

# Technical assessment of the **DIVERSIFY** species and new product development

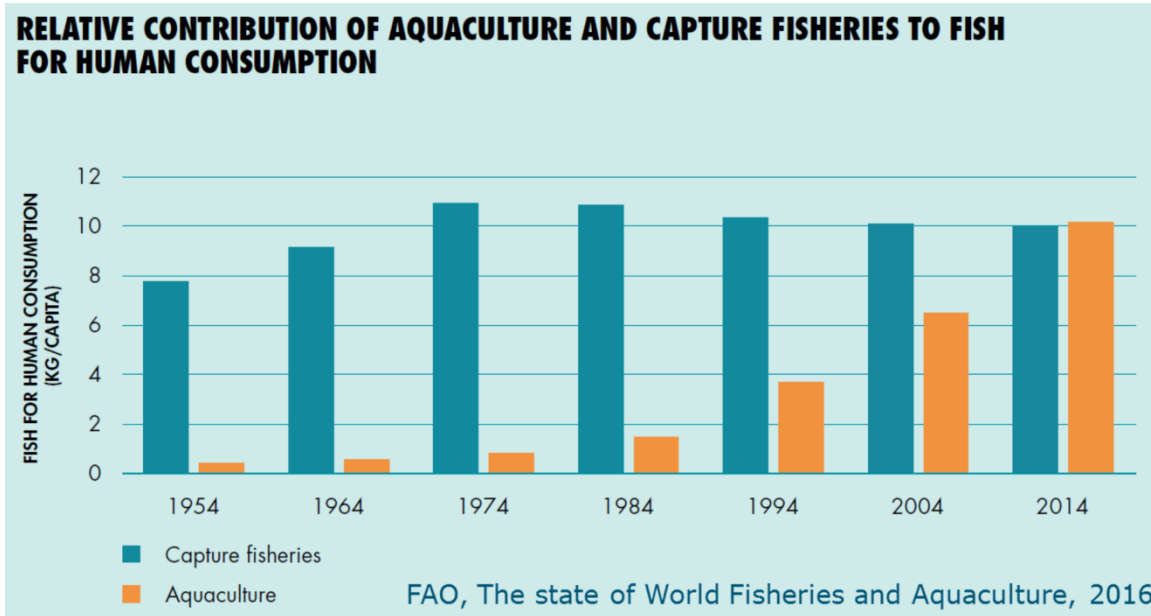


Co-funded by the Seventh  
Framework Programme  
of the European Union



## What we know...

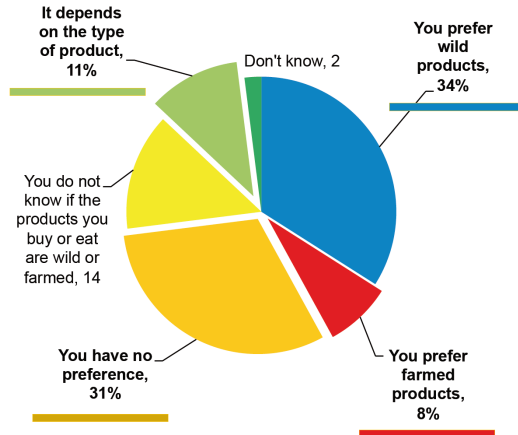
- Aquaculture supply approximately 50% of global food fish production compared with just 9% in 1980s



## What we know...

- Aquaculture is still far from its full potential development since European aquaculture production represent about 20% of the total fish production
- European consumers perceive farmed fish as being of lower general quality than wild fish

Special Eurobarometer 450  
EU28, N=24,452; 2017



Attributes	Levels	Utilities	Relative importance (%)
Country of origin	Spain	1.7396	42.96
	Norway	-0.7122	
	Morocco	-1.0275	
Storage conditions	Fresh fish	0.6765	20.58
	Frozen fish	-0.6765	
Purchasing price	6 €/kg	0.4264	19.31
	12 €/kg	0.4168	
	18 €/kg	-0.8432	
Obtaining method	Wild fish	0.5918	18.01
	Farmed fish	-0.5918	

Intercept 4.9707, higher utility values correspond to higher consumer preference.

Only one segment of consumers (19.6%) preferred farmed sea fish instead of wild sea fish.

