What do consumers think about aquaculture fish and the products made from it?

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

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
What we know...

Beliefs

B1. Farmed fish is safer than wild fish
B2. Wild fish is more affected by marine pollution (spillages) than farmed fish
B3. Wild fish contains more heavy metals than farmed fish
B4. Wild fish contains more antibiotics than farmed fish
B5. Wild fish is more affected by parasites (anisakis) than farmed fish
B6. Farmed fish has a healthier diet than wild fish
B7. Farmed fish is healthier than wild fish
B8. Farmed fish is of better quality than wild fish
B9. Farmed fish is fresher than wild fish
B10. Farmed fish is more nutritious than wild fish
B11. Wild fish is more fatty than farmed fish
B12. Farmed fish tastes better than wild fish
B13. Farmed fish is firmer than wild fish
B14. Farmed fish is more controlled than wild fish
B15. Farmed fish is more handled than wild fish
B16. Wild fish is more artificial than farmed fish
B17. Farmed fish provides more guarantees than wild fish
B18. Farmed fish is easier to find than wild fish
B19. Farmed fish is cheaper than wild fish
What we know...

Beliefs

Cluster 1 “Neutral”:
< 40 years

Cluster 2 “Pro-farmed fish”

Cluster 3 “Pro-wild fish”
> 50 years

Cluster 1 (N=1151)
Cluster 2 (N=391)
Cluster 3 (N=969)
Should we worry?

The Spanish case:

- 2008 vs. 2014 vs. 2016
- Low effectiveness
B1. Farmed fish is safer than wild fish
B2. Wild fish is more affected by marine pollution (spillages) than farmed fish
B3. Wild fish contains more heavy metals than farmed fish
B4. Wild fish contains more antibiotics than farmed fish
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B16. Wild fish is more artificial than farmed fish
B17. Farmed fish provides more guarantees than wild fish
B18. Farmed fish is easier to find than wild fish
B19. Farmed fish is cheaper than wild fish
Does information affect consumer liking of farmed and wild fish?

Anna Clareta, Luis Guerrerob,*, Irene Gartzia, Maruxa Garcia-Quirogab, Rafael Ginésb

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c ULPGC—Instituto Universitario de Sanidad Animal y Seguridad Alimentaria, Dept. Acuicultura y Genética Marina, Trasmontana s/n, E-35413 Arucas, Las Palmas, Spain

Overall liking of wild and farmed fish in the blind and informed conditions.

<table>
<thead>
<tr>
<th>Overall liking</th>
<th>Wild fish</th>
<th>Farmed fish</th>
<th>RMSE</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Informed condition</td>
<td>7.4</td>
<td>6.7</td>
<td>1.803</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Blind condition</td>
<td>6.3</td>
<td>6.7</td>
<td>2.095</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>RMSE</td>
<td>2.003</td>
<td>1.950</td>
<td></td>
<td></td>
</tr>
<tr>
<td>p Value</td>
<td>&lt;0.0001</td>
<td>0.957</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Efforts should be more oriented towards an improvement of the image of farmed fish than towards an enhancement of the sensory properties.
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 (high risk!!)

Objective:

To assess consumer perception of new products from new farmed species in the five countries investigated (i.e., Germany, France, United Kingdom, Italy and Spain)
New product development

Selected descriptors used for the final descriptive profile along with their description.

