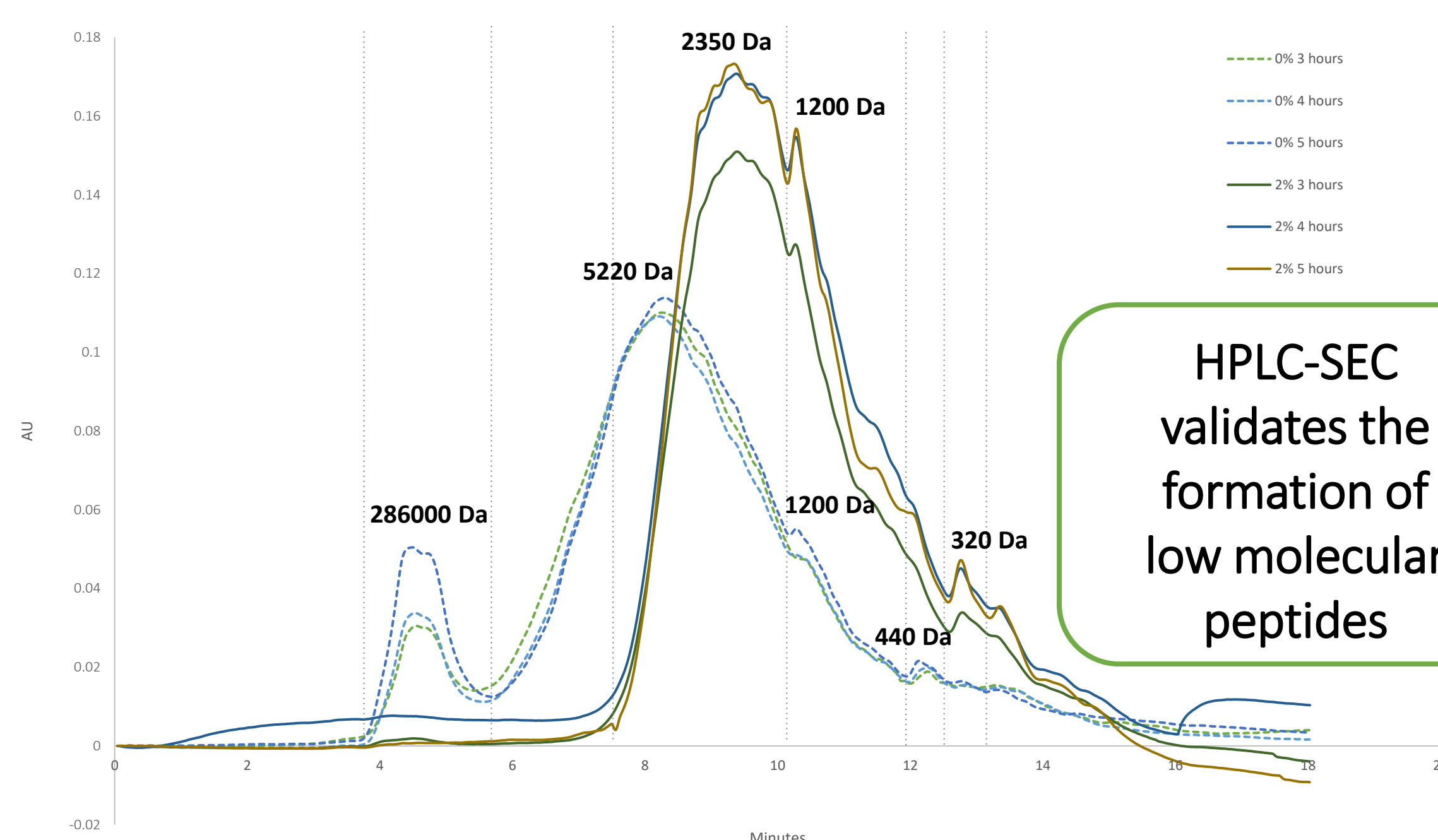


Figure 3 – Example of peptide profile of hydrolysates obtained at 50°C, pH 8 during 6 hours of enzymatic hydrolysis with Alcalase (3, 2, 1 e 0.5%).