SOURCE: Claret et al. Food Quality and Preference 26 (2012) 259–266

## What we know...

- The relative low market share of aquaculture can also be a direct consequence of the poor variety of aquaculture products in the market, and in particular because of the lack of processed aquaculture foodstuffs
- Variety has been identified as a relevant factor in order to stimulate consumers' purchase, thus avoiding boredom and satisfying individual curiosity
- Diversification: new species and new products, **DIVERSIFY**



# Meat products vs. Fish products



# Successful fish products



# What we know... in favour of the new farmed species

## THE BLUE REVOLUTION

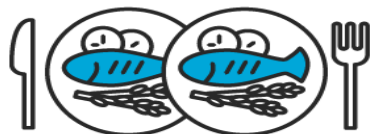
### DEMAND

OUR GLOBAL POPULATION WILL GROW AN ADDITIONAL **2.7 BILLION** IN THE NEXT 50 YEARS



WE WILL NEED **70% MORE PROTEIN** BY 2050

**2X** MORE FISH IS CONSUMED GLOBALLY THAN BEEF



OCEANS ARE OUR BIGGEST SOURCE OF PROTEIN FEEDING **2.6 BILLION**

### SUSTAINABILITY



OUR FISHERIES ARE **2.5X LARGER** THAN WHAT OUR OCEAN CAN SUPPORT

### VARIETY



**+500** SPECIES OF FARMED FISH  
 = 10 fish

### FEED CONVERSION FOR 1 LB OF MEAT



• 8/9 LB OF FEED • 1 LB OF FEED  
 • 8K LITERS OF WATER

### TRACEABILITY

**WILD FISH**

DON'T KNOW WHAT THEY'VE EATEN