<table>
<thead>
<tr>
<th>Attributes</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colour</td>
<td>Colour intensity from white to light brown inside the flesh of the fish</td>
</tr>
<tr>
<td>Exudates</td>
<td>Color homogeneity inside the flesh of the fish without black veins or spots</td>
</tr>
<tr>
<td>Turbidity</td>
<td>Quantity of liquid released after cooking the sample</td>
</tr>
<tr>
<td>Fat droplets</td>
<td>Fat released in fish exudate in the form of oil droplets</td>
</tr>
<tr>
<td>Laminar structure</td>
<td>Visual distinction of muscular structures when removing the skin of the fish</td>
</tr>
<tr>
<td>Turbidity of exudate</td>
<td>Suspended particles in exudate that block transparency</td>
</tr>
<tr>
<td>Odor</td>
<td>Intensity of odor like butanenedione</td>
</tr>
<tr>
<td>Smell</td>
<td>Intensity of odor like humid earth</td>
</tr>
<tr>
<td>Flavor</td>
<td>Intensity of odor like fish oil</td>
</tr>
<tr>
<td>Sour</td>
<td>Intensity of characteristic odor</td>
</tr>
<tr>
<td>Boiled vegetable</td>
<td>Flavor like cooked vegetable</td>
</tr>
<tr>
<td>Butter</td>
<td>Flavor like butanenedione</td>
</tr>
<tr>
<td>Bitter</td>
<td>Flavor like quinine</td>
</tr>
<tr>
<td>Earthy</td>
<td>Flavor like humid earth</td>
</tr>
<tr>
<td>Sardine</td>
<td>Flavor like sea food</td>
</tr>
<tr>
<td>Seafood</td>
<td>Flavor like sea food</td>
</tr>
<tr>
<td>Texture</td>
<td>Number of chews before swallowing</td>
</tr>
<tr>
<td>Chewiness</td>
<td>Degree of fish disintegration in the first bite</td>
</tr>
<tr>
<td>Crumbliness</td>
<td>Force required to deform the fillet between the tongue and palate</td>
</tr>
<tr>
<td>Firmness</td>
<td>Liquid released when chewing the fish sample</td>
</tr>
<tr>
<td>Pastiness</td>
<td>Degree in which fish turns in to a paste after chewing</td>
</tr>
<tr>
<td>Teeth adherence</td>
<td>Degree in which fish sticks between molars</td>
</tr>
</tbody>
</table>

Panel of eight assessors (with previous experience in sensory analysis of different foods): A list of 22 descriptors was used.
New product development

Sensory properties

APPEARANCE

- Colour
- Colour homogeneity
- Exudates
- Turbidity
- Fat droplets
- Laminar structure

Graph showing the sensory properties of different fish species:
- Amberjack
- Wreckfish
- Meagre
- Grey Mullet
- Pikeperch
New product development

Sensory properties

ODOUR

0
1
2
3
4
Butter
Seafood

Earthy

Sardine

Amberjack
Wreckfish
Meagre
Grey Mullet
Pikeperch
New product development

Sensory properties

FLAVOUR

Acid
Bitter
Butter
Seafood
Boiled vegetables
Earthy

Amberjack
Wreckfish
Meagre
Grey Mullet
Pikeperch
New product development

Sensory properties

TEXTURE

- Amberjack
- Wreckfish
- Meagre
- Grey Mullet
- Pikeperch

Properties:
- Firmness
- Crumbliness
- Juiciness
- Chewiness
- Pastiness
- Teeth adherence
New product development

Selected ideas for NPD

Based on technical feasibility and the opinion of experts (19 factors: Nutritional benefit, Healthiness, Convenience in preparation (easy-to-cook), Convenience in consumption (ready-to-eat), Cost for consumer (price), Technical feasibility (equipment & raw material), Technical feasibility (know-how), Specific consumer targeting, Familiarity, Newness/innovativeness, Existence of similar/competitive products, Shares characteristics of successful products, Perceived consumer freshness, Safety, Shelf life, Packaging, Added value, Attractiveness (Appearance/presentation), Recipes)

<table>
<thead>
<tr>
<th>Species</th>
<th>Growth rate</th>
<th>Fillet Size</th>
<th>Yield</th>
<th>Firmness</th>
<th>Fat content</th>
<th>Flavor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grey Mullet</td>
<td>Slow</td>
<td>300-500g</td>
<td>Low</td>
<td>High</td>
<td>Medium/high</td>
<td>Bitter</td>
</tr>
<tr>
<td>Meagre</td>
<td>Fast</td>
<td>1-2kg</td>
<td>Medium</td>
<td>Medium</td>
<td>Low</td>
<td>Mild</td>
</tr>
<tr>
<td>Greater Amberjack</td>
<td>Fast</td>
<td>3-5kg</td>
<td>High</td>
<td>Medium</td>
<td>High</td>
<td>Sour</td>
</tr>
<tr>
<td>Wreckfish</td>
<td>Fast</td>
<td>&gt;8kg</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>Neutral</td>
</tr>
<tr>
<td>Pikeperch</td>
<td>Medium</td>
<td>1-2kg</td>
<td>Medium</td>
<td>Low</td>
<td>Low</td>
<td>Earthy</td>
</tr>
</tbody>
</table>
New product development
Selected ideas for NPD

