D28.4: Physical prototypes of new products from the selected species meagre, greater amberjack, wreckfish, pikeperch and grey mullet

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Objective:

Physical prototypes of new products from the selected species meagre, greater amberjack, wreckfish, pikeperch and grey mullet.

Species and product selection criteria will be decided according to previous tasks information, technical processing limitations, fish availability and similar products availability in markets.

Description:

- Guidelines to obtain new products as well as packaging, conservation conditions, product shelf life and consumer handling/cooking specifications

- A maximum of 3 physical prototypes per species of new products of varying degree of processing

Selected ideas for each fish species:

Meagre	**Idea 1: Frozen fish fillets with different recipes**
(IRTA)	**Idea 6: Fish burgers shaped as fish**
	Idea 4: Ready to eat meal: salad with fish
Pikeperch	**Idea 21: Fresh fish fillet with different 'healthy' seasoning and marinades**
(IRTA)	**Idea 30: Ready-made fish tartar with additional soy sauce**
	Idea 9: Fish spreads / pate
Grey mullet	**Idea 2: Thin smoked fillets**
(CTAQUA)	**Idea 33: Ready-made fish fillets in olive oil.**
	Idea 21: Fresh fish fillet with different 'healthy' seasoning and marinades
Greater amberjack	**Idea 13: Frozen fish fillet that is seasoned or marinated**
(CTAQUA)	**Idea 30: Ready-made fish tartar with additional soy sauce**
	Idea 34: Fresh fish steak for grilling in the pan

EVALUATION SHEET

For the different fish products development

New product idea 1 is shown as an example

IDEA 1: Frozen fish fillets with different recipes	
APPEARENCE (Scale from 0 to 10, where 10 is the highest score)	
SUGGESTIONS FOR IMPROVEMENT:	
AROMA (Scale from 0 to 10, where 10 is the highest score)	
SUGGESTIONS FOR IMPROVEMENT:	
FLAVOUR (Scale from 0 to 10, where 10 is the highest score)	
SUGGESTIONS FOR IMPROVEMENT:	
TEXTURE (Scale from 0 to 10, where 10 is the highest score)	
SUGGESTIONS FOR IMPROVEMENT:	
OVERAL ACCEPTABILITY (Scale from 0 to 10, where 10 is the highest score)	
GENERAL REMARKS:	

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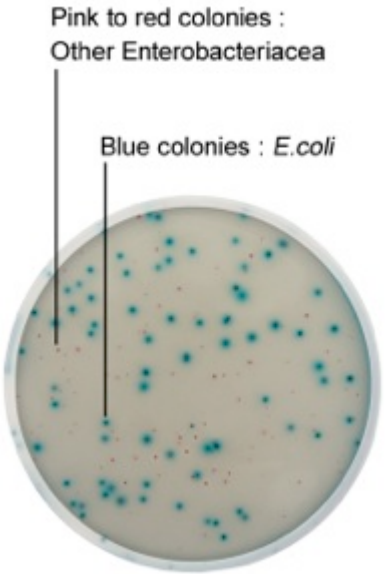
Determination of physicochemical properties and nutrition facts of prototypes:

- Proximate composition:
  - ✓Crude protein
  - ✓Crude fat
  - ✓Ash
  - ✓Moisture
  - ✓Carbohydrates
  - ✓Calories
- Salt content
- pH

Microbiological control:

- *Salmonella spp.*
- *Lysteria monocytogenes*
- *Lysteria spp.*
- *Shiguella spp.*
- *Enterobacteriaceae*
- Meshophilic bacteria
- Psycrophylic bacteria
- Histamine



n= 5 per product

Shelf-life assessment :

- Data on total shelf-life from literature (frozen products) and from prototype testing.
- Refrigerated products: Temp. 4 °C (1/3 total shelf-life), abuse Temp. 8 °C (2/3).
- Regulation (EC) No. 2073/2005 microbiological criteria for *L. monocytogenes* in ready-to-eat foods.
- Sensory properties: appearance, aroma, flavour, and texture. Different time points by means of a 3 point scale : 0 (similar to fresh product) to 2 (unacceptable).