NO IDEA WHAT KIND OF WATER THEY CAME FROM



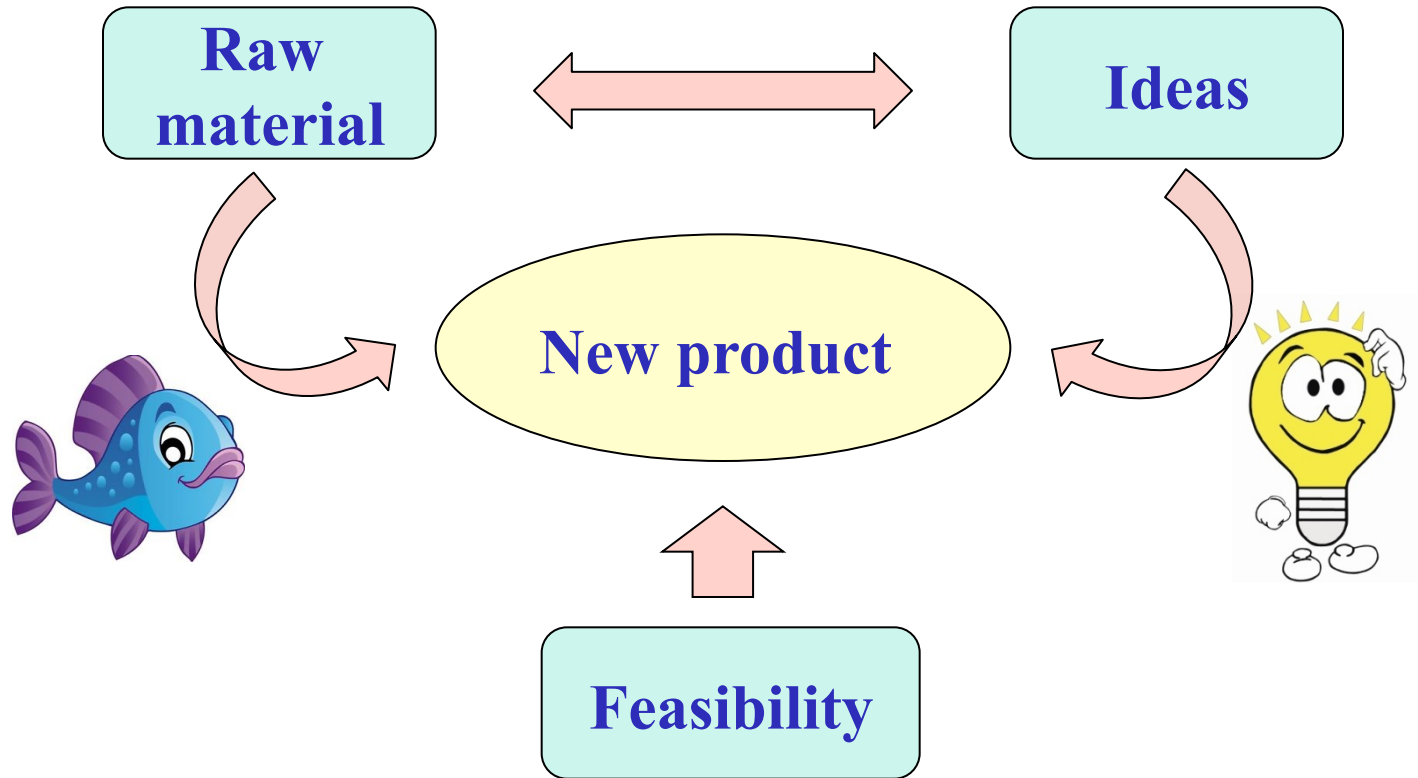
## WP 28. New product development

### Objectives:

- To develop new product concepts from selected species, by incorporating consumer and expert input
- To select product ideas and develop physical new products from selected species
- To monitor the quality of new products in terms of sensory characteristics and nutrition-rearing history
- To make a technical assessment of the products.



## WP 28. New product development



# WP 28. New product development

## Raw material

Food Research International 100 (2017) 396–406



ELSEVIER

Contents lists available at [ScienceDirect](#)

Food Research International

journal homepage: [www.elsevier.com/locate/foodres](http://www.elsevier.com/locate/foodres)



Sensory characterization, physico-chemical properties and somatic yields of five emerging fish species



Oxana Lazo<sup>a,d</sup>, Luis Guerrero<sup>a,\*</sup>, Niki Alexi<sup>b,e</sup>, Kriton Grigorakis<sup>b</sup>, Anna Claret<sup>a</sup>, José A. Pérez<sup>c</sup>, Ricard Bou<sup>a</sup>

# WP 28. New product development

## Raw material

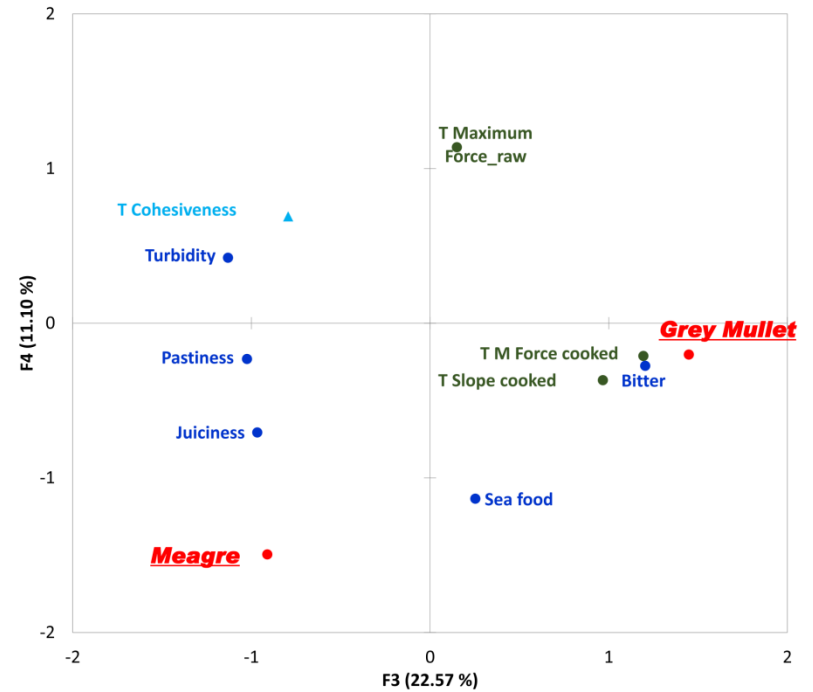
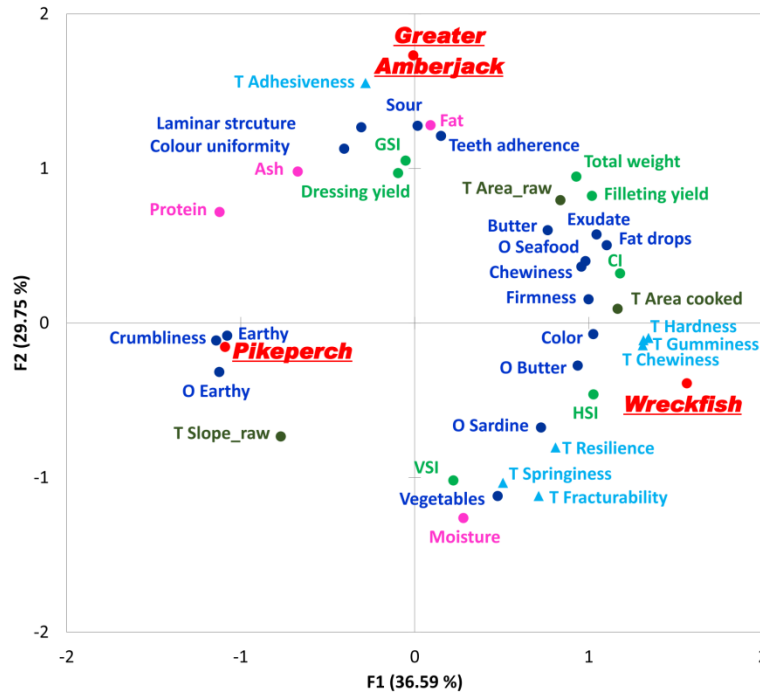
Origin, season, sample (N), feed and size information of the selected fish species.

