

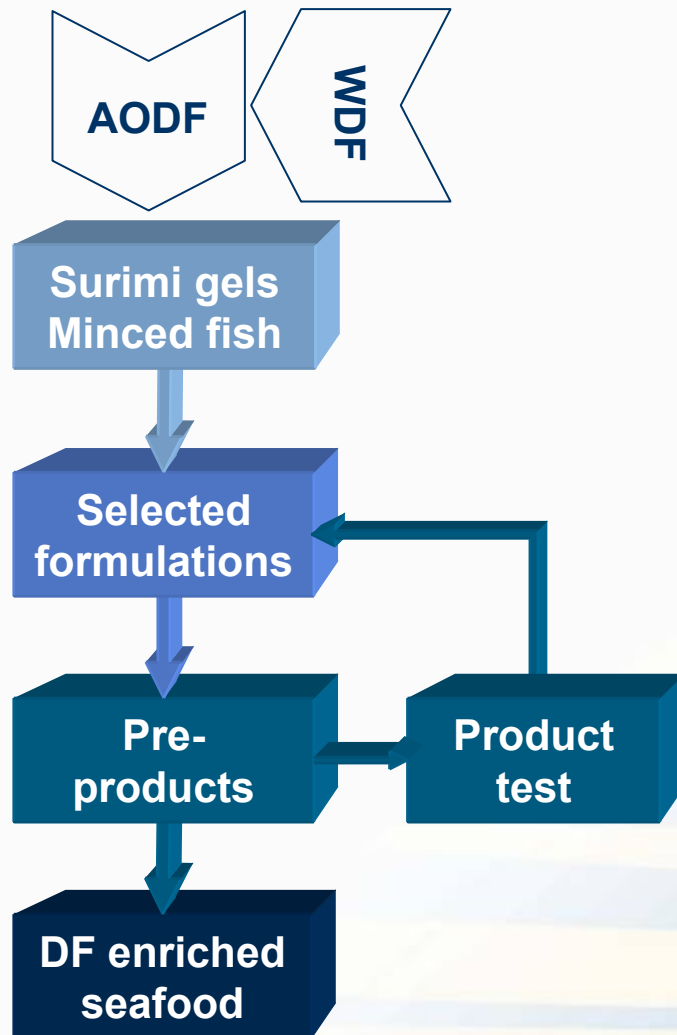
Functional food development based on restructured fish and dietary fibres

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Content

- Introduction & Objective
- Wheat & antioxidant dietary fibers
- Surimi gels & minced fish products
 - Technological characteristics
 - Interactions (surimi gels)
- Selected formulations
 - Product concepts
- Product test
 - Some highlights of the results
- Next
- Acknowledgements

Introduction

- Seafood components associated to health benefits
 - PUFA, Proteins, Taurine, Minerals, Vitamins
- Health promoting components from other foods
 - Dietary fibres (DF)
 - *Antioxidant dietary fibres (AODF)*
 - **'A product containing significant amounts of natural antioxidants associated with the fibre matrix'**

Introduction

- Upon storage, processing or cooking
 - Changes or losses of some components may occur
 - Lipid oxidation
- Need for convenience seafoods
 - Less time, effort
 - Increase variety of seafood products
 - Increase consumption of seafood

Objective

- Restructured products with (antioxidant) dietary fibres
 - Suitable for use in the production of a functional seafood
 - Improving intestinal health
 - Effective in preventing lipid oxidation in the product
 - Maintaining the intrinsic beneficial effects of constituents from seafood
 - Easy to prepare and consume



AntiOxidant *Dietary Fibre* from grapes



Skin/Seed/Stems





Wheat *Dietary Fibre*

Composition

Cellulose (75%)

Hemicellulose (25%)

(<0.5% Lignin)



Vitacel®



Surimi gels
Minced fish

*Restructured seafood
products*

- Carriers of functional components
- Image
- Different matrices
- Maximal use of existing resources





Surimi gels
Minced fish

Searching for technological feasibility

- Fiber type
 - WDF (250 & 80 μ m)
 - GADF (red, white)
- Fiber concentration
- Frozen storage
- Surimi type





surimi



chopped



gel



with salt & WDF



gel



...or with salt & Red AODF



Surimi gels
Minced fish

*Searching for technological
feasibility*

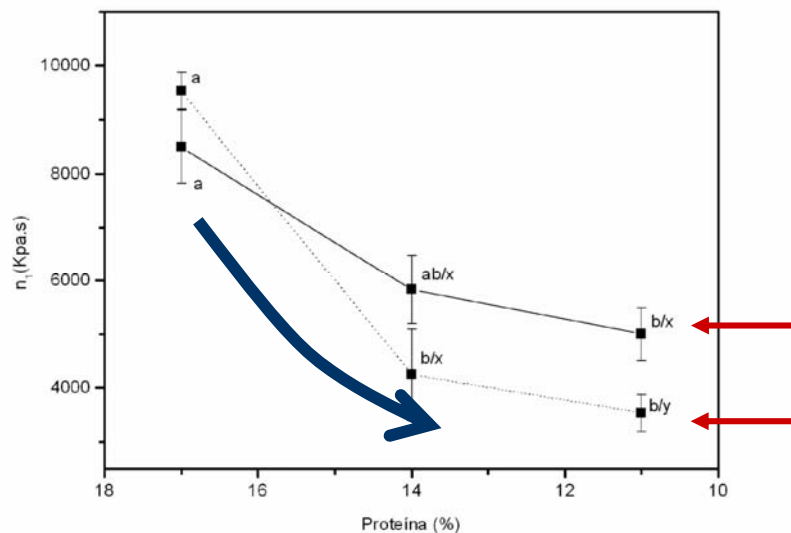
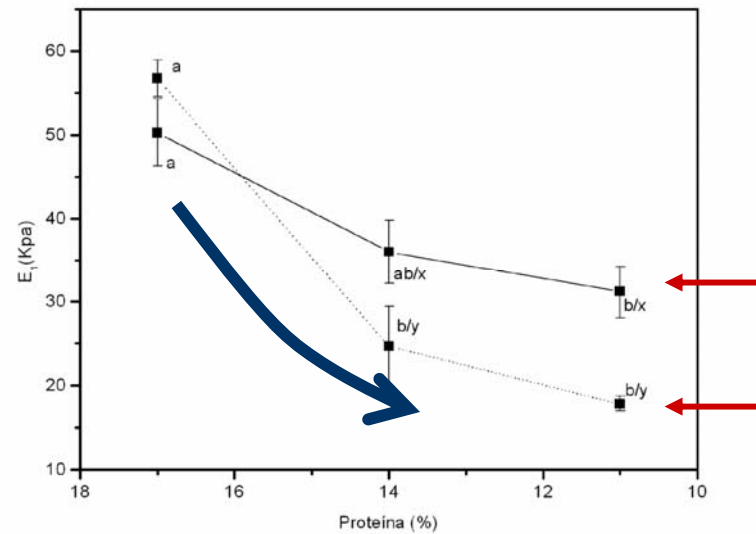


