

INTRODUCTION

Surimi sticks are made of fish flesh, minced into a paste with cryoprotective agents, then mixed with other ingredients to be jellified for commercialization. The wastes are cuts of the final product caused by line breakdowns. This constitutes the non-compliant surimi sticks, a by-product which cannot be easily reutilized due to its consistency.

OBJECTIVES

The aim of this work is to develop an enzymatic treatment to recover the protein from non-compliant surimi sticks into food ingredient, work developed in the European Project INNOAQUA.

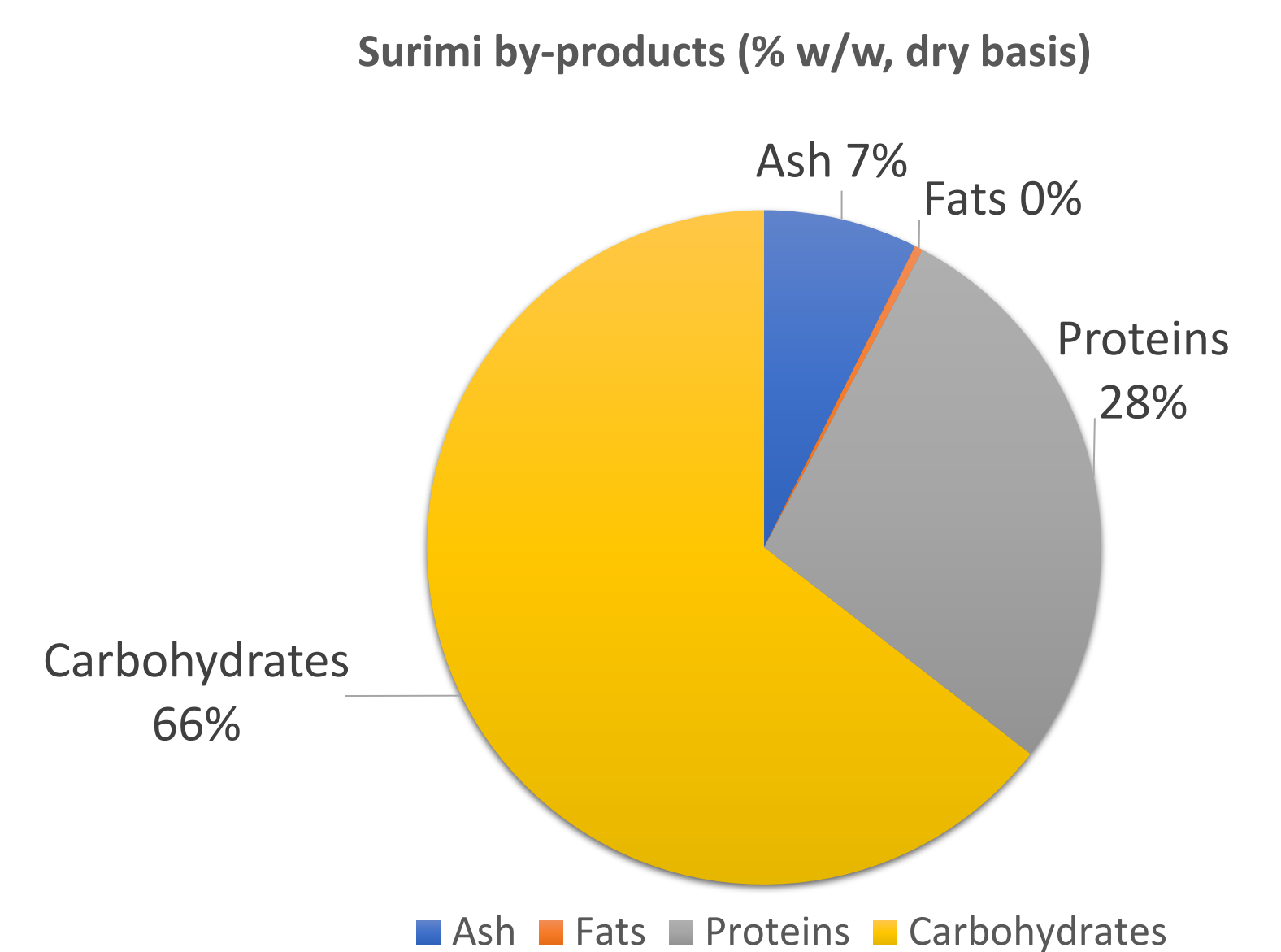
Specific objectives:

- Study of endoproteases (hereinafter P1, P2, P3, P4) and their combination with amylase (A) to evaluate the potential reduction of carbohydrates and thus, increasing the protein content in the fish protein hydrolysate (FPH) obtained.
- Study of pretreatments: (i) a washing methodology to reduce carbohydrates, and (ii) Ultrasound Assisted Extraction (UAE) to recover protein.

