Influence of temperature and pH on antioxidant and antihypertensive activities of a fish protein hydrolysate

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TRACE-RICE with Grant nº 1934, (call 2019, section 1 Agrofood) is part of the PRIMA Programme supported under Horizon 2020, the European Union's Framework Programme for Research and Innovation

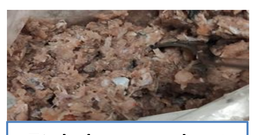
Background

Nowadays, there is an increased concern about the reuse of animal by-products. During fish processing, fish by-products are generated, which can be transformed into fish protein hydrolysates. They are rich sources of peptides and short-chain amino acids that can add value to petfood products. Fish protein hydrolysates (FPH) have anti-inflammatory, antimicrobial, antihypertensive and antioxidant activity.

Objectives

The MAIN GOAL of this work was to study the stability of bioactive properties of fish protein hydrolysate after petfood manufacture.

Methods



Fish by-product

Orbital

Lyophilization

1.3% Enzyme Alcalase *Novaenzyme*

Effect of temperature

Incubation of hydrolysates in water bath
Time: 30 min
Temperatures: 25, 65, 75, 85 or 100 ° C

Incubation of hydrolysates in Muffle
Time: 10 min
Temperature: 120 e 150° C

Effect of pH

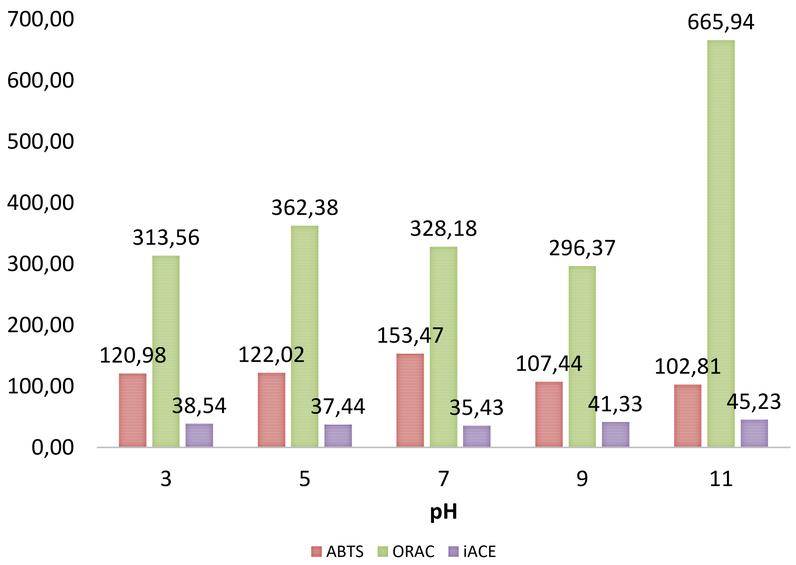
Adjust pH: 3, 5, 7, 9 e 11
Incubation of hydrolysates
Time: 60 min
Temperature: 25° C
Adjust pH to 7

Analysis of bioactivities:

- Antioxidant activity: ABTS and ORAC
- Anti-hypertensive activity: % of ACE inhibition

Furthermore, it was carry out the foaming capacity and stability, emulsifying capacity and stability index, water holding and fat binding capacity at pH 4, 7 e 10.