- Whiter gels with WDF
- Hardness, cohesiveness and water holding decrease with WDF added (constant moisture)
- Triangular test shows sensory differences between control and gels with WDF added



Surimi gels
Minced fish

*Interactions among
protein, water & fibre*



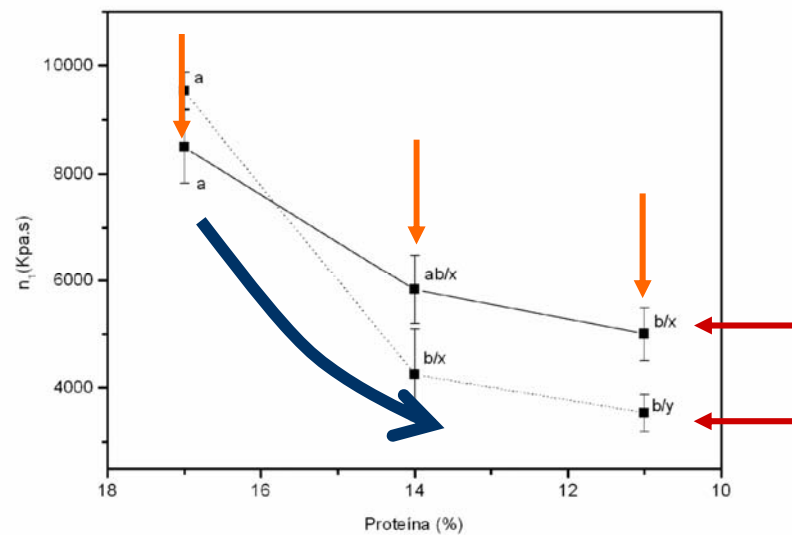
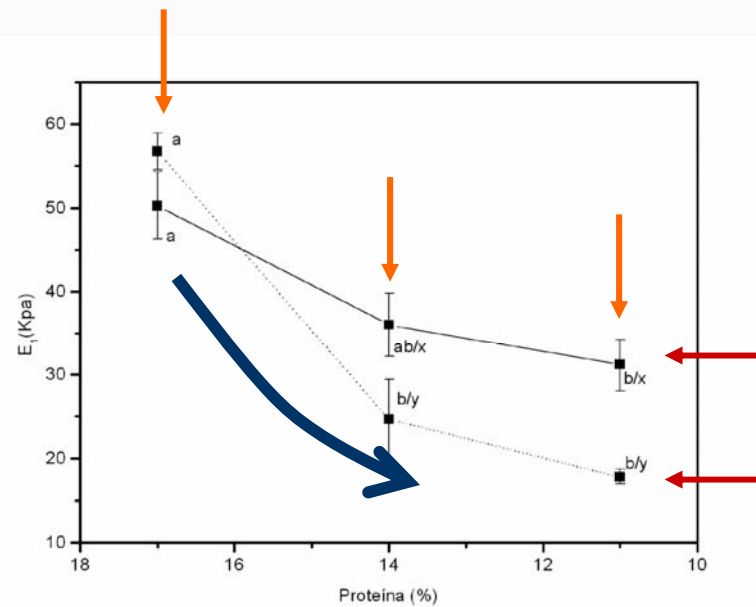
- Rheological parameters decrease at decreasing protein concentration
- WDF added at constant protein increases these parameters-filler

Sánchez-González et al. in prep.(a)



Surimi gels
Minced fish

*Interactions among
protein, water & fibre*



■ The net effect at constant moisture is a balance between the protein dilution and WDF filler effects

Sánchez-González et al. in prep.(a)