Species	Season	N	Origin – farming conditions	Feed	Fish size
Greater amberjack ( <i>Seriola dumerili</i> )	Winter	8	Farm (Argosaronikos S.A.) – Attiki, C. Greece - floating sea cages	Frozen fish	15–20 kg
Pikeperch ( <i>Sander lucioperca</i> )	Summer	10	Farm France –sweet water intensive farming	Commercial extruded feed	1–2 kg
Grey mullet ( <i>Mugil cephalus</i> )	Winter	10	Wild fish. Bay of Cadiz – earthen ponds with sea water	Natural feeding	500 g–1 kg
Meagre ( <i>Argyrosomus regius</i> )	Winter	10	Farm (Andromeda Group), Burriana, Spain – floating sea cages	Commercial extruded feed	1.5–2 kg
Wreckfish ( <i>Polyprion americanus</i> )	Winter	5	Wild specimens: 2 caught in FAO 34.1.2 ATLANTIC N by the Canary Islands fishermen and 3 caught in Azores by Galicia's fisheries	Natural feeding	Two specimens of 25–30 kg <sup>a</sup> Three specimens of 2–3 kg

<sup>a</sup> These high weight value specimens were kept to include the range of commercial sizes available in the market.

# WP 28. New product development

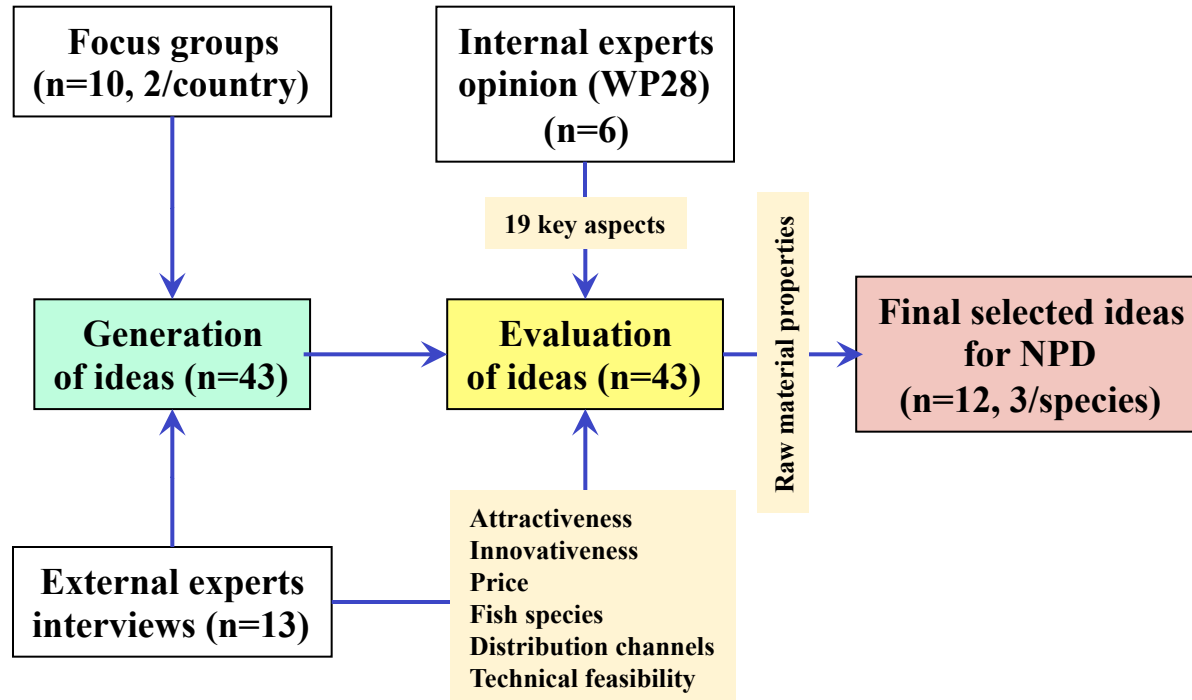
## Raw material





# WP 28. New product development

## Generation and evaluation of ideas



# WP 28. New product development

## Ideas

Food Research International 87 (2016) 211–223



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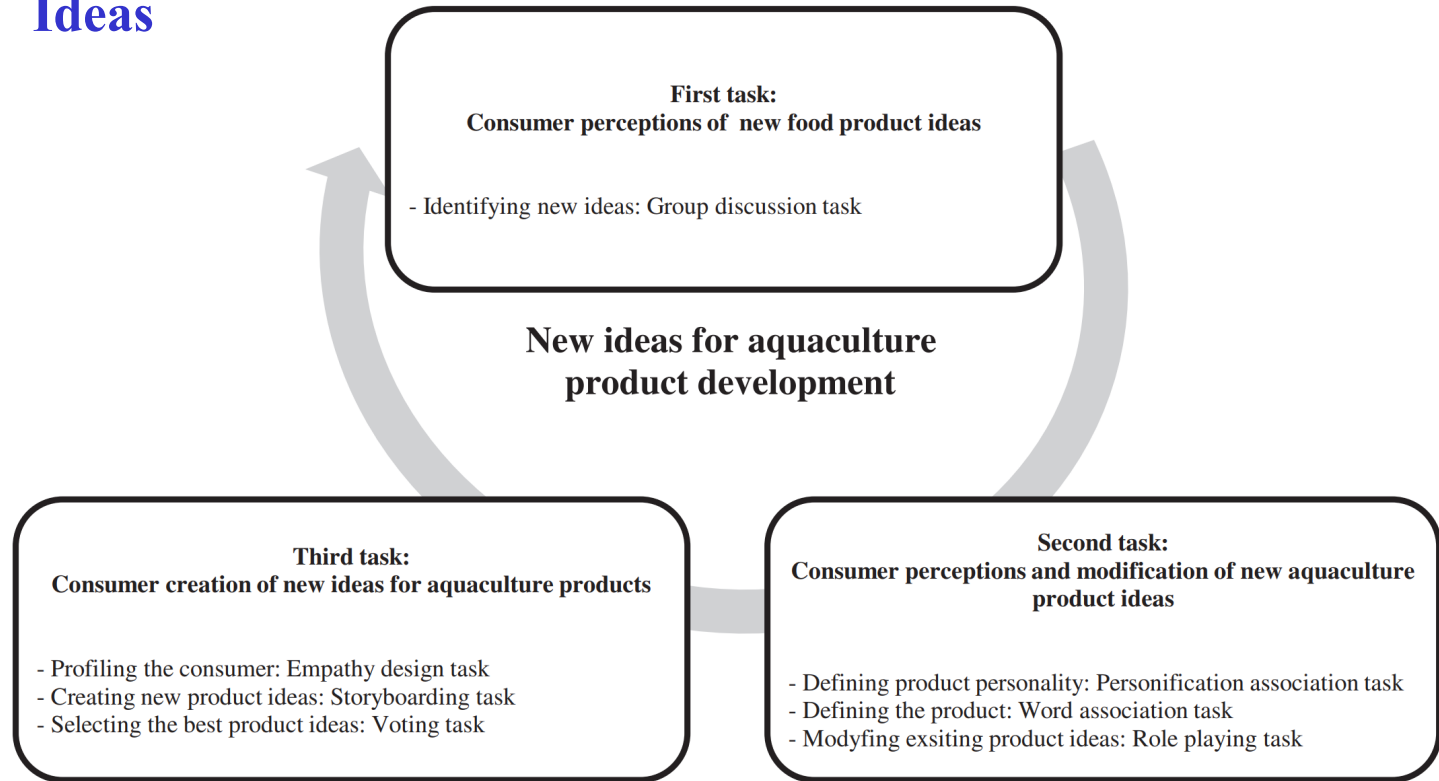
Consumers as co-creators of new product ideas: An application of projective and creative research techniques