SURIMI BY-PRODUCT CHARACTERISATION



Surimi sticks by-products (ground)



EXPERIMENTAL DEVELOPMENT

Study of proteases



Variable parameters
Type of endoprotease P1, P2, P3, P4
With and without 2% Amylase (A)

Study of pretreatments



Variable parameters + 2% Protease
Without pretreatment
Washing method
Ultrasound Assisted Extraction (UAE)



Centrifugation & Filtration



FPHs from surimi



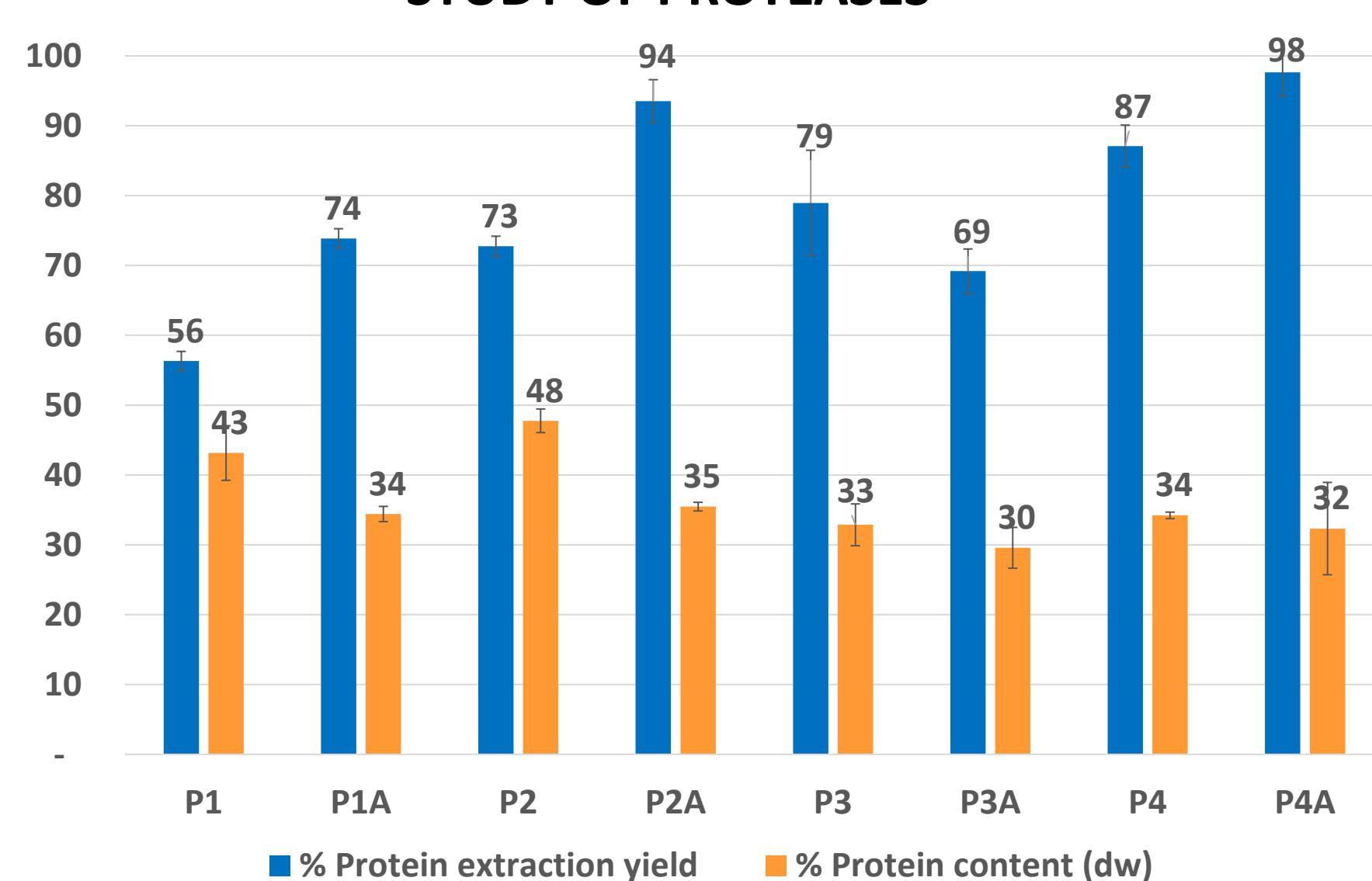
Non-compliant surimi sticks



Mincing & Grinding

RESULTS

STUDY OF PROTEASES



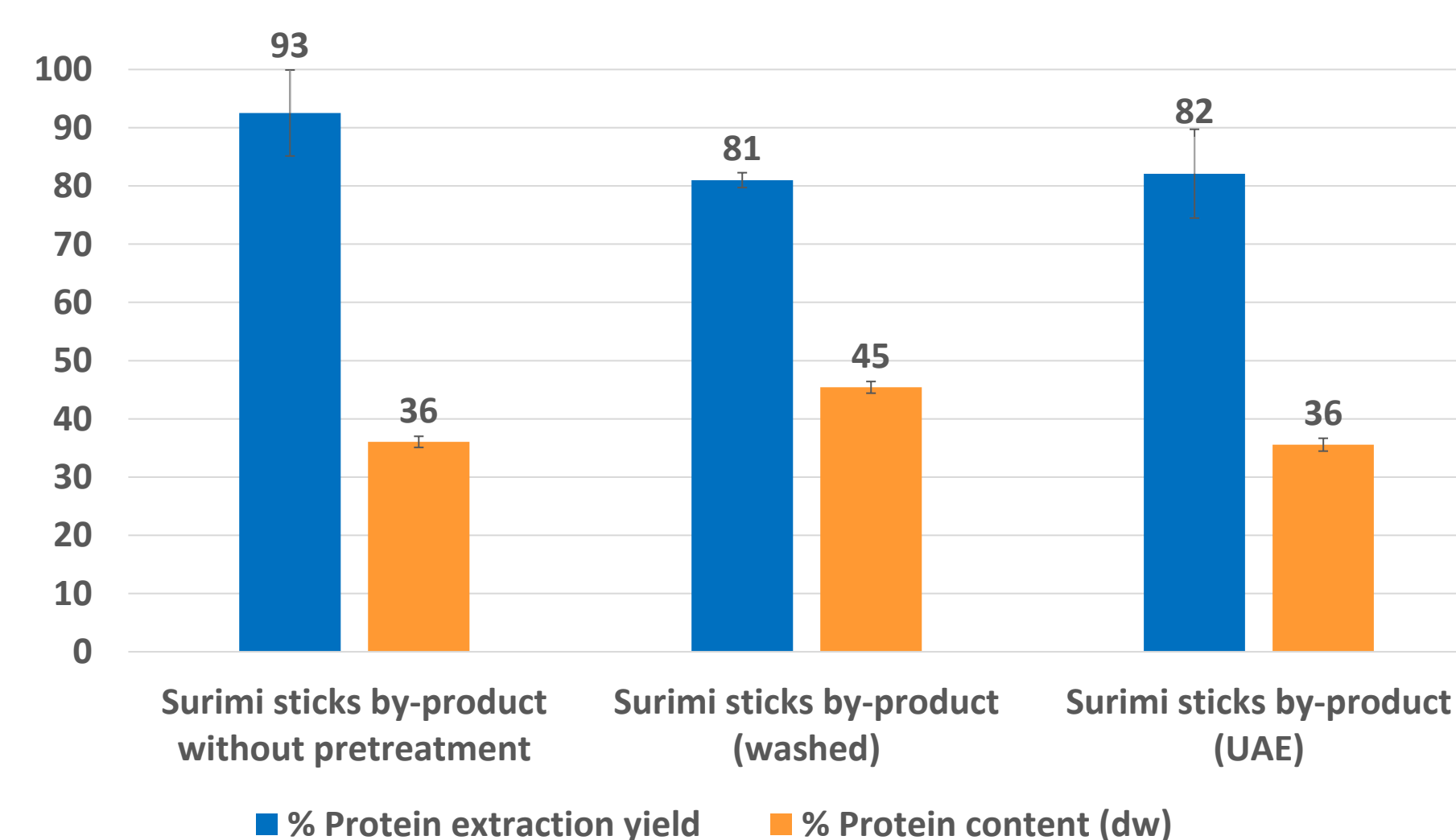
Protein extraction yield:

over 70% protein extraction yield with all proteases except for protease P1
significant differences with P1, P2 and P4 on the extraction yield when combined with amylase

Protein content:

the addition of amylase did not increase the protein content in the protein hydrolysate significantly, all ranging 30 - 48% protein on dry weight

STUDY OF PRETREATMENTS



Protein extraction yield:

over 80%

Protein content:

the washing method increased protein content in the hydrolysate, from 36% to 45% on dry weight
no significant differences with or without UAE



FPH (Fish Protein Hydrolysate)

Solid fraction

Surimi FPH

CONCLUSIONS

The study of proteases proved over 70% protein extraction yield from non-compliant surimi sticks, except for protease P1. The addition of amylase did not increase the protein purity. The study of pretreatments showed that the washing method increased protein purity from 36% to 45% on dry weight. No significant differences were found on the extraction yield with or without UAE.

The endoprotease P2 reached 73% protein recovery yield without pretreatment. It is promising to be combined with P3, a blend of endo- and exo-peptidases to maximise the hydrolysis, produce small molecular peptides. Technofunctional properties are currently under analysis, and preliminary food application trials are underway. Future analyses will optimize and explore the antioxidant, anti-inflammatory and antihypertensive activities.