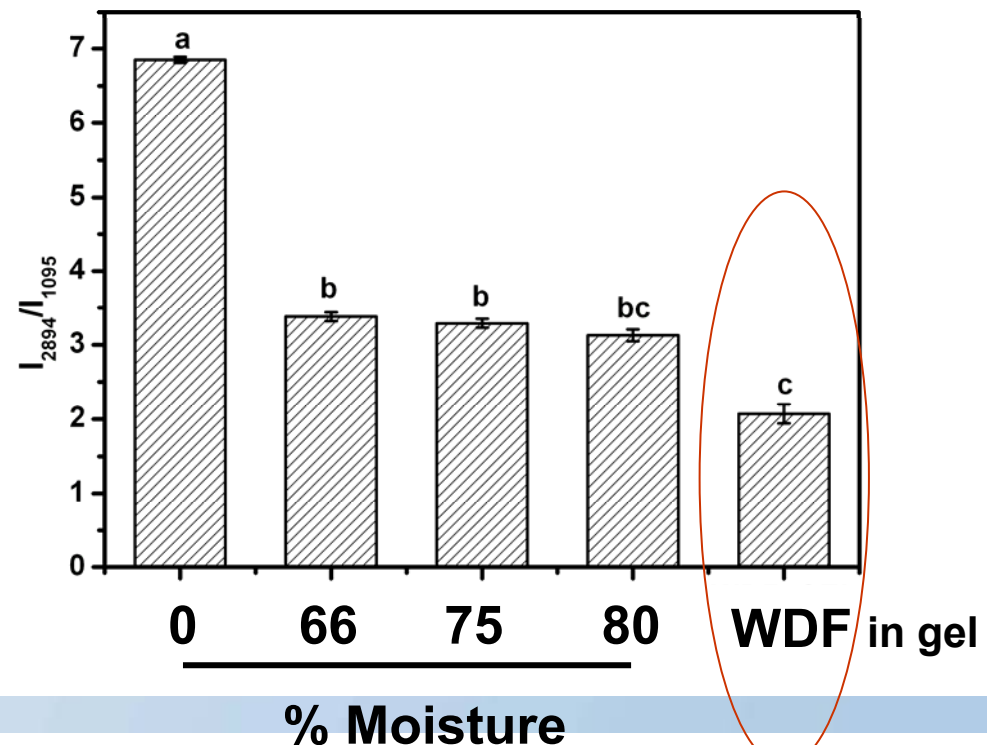
Surimi gels
Minced fish

*Interactions among
protein, water & fibre*

Sánchez-González et al. in prep. (b)

- The local humidity of WDF within the gel phase is higher relative to the mean humidity of the whole samples

.....as a consequence, there may be a local dehydration of the protein matrix

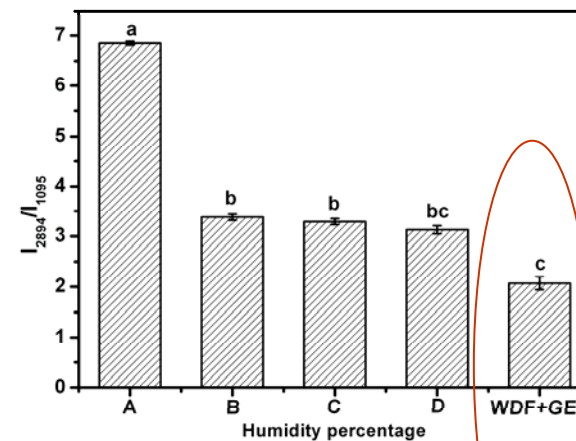
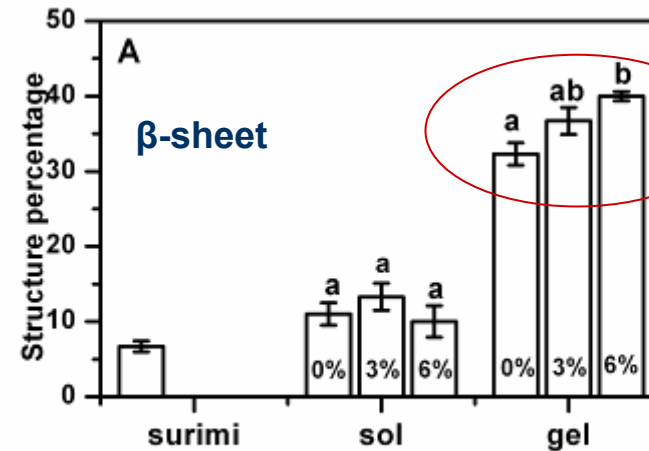




Surimi gels
Minced fish

*Interactions among
protein, water & fibre*

- Higher changes in the protein secondary structure of gels are observed due to WDF
- The increase in % β -sheet could be explained in terms of a local dehydration effect due to the WDF



Sánchez-González et al. in prep. (b)



Surimi gels
Minced fish

*The modifications observed are desirable
and/or be overcome depending on the final
product to be made*



Surimi gels
Minced fish

Searching for technological feasibility

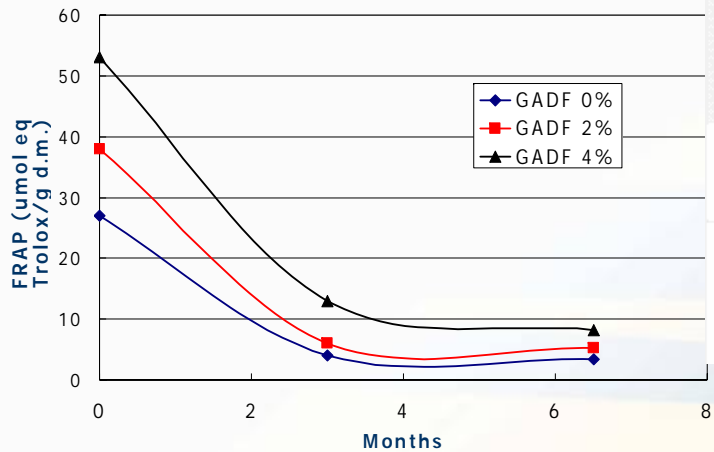
- Fiber concentration
- Fiber type
 - GADF (red, white)
 - WDF (250 & 80 μ m)
- Frozen storage





Surimi gels
Minced fish

Horse mackerel & red grape AOD



Sánchez-Alonso et al. Food Chem. 2007

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By Stephen Daniells
17/08/2006 - Antioxidant and fibre-rich waste from wine 1 altern. shelf li Spain.

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Items by Product category
- Select a category -
Carbohydrates and fibres (sugar, starches)
Cereals and bakery preparations

Items by supplier
- Select a sponsor -
A.S.F. Ingredients
AarhusKarlshamn

Wine waste could boost shelf life of fish
22/2/2007 - Antioxidant and fibre-rich waste from wine making could offer a cheap and healthy alternative to synthetic antioxidants to prolong the shelf life of fish meat, suggests a study from Spain.

"The results indicate that WGDF had good functional properties, high water and oil retention capacity, and considerable swelling properties, which would make it useful as a natural ingredient in foods," reported Isabel Sánchez-Alonso in the Journal of Food Science.