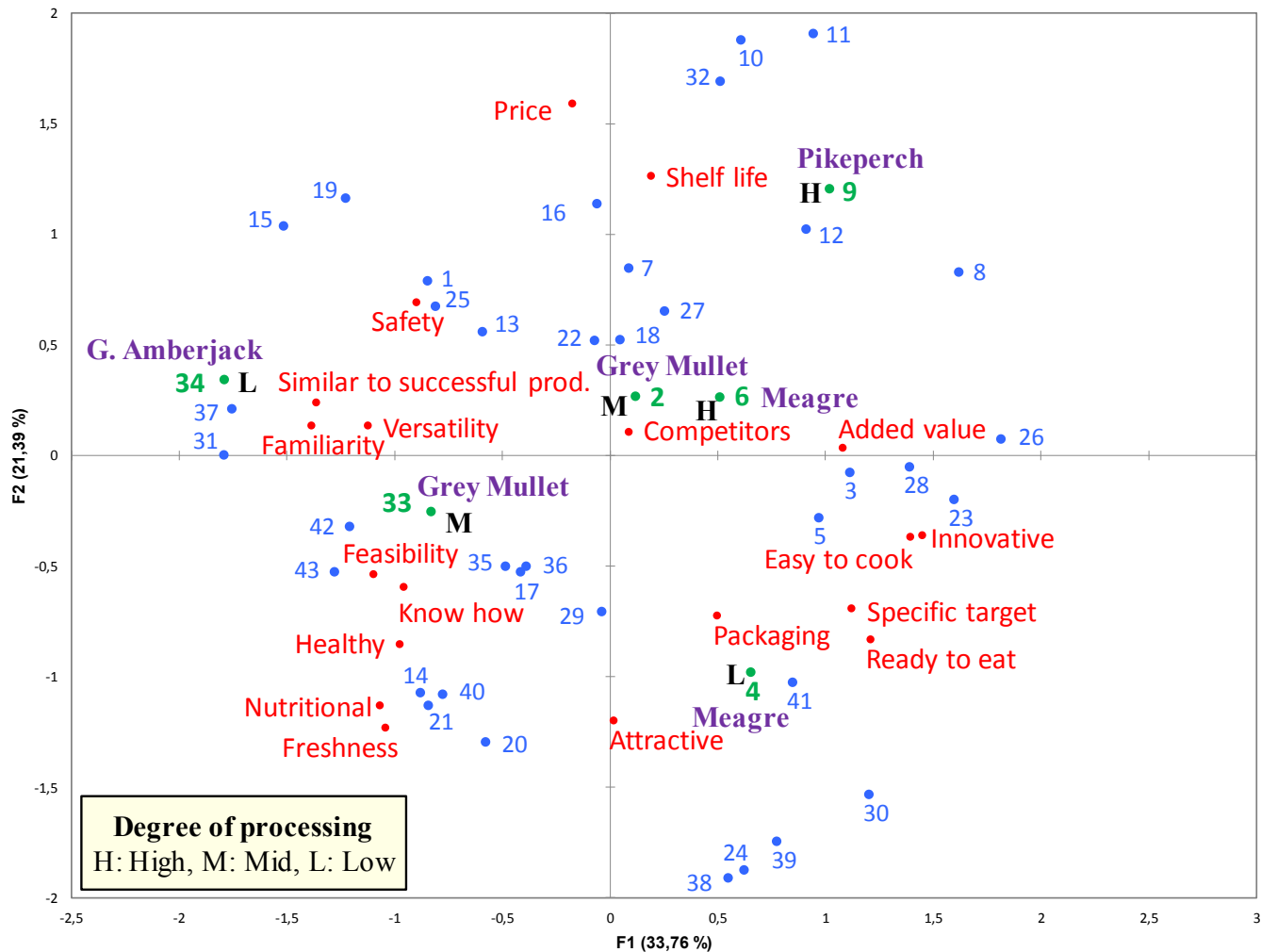
Marija Banović <sup>a,\*</sup>, Athanasios Krystallis <sup>a</sup>, Luis Guerrero <sup>b</sup>, Machiel J. Reinders <sup>c</sup>



# WP 28. New product development

## Ideas







# WP 28. New product development

## Selection of the new products to develop and to test

MEAGRE	<p>Idea 1*: Frozen fish fillets with different recipes</p> <p><b>Idea 6: Fish burgers shaped as fish (H)</b></p> <p><b>Idea 4: Ready to eat meal: salad with fish (L)</b></p>
PIKEPERCH	<p>Idea 21: Fresh fish fillet with different “healthy” seasoning and marinades</p> <p>Idea 30: Ready-made fish tartar with additional soy sauce</p> <p><b>Idea 9: Fish spreads/pate (H)</b></p>
GREY MULLET	<p><b>Idea 2: Thin smoked fillets (M)</b></p> <p><b>Idea 33: Ready-made fish fillets in olive oil (M)</b></p> <p>Idea 21: Fresh fish fillet with different “healthy” seasoning and marinades</p>
GREATER AMBERJACK	<p>Idea 13: Frozen fish fillet that is seasoned or marinated</p> <p>Idea 30: Ready-made fish tartar with additional soy sauce</p> <p><b>Idea 34: Fresh fish steak for grilling in the pan (L)</b></p>

L: low processing; M: mid processing; H: high processing.