Antioxidant & Anti-hypertensive Activity

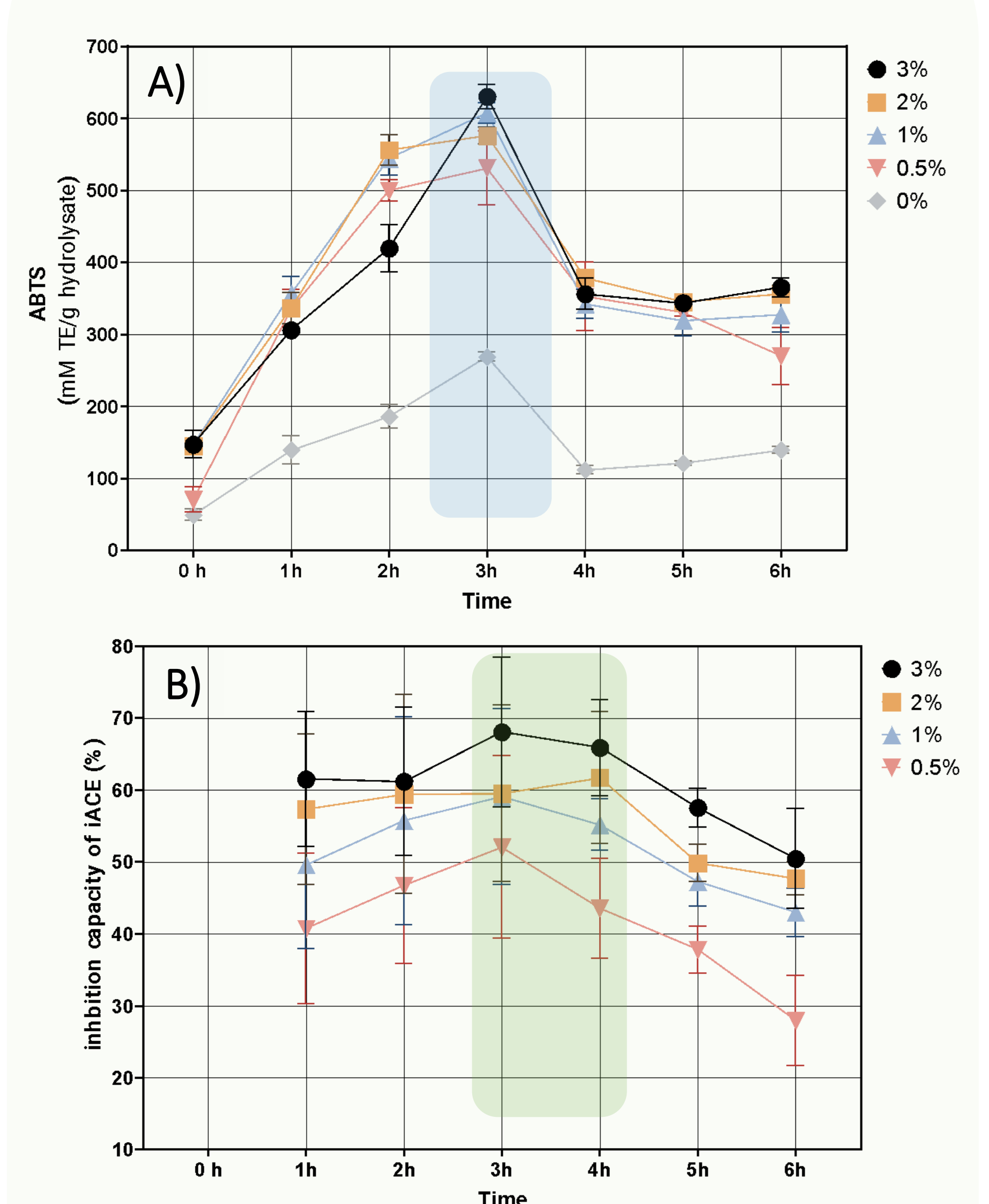


Figure 4 – Bioactivities of hydrolysates obtained at 50°C, pH 8 during 6 hours of enzymatic hydrolysis with Alcalase (3, 2, 1 e 0.5%). A) Antioxidant activity by ABTS; B) Anti-hypertensive activity by inhibition of acetylcholinesterase (ACE).

Conclusion

The optimal enzyme concentration and hydrolysis time were 3% and 3 hours, respectively.

Antioxidant and anti-hypertensive hydrolysates were produced, which have the potential to support animal well-being and be used as nutraceuticals to prevent and relieve symptoms of several chronic diseases.

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