Oxidation processes in food can lead to organoleptic deterioration in taste, colour and texture. And fish products are particularly susceptible to oxidation processes because of the high unsaturated lipid content.

The food industry has long been aware of this, and is increasingly seeking natural solutions rather than artificial additives, such as like butylhydroxyanisole (BHA) and butylhydroxytoluene (BHT), to extend the shelf life of milder-tasting products.

The researchers, from the Instituto del Frio (CSIC), looked at using white grape dietary fiber concentrate (WGDF) as a natural antioxidant to increase the shelf life of minced fish muscle (MFM). The WGDF is described as a "natural product containing high concentrations of dietary fiber (DF) with a high-soluble DF (sDF)/insoluble DF (iDF) ratio and associated bioactive compounds".

Free Newsletter

[All newsletters](#)

**IMPROVE
YIELD**

**PREVENT BREAKING
OF COATING**

**PREVENT
DEFORMATION**

BOTH FIBERS BIND EFFECTIVELY WATER

WHEAT FIBER

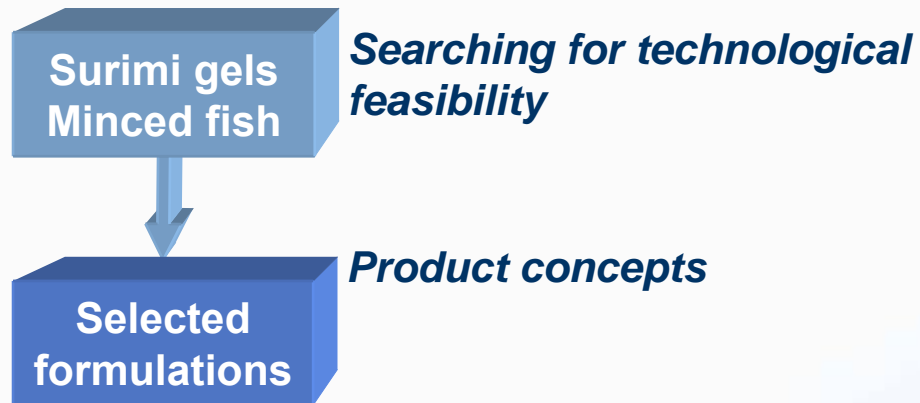
GRAPE FIBER

**THEY DO NOT PREVENT PROTEIN AGREGATION UPON
FROZEN STORAGE**

**GRAPE
FIBERS**

PRESERVE THE MINCE FROM OXIDATION

COLOR MAY BE A PROBLEM IN SOME PRODUCTS



- Associated Member Angulas Aguinaga
- Formulation with 2% WDF in a surimi type product