Results

Frozen fish fillets with different recipes (meagre)

Recipes:	
Fish fillet citrus sauce	8.0
Baked fish	7.0
Fish with tomato (microwave)	7.5
Fish fillet in green sauce	8.0
Fish fillet with yogurt sauce and mushrooms	**9.0**
Baked fish with tomato sauce	**8.0**
Fish fillet with orange	**8.0**
Fish fillet with garlic and parsley	8.5
Fish fillet with vegetables	**8.5**
Three cheeses fish fillets	**8.0**

fish fillet with vegetables

three cheeses fish fillets

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Ready to eat meal: salad with fish (meagre)

Effect of different concentrations of cider vinegar on the pH of meagre after different storage temperatures at 4 °C

Concentration of vinegar	Initial pH	pH 30 min	pH 60 min	pH 120 min	pH 180 min
30%	6.64	6.45	5.72	5.20	5.10
40%	6.64	6.24	5.52	5.16	4.90
50%	6.64	5.99	5.10	5.06	4.87
60%	6.64	5.79	4.75	4.54	4.45
70%	6.64	5.34	4.56	4.35	4.20

Meagre was cut in cubes of approximately 1.5 cm and marinated at 1:1 weight ratio with the different vinegar solutions containing 1% NaCl. The pH was measured in dried samples which were homogenized in 10 volumes of distilled water.

Shelf life assessment of the vinegar-cooked meagre and the mustard vinaigrette: microbial counts over the shelf-life assessment period (8 days)

		Day 1 Log (ufc/g)	Day 5 Log (ufc/g)	Day 8 Log (ufc/g)
Vinegar-cooked meagre	Lactic acid bacteria	<1.00	<1.00	<1.00
	Mesophilic bacteria	1.10	1.45	0.86
	Enterobacteriaceae	<1.00	<1.00	<1.00
	E.coli	<1.00	<1.00	<1.00
	Psycrophilic bacteria	<2.00	<2.00	<2.00
	Salmonella	A	A	A
	Listeria monocytogenes	A	A	A
Mustard vinaigrette	Mesophilic bacteria	4.06	4.22	4.33
	Enterobacteriaceae	<1.00	<1.00	<1.00
	Salmonella	A	A	A
	Listeria monocytogenes	A	A	A

Results are averages of 5 different samples. The presence of *Listeria* and *Salmonella* is determined in 25 g of sample and the rest in 10 g. Letter "A" stands for absence and the asterisk indicates that is below the limit of detection.

Fish burgers shaped as fish (meagre)

Fish spreads / pate (pikeperch)

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Fresh fillet with ‘healthy’ seasonings and marinades (pikeperch)

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Ready-made fish tartar with additional soy sauce (pikeperch)

Products with greater amberjack and grey mullet

- **Grey mullet**
  - Idea 2: Thin smoked fillets
  - Idea 33: Ready-made fish fillets in olive oil.
  - Idea 21: Fresh fish fillet with different 'healthy' seasoning and marinades
- **Greater amberjack**
  - Idea 13: Frozen fish fillet that is seasoned or marinated
  - Idea 30: Ready-made fish tartar with additional soy sauce
  - Idea 34: Fresh fish steak for grilling in the pan

Greater amberjack

- Farmed specimens (South of Spain)
- Average size 1,5-2 kg
- Filet yield 48-50%

Frozen fish fillet that is seasoned or marinated (Greater amberjack):

Description: Frozen fish filet with Asian marinade (Soya sauce and honey). The product is produced environmentally sustainable.

Recipes can be included in the package or include the QR code to several Internet cooking sites to give more options to the consumer.

Ready-made fish tartar with additional soy sauce (Greater amberjack):

Description: Packaging is a golden tray that reflects the colours and physical appearance of the product and that could also be used for serving.

Shelf-life: 1 day.
(Mesophilic bacteria, enterobacteria)