Selected Ideas
1. Frozen fish fillets with different recipes
2. Thin smoked fillets
3. Ready to eat meal: fish soup
4. Ready to eat meal: salad with fish
5. Ready to eat meal: fish risotto
6. Fish burgers shaped as fish
7. Fish balls
8. Dried fish sticks with accompanying dip
9. Fish pate/spreads
10. Fish broth in cubes
11. Fish powder/seasoning
12. Fish sauces
13. Frozen fish fillet that is seasoned or marinated
14. Fresh fish fillet with herbs and spices
15. Whole deep frozen fish
16. Frozen whole fish filled with spices and with organic vegetables
17. Fresh whole fish filled with spices and with organic vegetables
18. Frozen fish fillet with potatoes and vegetables
19. Deep frozen white fish fillet in the transparent packaging with additional information
20. Fresh back fish fillet
21. Fresh fish fillet with different ‘healthy’ seasoning and marinades
22. Frozen fish and seafood salad
23. Varied meal with fish fillet, burgers sausages
24. Fresh fish Carpaccio
25. Frozen back fish fillet in transparent packaging and accompanying marinades
26. Fresh ready to eat meal with fish fillet with different cheese and fine herbs
27. Fish sausages and fish hamburgers
28. Liquid fish to make soups or drinks.
29. Fresh fish fillet medallions with garnish and sauce, separately packed.
30. Ready-made fish tartar with additional soy sauce
31. Whole fresh fish with information how to be prepared
32. Bread crusted crispy frozen fish product with a topping
33. Ready-made fish fillets in olive oil
34. Fresh fish steak for grilling in the pan
35. Steamed fish fillets
36. Ready-made larger pieces of fish without bones
37. Fresh fish fillet in a simple package
38. Fresh fish Carpaccio 2
39. Bottarga sliced as medallions
40. Fresh fish fillet sliced presented in the shape imitating of fish scales
41. Ready-made fish fillet / fish dices accompanied with cereals and vegetables
42. Fresh fish roast
43. Fresh fish fillet that comes with 3-day plan

Degree of processing
H: High, M: Mid, L: Low

- G. Amberjack
- Pikeperch
- Grey Mullet
- Meagre

- Nutritional
- Healthy
- Feasibility
- Safety
- Versatility
- Added value
- Innovativeness
- Specific target
- Ready to eat
- Easy to cook
- Packaging
- Competitors
- shelf life
- Price
- Attractive
**New product development**

- Selection of the new products to test

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

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

Recruitment of participants

100 consumers

- 50% of the individuals per country "Involved innovators" and "Involved traditional"

- Balanced fish consumption (farmed and wild), age, gender, income and marital status, trying to fit the average frequencies in their respective segments per country
Consumer test

Preparation of the samples
Consumer test

Test design and execution

• Ten tasting sessions (1-1.5h) in each location in two consecutive days (10-12 participants)

• Each tasting session was divided in four main parts:
  1) Participants were informed about the aim of the test and how to use the computers for inserting their answers
  2) Overall liking expectation and image for each of the 10 different ideas
  3) Blind tasting: liking of the six selected products
  4) Overall expectation in informed condition: overall acceptability and personal perception of each product by means of a semantic differential scale (made up of 11 adjectives)
Results

Liking expectations

Average expected degree of liking of selected product ideas.

<table>
<thead>
<tr>
<th>Idea</th>
<th>Mean value</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grilled fillet (Idea 34)</td>
<td>7.5&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.672</td>
</tr>
<tr>
<td>Fresh fillet (Idea 21)</td>
<td>7.1&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1.843</td>
</tr>
<tr>
<td>Smoked fillet (Idea 2)</td>
<td>6.8&lt;sup&gt;bc&lt;/sup&gt;</td>
<td>1.862</td>
</tr>
<tr>
<td>Frozen fillet (Idea 1)</td>
<td>6.7&lt;sup&gt;c&lt;/sup&gt;</td>
<td>1.716</td>
</tr>
<tr>
<td>Salad (Idea 4)</td>
<td>6.7&lt;sup&gt;c&lt;/sup&gt;</td>
<td>1.867</td>
</tr>
<tr>
<td>Fish olive oil (Idea 33)</td>
<td>6.6&lt;sup&gt;c&lt;/sup&gt;</td>
<td>1.879</td>
</tr>
<tr>
<td>Frozen marinated fillet (Idea 13)</td>
<td>6.6&lt;sup&gt;c&lt;/sup&gt;</td>
<td>1.858</td>
</tr>
<tr>
<td>Hamburger (Idea 6)</td>
<td>6.2&lt;sup&gt;d&lt;/sup&gt;</td>
<td>1.929</td>
</tr>
<tr>
<td>Tartar (Idea 30)</td>
<td>5.8&lt;sup&gt;e&lt;/sup&gt;</td>
<td>2.273</td>
</tr>
<tr>
<td>Pate (Idea 9)</td>
<td>5.8&lt;sup&gt;e&lt;/sup&gt;</td>
<td>2.184</td>
</tr>
</tbody>
</table>

