Tuna processing wastewater and by-products as source of protein for muscle injection

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Introduction

Tuna processing wastewater (TPW) results from the tuna cooking process in canning industries. Their main soluble components are salt, solubilized sarcoplasmic and myofibrillar proteins and a higher proportion of gelatin. Because of this, have a high organic load and strong contaminant impact. The recuperation of a gelling fraction from this stream, by mean ultrafiltration technologies to use them as injection solution for protein fortification of fish preparations could constitute a alternative, which wasn’t enough tested until now.

Aim

The aim of this study was to design a protein injection brine solution to be applied in fish products based on the mixture of a gelling fraction from tuna wastewater with other agents (salts, muscle extracts).

Materials and Methods

Ultrafiltration trials of TPW were carried using 0.5 m² spiral polysulphone membranes with cut-off at 10, 30 and 100 kDa. The operation consisted of two phases: a first ultrafiltration step following by diafiltration.

Myofibrillar proteins extracts (EM) were obtained from tuna red muscle frozen in brine. These proteins were able to form gels only by isoelectric precipitation method.

Results and Discussion

![Graphical representation of the ultrafiltration process.](image)

When mixtures of 30 kDa retentates, myofibrillar proteins extracts and phosphates (P) were used to inject tuna muscle an improvement of weight yield of injected muscle after cooking was obtained. A factorial design was used to find the optimal values that maximize the weight gain. The highest muscle weight gain was of 4.55% with regard to a mixture containing 1.6% of TPW, 5.93% of MFE and 0.29% of P.

Conclusions

TPW and tuna red muscle are suitable to obtain salt brine able to be injected in tuna muscle increasing the protein content and minimizing the weight losses during the cooking and sterilization of tuna.

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