

Protein Extraction from Underutilized Fish Species

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Introduction

- With the pH-shift –method, underutilized fish species can be used more efficiently
- The method consists of solubilizing muscle proteins in an acidic or alkaline pH, after which proteins, are precipitated in a pH close to the fish's isoelectric point
- Protein extract can be utilized in surimi-like products or other fish products

Aim

- The aim of the study was to study the effect of different solubilization and precipitation pH values, and the addition of natural antioxidants on the properties of protein concentrate acquired from Baltic herring (*Clupea harengus membras*) and European smelt (*Osmerus eperlanus*). The studied parameters were protein yield, basic composition, color and oxidation.

Materials & Methods

- Baltic herring and European smelt were both from Finland
- The effect of raw materials (gutted herring and herring fillet) on the protein masses color and yield were studied
- Natural antioxidants were ascorbic acid, α -tocopherol, and Sea Buckthorn press cake
- Protein content was studied with Kjeldal-method
- The oxidation was studied with a peroxide value analysis and volatile compounds with head-space solid-phase micro extraction coupled with gas chromatography and mass spectrometry (HS-SPME-GC-MS)

Preliminary Results

- Baltic herring`s protein content was with acid and alkaline pH-shift –method 85% and 87%, respectively, while the raw material contained 87%
- Baltic Herring`s moisture content was with acid and alkaline pH-shift –method (94%) and (92%), which were both significantly higher ($p<0,05$) than in the raw material (82%)

→ Acid pH-shift –method resulted in a significantly higher moisture content ($p<0,05$) than alkaline pH-shift -method

- The protein content of European smelts with acid and alkaline pH-shift –method were 88% and 93%, respectively, which were both significantly higher ($p<0,05$) than in the raw material (73%)
- The moisture content of European smelt was 94% with the acidic and 93% with the alkaline pH-shift –method (which were both higher than significantly higher ($p<0,05$) than in the raw material (79%))
- The preliminary results from the volatile compound analysis shows a distinct difference between the acidic and alkaline pH-shift -methods
- Natural antioxidants decreased oxidation with the alkaline pH-shift -method

Conclusion

- The study is still ongoing but the results on protein yield show, that pH shift is an efficient way of extracting proteins from underutilized fish species. The current study will also be important to understand how different parameters affect oxidation, lipid removal and color during the process.