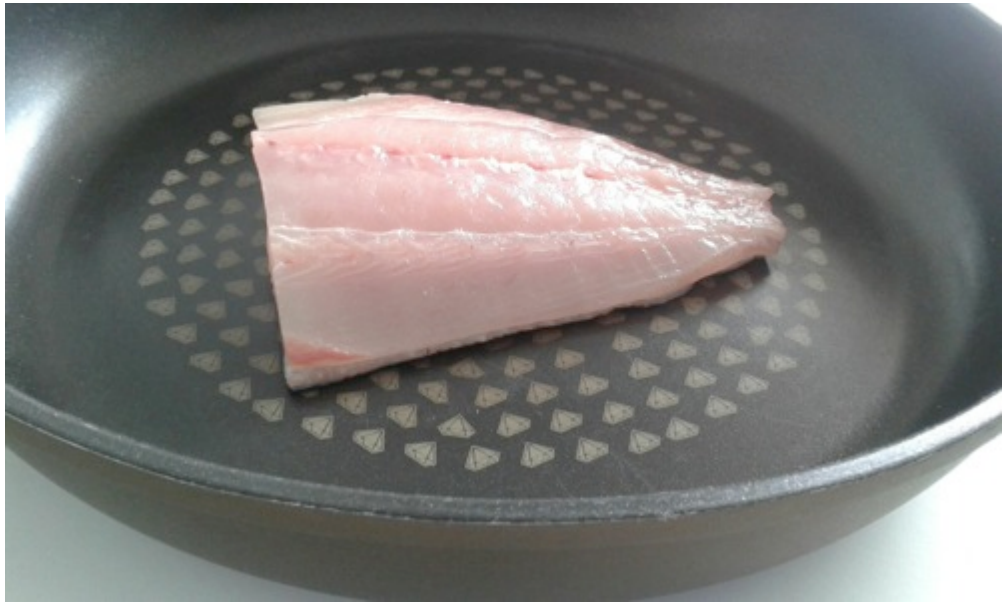
Shelf life assessment of the ready-made greater amberjack tartar with additional soy sauce: microbial counts over the shelf life assessment period[1]

	Day 0 Log (CFU/g)	Day 1 Log (CFU/g)	Day 2 Log (CFU/g)
Mesophilic bacteria	2.00	3.93	4.40
Enterobacteriaceae	2.79	3.24	3.62
E.coli	<1.00*	<1.00*	<1.00*
Psycrophilic bacteria	2.20	3.19	3.19
Salmonella	A	A	A
Listeria monocytogenes	A	A	A
Listeria spp.	A	A	A
Shigella	A	A	A

[1]Samples were stored at 4ºC. Results are averages of 3 different samples. The presence of microorganisms is determined in 25 g of sample. Letter "A" stands for absence and the asterisk indicates that is below the limit of detection.

Fresh fish steak for grilling in the pan (Greater amberjack):

Description: Fresh fish steak for grilling in the pan. Transparent packaging.



Grey mullet: *M. cephalus*

- Farmed fish not available
- Wild specimens have been used (very difficult to find the needed amount for all the products)
- Average weight 2 kg
- Filet yield 39%

Thin smoked filet (Grey mullet):

Description: Fresh thin smoked fillets; packaging is a plastic tray where the fillets are laid covered with a transparent plastic. Ideas concerning the different uses of the fillets are included on the product's sleeve.

Ready-made fish fillets in olive oil (Grey mullet):

Description: Ready-made fish fillets stored in olive oil with visible glass packaging. Product message: 'Tradition'. It is labelled as a premium product; the country of origin is EU.

Fresh fielt with different healthy seasoning (Grey mullet):

Description: Fresh fish fillet with different 'healthy' seasoning separately packed that consumer can choose and vary depending on the occasion

Conclusions for meagre and pikeperch species:

Frozen fish fillets (meagre):

- Easy, long shelf life

Salad with fish (meagre):

- Shelf life depends on the *mesclun* vegetables

Fish burger (meagre):

- Minimum difficulties, long shelf life

Fish pate (pikeperch):

- Filling under aseptic conditions or pasteurize afterwards

Fresh fillet with healthy seasonings and marinades (pikeperch):

- Easy, relatively limited shelf life

Fish tartar (pikeperch)

- Shelf life is 6 days, however, with HPP can be extended and eventually combined with avocado

Conclusions for greater amberjack and grey mullet :

Frozen fish fillet that is seasoned or marinated (great amberjack):

- Easy, long shelf life

Ready-made fish tartar with additional soy sauce (great amberjack):

- Difficulties with the packaging, short shelf life

Fresh fish steak for grilling in the pan (great amberjack):

- easy, limited shelf life

Thin smoked fillets (grey mullet):

- Minimum difficulties, long shelf life

Ready-made fish fillets in olive oil (grey mullet):

- Minimum difficulty, very long shelf life

Fresh fillet with healthy seasonings (grey mullet):

- easy, limited shelf life

Thank you

Questions?

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