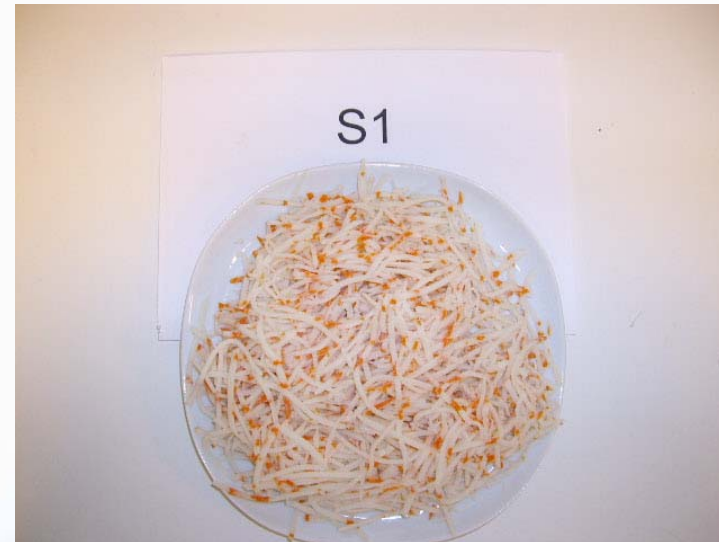


Surimi gels
Minced fish

Searching for technological feasibility

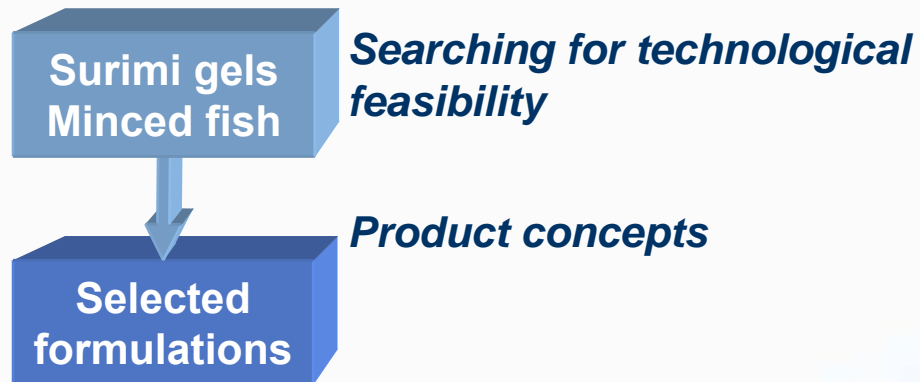
Selected
formulations

Product concepts

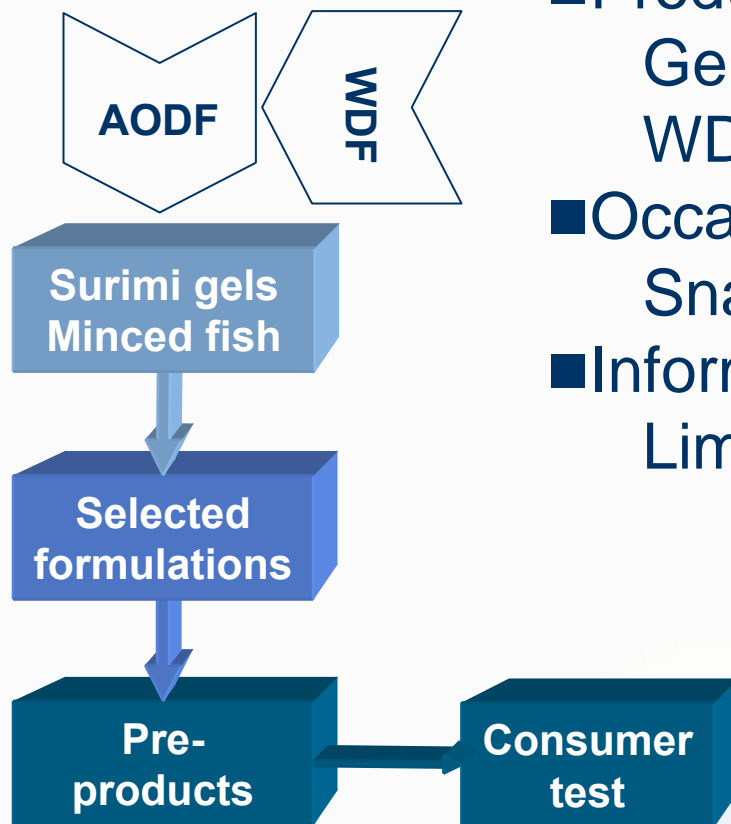


- Shredded product
- 2% WDF (and control)
- Snack food
- Suitable for product test





- WDF or GDF in a salmon product
- Restructured fillet
- Main course
- 2% WDF or 1.5% GADF
- Suitable for product test



- Product profile
 - Gel or mince
 - WDF, GADF or control
- Occasion use
 - Snack (gel) or main course (mince)
- Information
 - Limited or complete

- Sensory acceptability
- Importance of the fiber

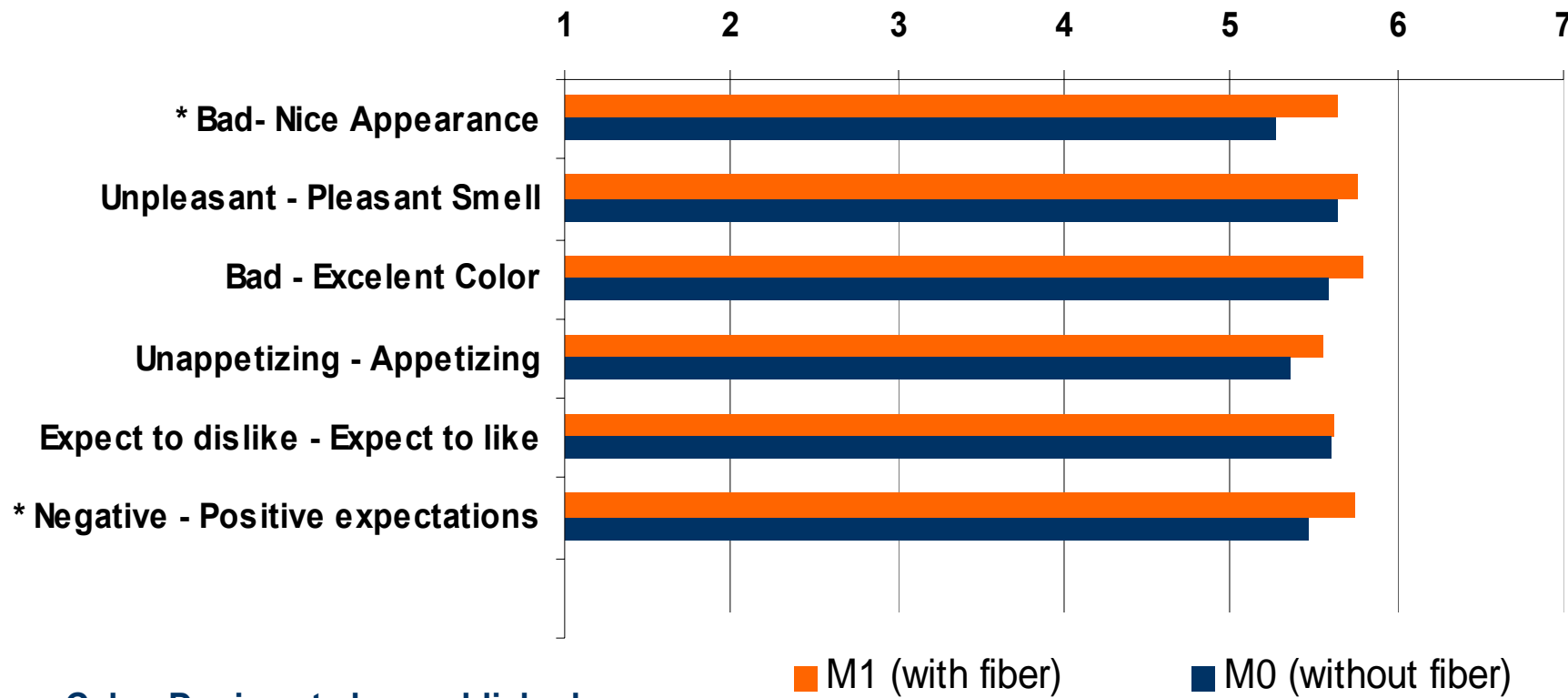


Mince Product



EVALUATION PRIOR TO TASTING (mean values)