## WP 28. New product development

### Optimization processes and different measurements:

- Physicochemical properties and nutritional facts
- Microbiological quality
- Shelf life
- Sensory properties: trained assessors and consumers (WP29)
- Extrinsic properties: origin, certification logo, nutritional claims, price, etc (WP29)

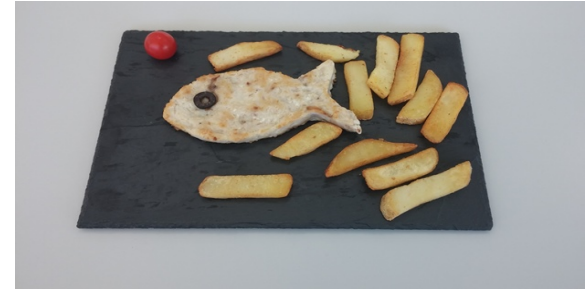
# WP 28. New product development

## Frozen fish fillets with different recipes (meagre)



## WP 28. New product development

### Fish burgers shaped as fish (meagre)





# WP 28. New product development

## Fish pate (pikeperch)



## WP 28. New product development

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



## WP 28. New product development

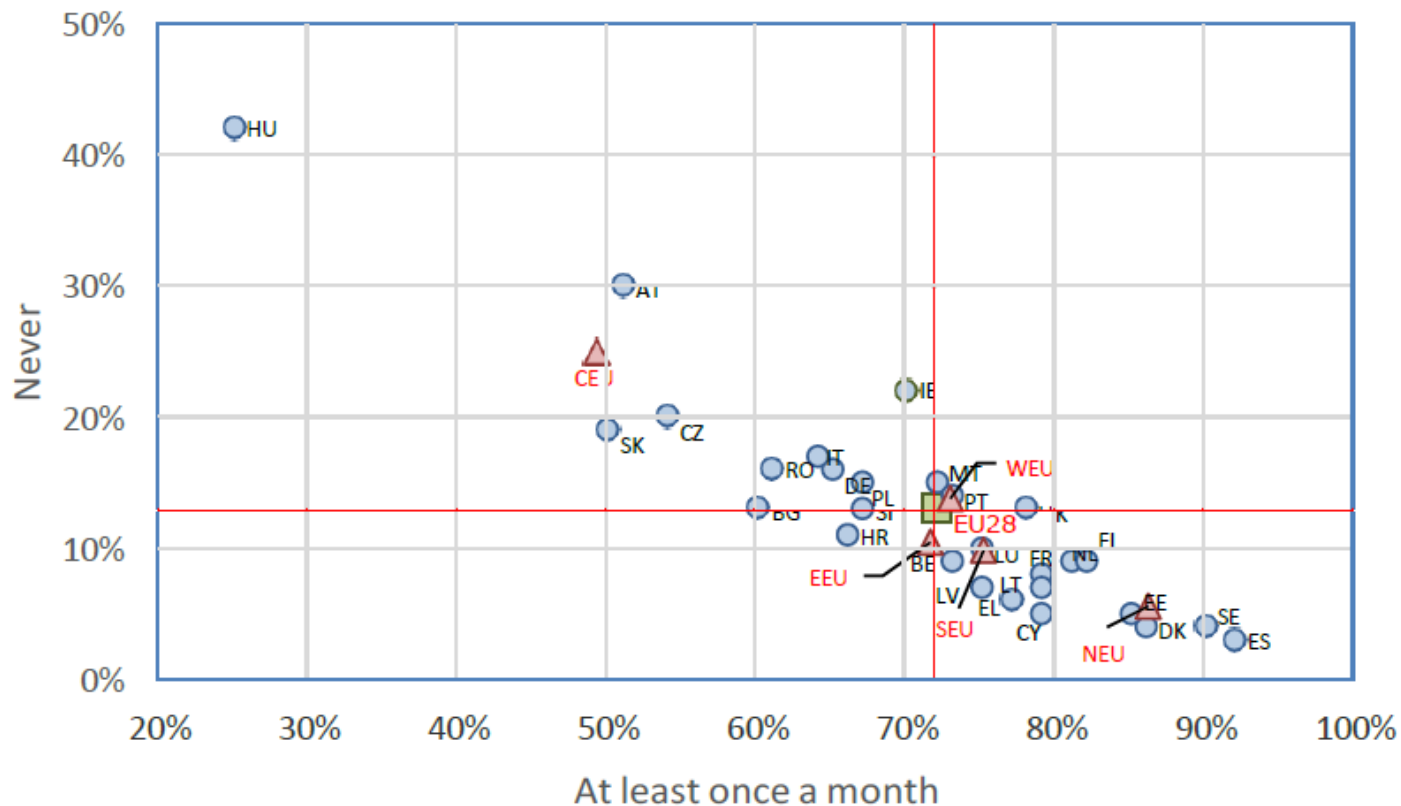
### Ready-made fish fillets in olive oil (grey mullet)