Results



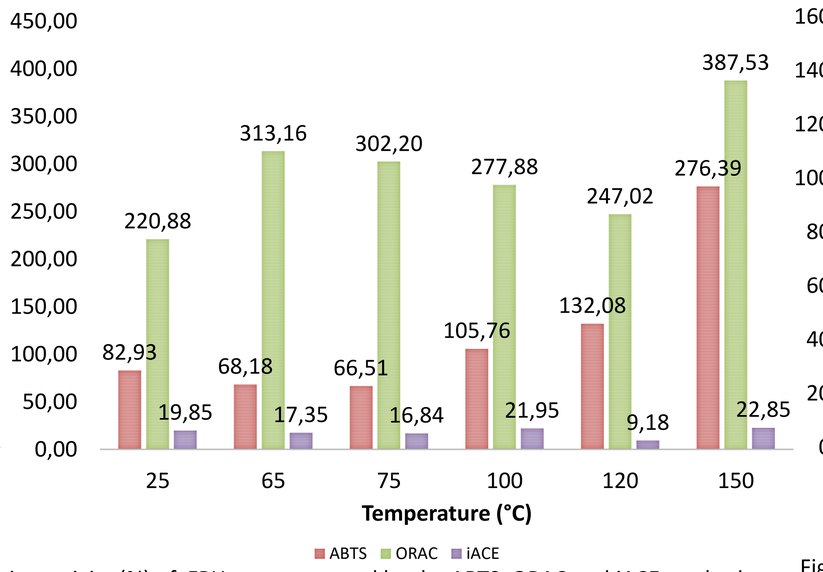


Fig 1 and Fig 2. The antioxidant activity (µM eq trolox / g sample) and antihypertensive activity (%) of FPH were assessed by the ABTS, ORAC and iACE methods at different pH and temperature.

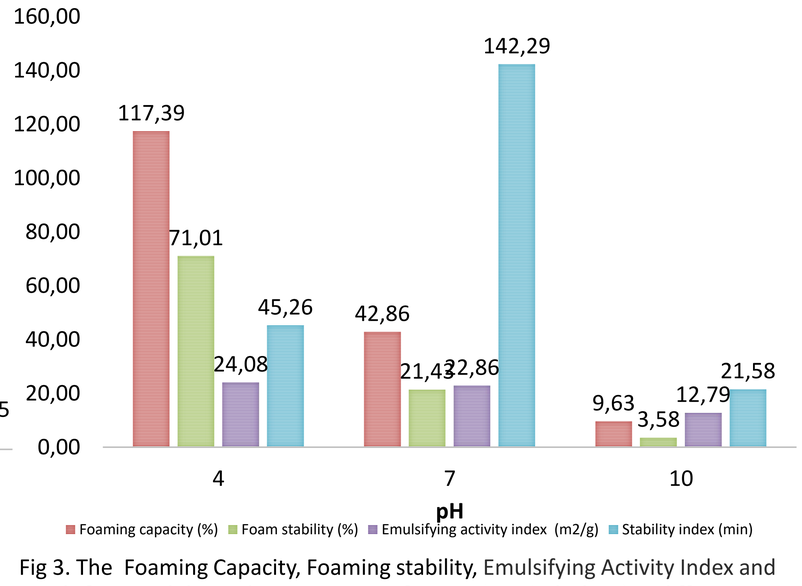


Fig 3. The Foaming Capacity, Foaming stability, Emulsifying Activity Index and Emulsifying Stability Index were assess for FPH (1.3% Alcalase) at different pH.

Applications & Expected Outcomes

This study showed that the developed fish protein hydrolysates exhibited higher antioxidant capacity by ORAC (247.02 and 387.53 µM eq trolox / g sample) and ABTS (132.08 and 276.39 µM eq trolox / g sample) at highest temperatures (120 and 150 °C) than at lowest at temperatures. FPH exhibited higher ACE inhibitory activity (22.95% and 45.23%) at highest temperature (150 °C) and pH effect (11).

Regarding technological properties, fish protein hydrolysate had higher foaming capacity and stability at low pH values, while at neutral pH, the fish protein had a higher emulsifying capacity and stability index. These results validate the potential applicability of the developed fish protein hydrolysate as functional ingredients to promote animal health when incorporated in animal feed, to animal well-being.

References

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Acknowledgment

The authors thank to Sebol - Comércio e Indústria de Sebol S.A. for providing the fish by-products. This work was financially supported by Foundation for Science and Technology (FCT) under the scope of the strategic funding of the UIDB/50016/2020 unit. Further support was obtained by Portugal 2020, European Structural and Investment Funds (ESIF) and Agência Nacional de Inovação, S.A. (ANI) under the scope of the project HeathyPETFOOD- PetFood formulations for the of health and quality of life (POCI-01-0247-FEDER-047073promotion).