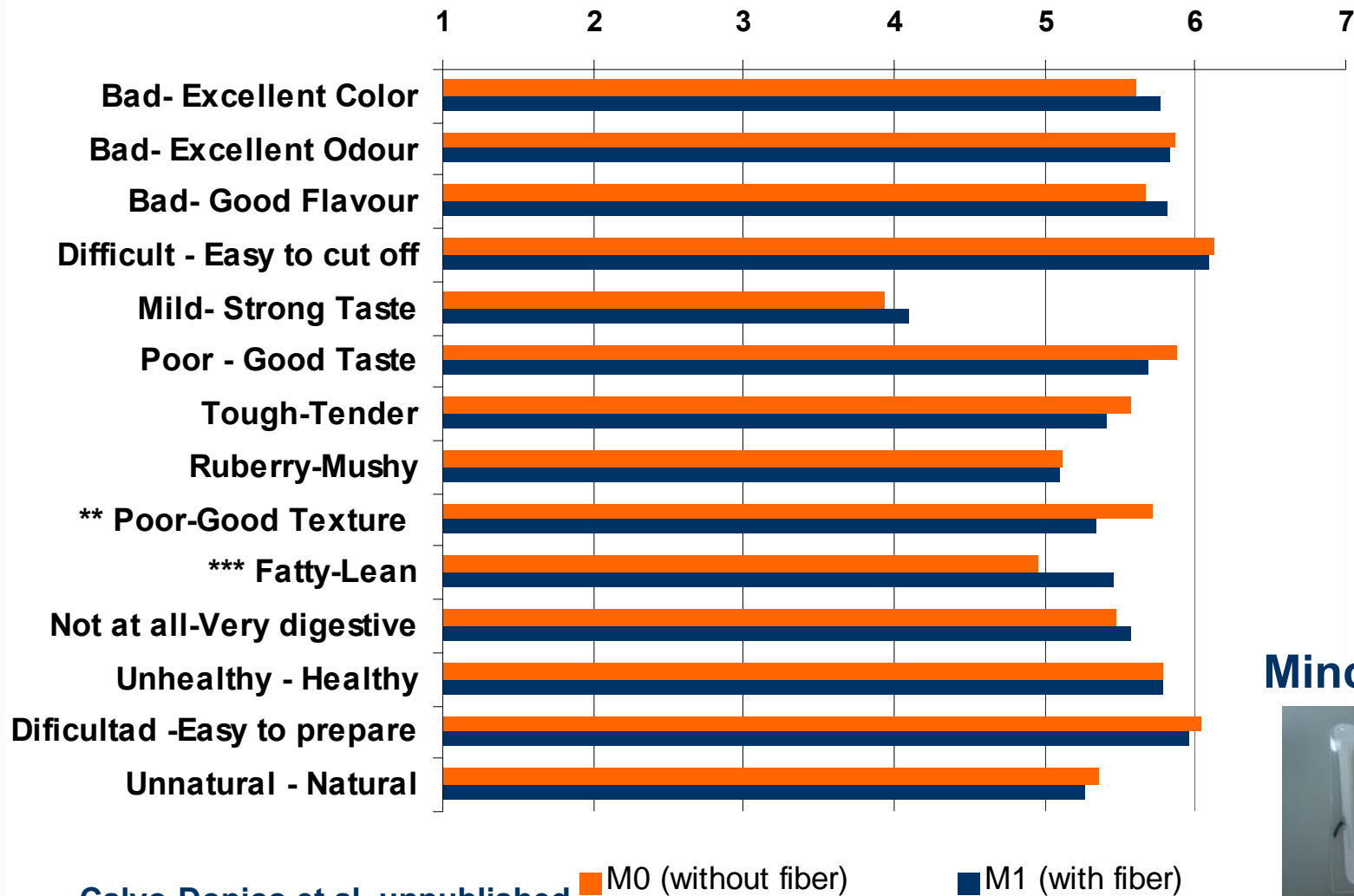
(* significant differences at p -level < 0.05)



Calvo-Dopico et al. unpublished

EVALUATION DURING CONSUMPTION (mean values)

(** significant differences at p -level < 0.05 ; *** $p < 0.01$)



Calvo-Dopico et al. unpublished

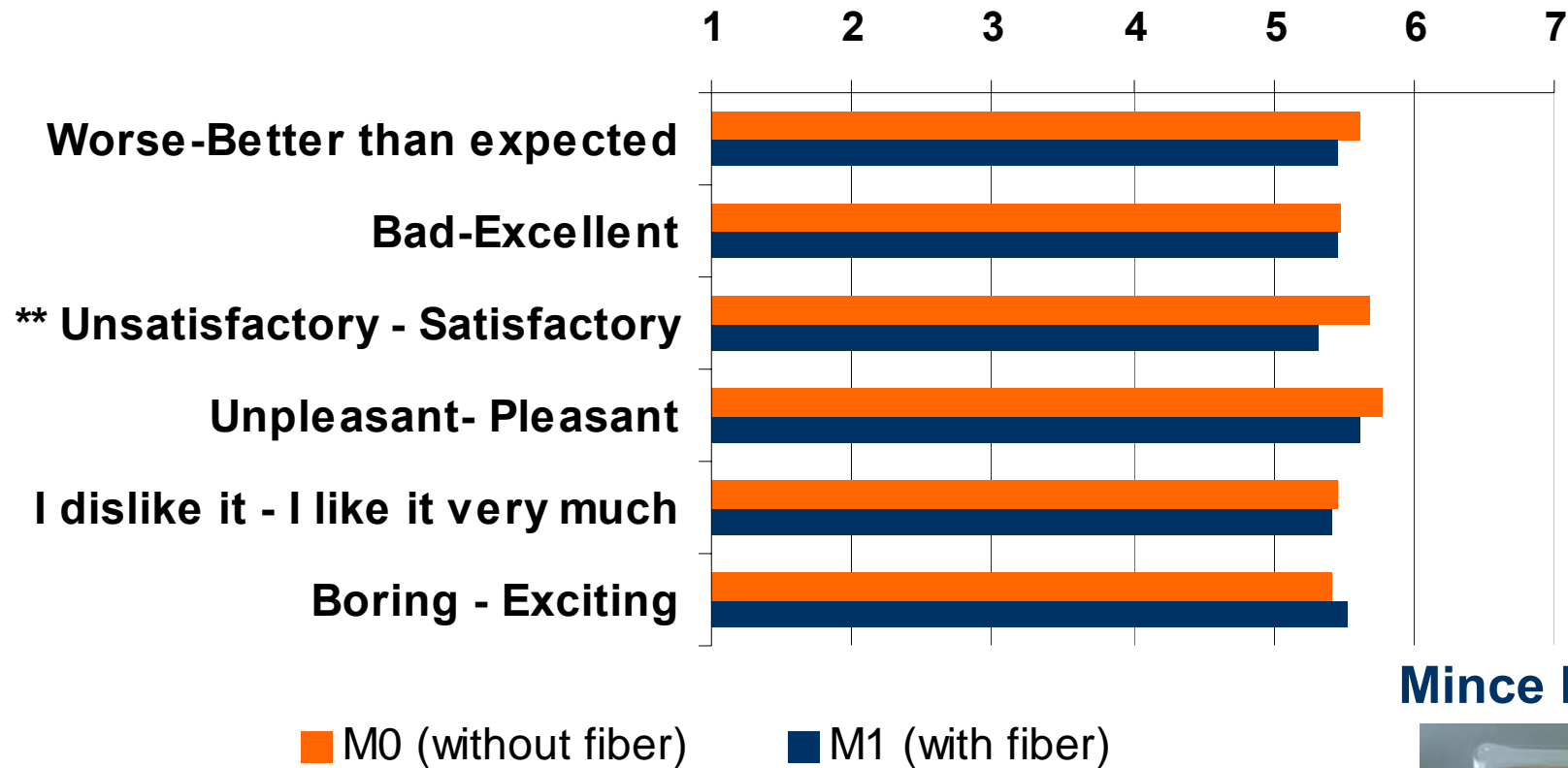
M0 (without fiber)

