

A Highly efficient method of protein recovery

This novel method of protein extraction from solid animal proteinaceous material, based on sequential isoelectric solubilisation resulting significantly high total protein recovery yields (up to 95% achieved in selected fish by-products). This presents an opportunity for fish, meat and plant processing companies to generate alternative product streams with higher value add.

Protein Recovery; Protein Extraction; Food by-products; Isoelectric solubilisation precipitation; ISP.

Problem Addressed

The world is facing a major challenge in the supply of accessible, affordable, healthy and sustainable protein for the growing population. The fishing industry is key to this challenge, but, ~25% of total production is considered inedible, despite the fact that the nutritional value is almost identical to that of the edible portion. This biomass is discarded as waste, or as low value by-products (e.g. composting, pet food or animal feed) generating significant waste disposal and environmental problems. There is growing need to generate alternatives high value-add of this discarded biomass to reduce waste disposal.

Existing methods for protein recovery, include enzymatic extraction, single step/conventional isoelectric solubilisation precipitation (ISP), ultrasound (US), pulse electric field (PEF) and microwave assisted extraction. While ISP technology allows rapid recovery of proteins, it results in a low yield as the method is unable to recover all available protein in raw material. To date, ISP alone only retrieves in the range of 40%-80% of total available protein. As a result, most products are of low value.

The Solution

This novel method involves the use of an improved sequential extraction process based on ISP to utilize this raw waste by-products, allowing recovery of the available protein when processing raw animal material. After the first protein extraction of raw materials, the remaining precipitate is subjected to a second extraction process after pH shifting to extract remaining protein. Applying this method (see Figure) showed recovery of 95% of the total protein available, while increased yields have also been obtained for meat co-products, as well as efficient and economical use of reagents when compared to conventional ISP.

Value proposition

1. Significant increase in protein yield (>95%) over conventional ISP with selected raw materials.
2. Opportunity for animal processing companies to generate alternative product streams with a higher value-add
3. Fast, economical, scalable, and transferable across industry. Adaptable to differential animal (and plant)

by-products after adjustment and validation

Intellectual Property Status

Patent application involving novel method- "Isoelectric Solubilisation of Animal Matter", Granted in Europe EP 3324751 March 2021 (WO 2017/013043). Filed in US.

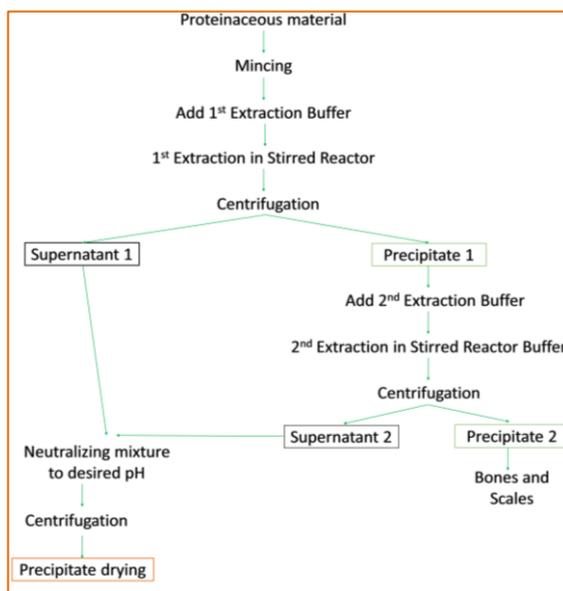


Figure: Method adapted from publication: Álvarez, C., Lélou, P., Lynch, S.A. and Tiwari, B.K., 2018. Optimised protein recovery from mackerel whole fish by using sequential acid/alkaline isoelectric solubilization precipitation (ISP) extraction assisted by ultrasound. LWT, 88, pp.210-216.

Funding

Marine Functional Food Research Initiative Programme, (Irish Department of Agriculture, Food and the Marine)

Opportunity

Teagasc wishes to partner with food processing companies to validate this method on a commercial scale for a range of animal (and plant) by-products with a view to licencing for commercial purposes

How to Proceed:

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