## After 5 years of research: still to be solved...

- Focus more on the new species themselves than on the developed products (consumer perception)
- Explore the gap between product expectations and actual acceptance
- Involve the distribution in a real market test for both species and products
- Develop appropriate communication strategies for products and species (price, sustainability,...)
- Take into account non-fish consumers: potential users of new fish products

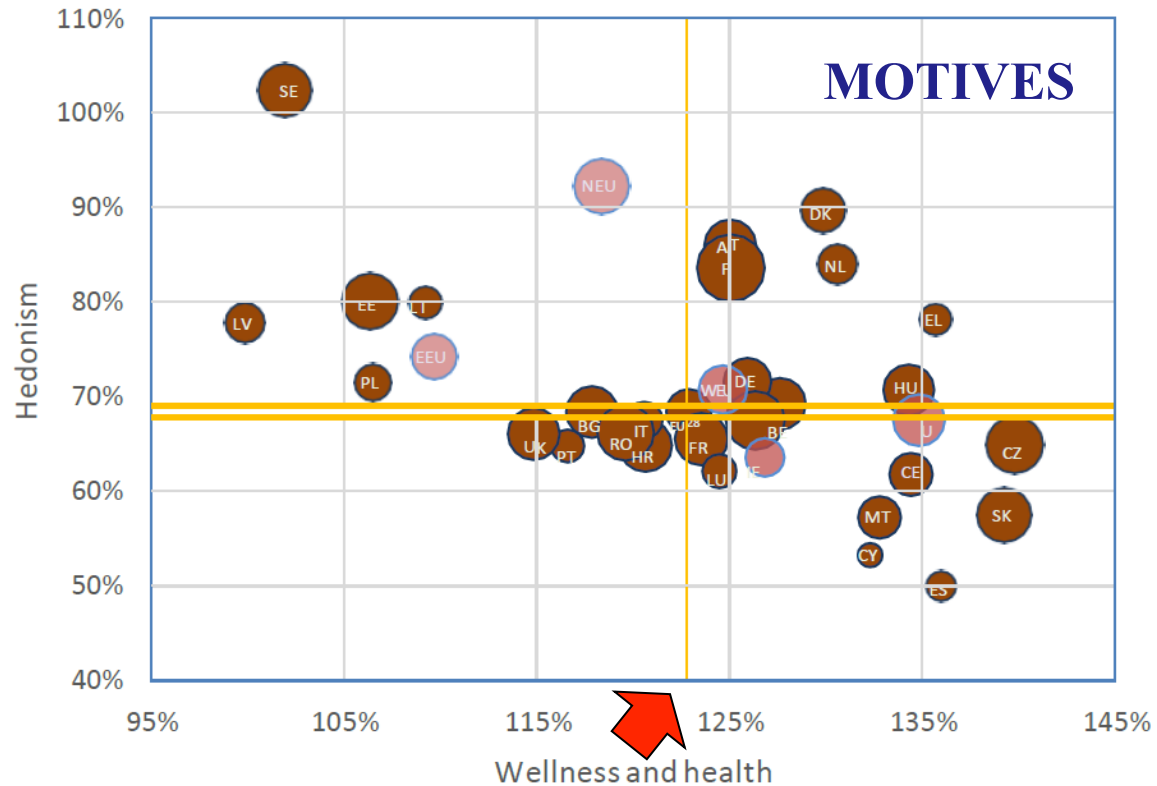
# After 5 years of research: still to be solved...



## After 5 years of research: still to be solved...

- Fish products could overcome some of the barriers for fish consumption:
  - price (adding other ingredients)
  - contamination risks (controls at the food industry)
  - environmental risk (production based on farmed fish)
  - smell (by adding different additives)
  - bones (removed at the food industry)
  - unavailability (based on farmed fish)
  - bad taste (easy to modify by adding different ingredients)
  - preparation difficulties (ready to eat products)
  - difficulties in evaluating the quality (made by the processors)

# After 5 years of research: still to be solved...





## The team

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**DIVERSIFY**



**New species for EU aquaculture**