M1 (with fiber)

Mince Product



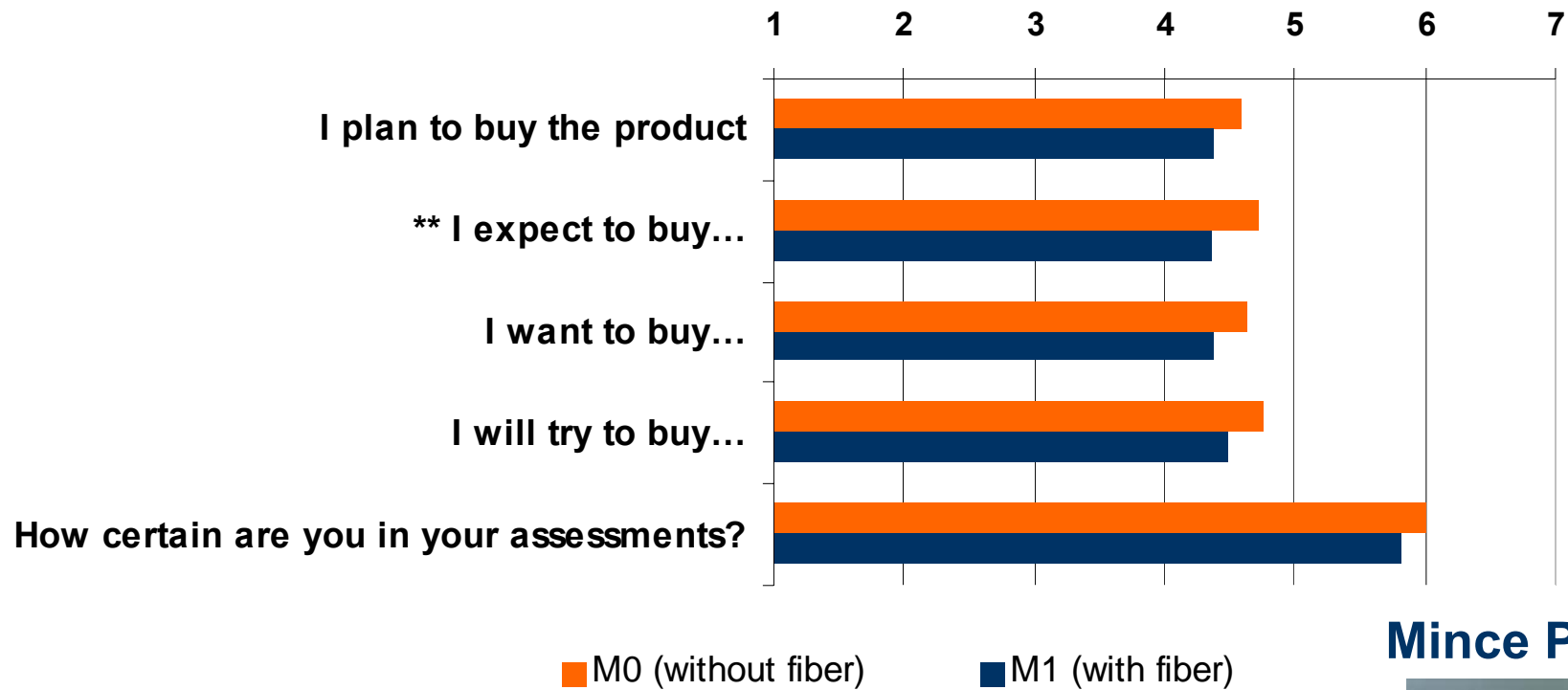
SATISFACTION POST-CONSUMPTION (*mean values*)
 (** significant differences at p -level <0.05)



Mince Product

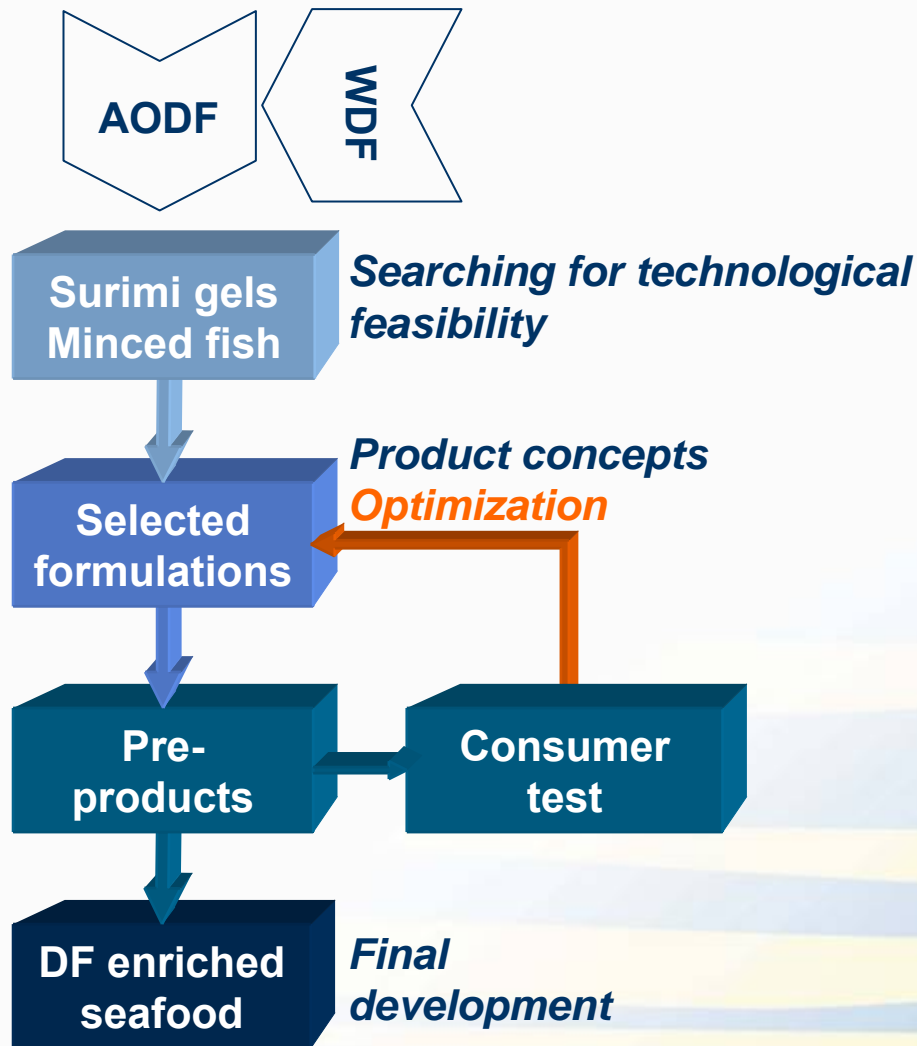


INTENTION TO BUY (*mean values*)
 (** significant differences at p -level <0.05)



Mince Product

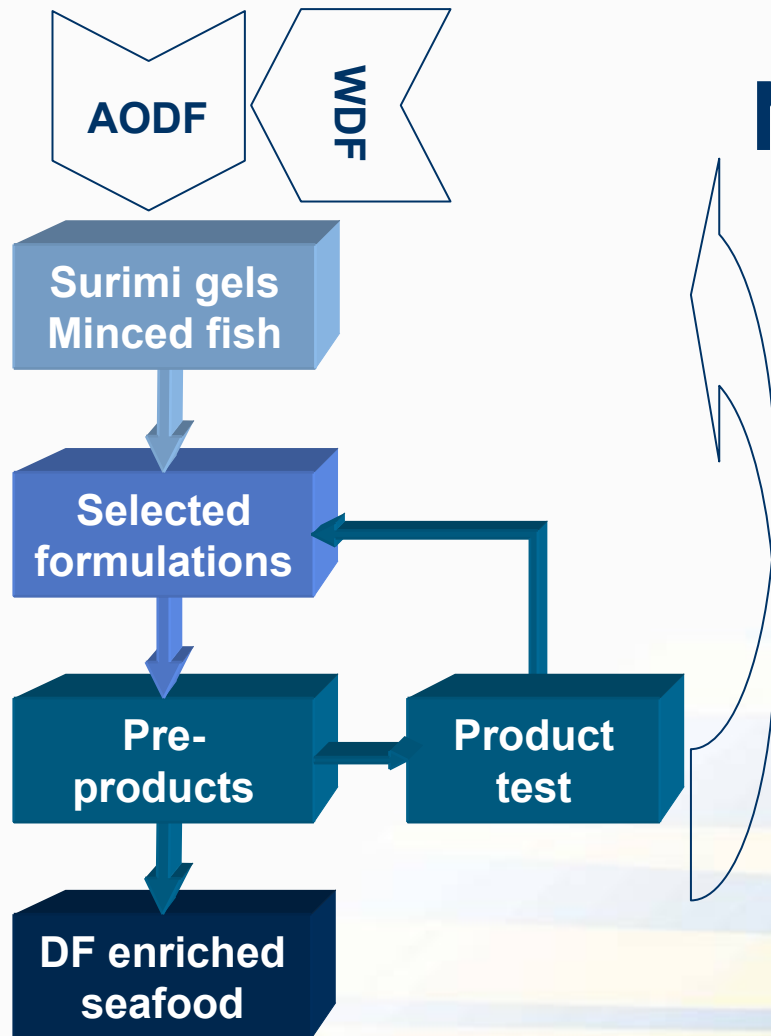




- Good sensory acceptability of the minced product
- Slight differences between fiber-enriched and control

Mince Product





Next

- Perform real products
- Continue analysis on tested formulations
- New formulations

Acknowledgements

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- Other members of the research team participating in this part of the project:
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 - ✓ S. Alina (University of Coruña)
 - ✓ S.O. Olsen (University of Tromsø)
 - ✓ J.L. Hurtado (Angulas Aguinaga S.A.)



Thank you!
Gracias!
Eskerrik asko!



A better life with seafood...

SEAFOOD
plus