a-e: Mean values with different superscripts differ significantly (p<0.05).

- Higher preference for those products having the genuine sensory properties of fish, without any interference (recruitment criteria)
• Higher preference for those products having the genuine sensory properties of fish, without any interference (recruitment criteria)
Results

Image/perception of the different products or ideas

- All the products were perceived quite positively.
## Results

### Effect of image/perception on expectations

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Overall</th>
<th>DE</th>
<th>ES</th>
<th>FR</th>
<th>IT</th>
<th>UK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nutritious</td>
<td>+</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Healthy</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feels good</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Convenient</td>
<td>+</td>
<td></td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Available</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tastes good</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No additives</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Natural</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good value</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expensive</td>
<td>-</td>
<td></td>
<td></td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hard to digest</td>
<td>-</td>
<td>+</td>
<td></td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Familiar</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traditional</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Env. friendly</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Authentic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High quality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Helps locals</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Unsafe</td>
<td>*R²</td>
<td>0.418</td>
<td>0.385</td>
<td>0.350</td>
<td>0.465</td>
<td>0.342</td>
</tr>
</tbody>
</table>

*: significant positive effect on expectations (p<0.05); -: significant negative effect on expectations (p<0.05); *: All the R² values are significant (p<0.0001). Signs marked in green are those with the highest standardised regression coefficient, in orange the second highest and in red the third highest ones (in absolute value).
Results

Blind tasting (6 products)

Mean acceptability values for the different products per country.

<table>
<thead>
<tr>
<th>Product</th>
<th>Overall</th>
<th>DE</th>
<th>ES</th>
<th>FR</th>
<th>IT</th>
<th>UK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish olive oil</td>
<td>6.3ᵇ</td>
<td>6.0ᵇ</td>
<td>6.7ᵃᵇ</td>
<td>7.2ᵃᵇᶜ</td>
<td>6.0ᵇᶜ</td>
<td>5.7ᵇᶜ</td>
</tr>
<tr>
<td>Grilled fillet</td>
<td>7.1ᵃ</td>
<td>6.9ᵃ</td>
<td>7.0ᵃ</td>
<td>7.5ᵃ</td>
<td>6.8ᵃ</td>
<td>7.3ᵃ</td>
</tr>
<tr>
<td>Hamburger</td>
<td>6.5ᵇ</td>
<td>6.2ᵃᵇ</td>
<td>6.9ᵃᵇ</td>
<td>7.1ᵃᵇᶜ</td>
<td>6.4ᵃᵇ</td>
<td>6.0ᵇᶜ</td>
</tr>
<tr>
<td>Pate</td>
<td>5.8ᶜ</td>
<td>5.2ᶜ</td>
<td>6.4ᵃᵇ</td>
<td>6.6ᶜ</td>
<td>5.3ᶜ</td>
<td>5.3ᶜ</td>
</tr>
<tr>
<td>Salad</td>
<td>6.3ᵇ</td>
<td>6.0ᵇ</td>
<td>6.2ᵇ</td>
<td>7.4ᵃᵇ</td>
<td>5.5ᶜ</td>
<td>6.4ᵇ</td>
</tr>
<tr>
<td>Smoked fillet</td>
<td>6.2ᵇ</td>
<td>6.3ᵃᵇ</td>
<td>6.7ᵃᵇ</td>
<td>6.7ᵇᶜ</td>
<td>5.6ᶜ</td>
<td>5.9ᵇᶜ</td>
</tr>
</tbody>
</table>

Std. Error       | 0.088   | 0.200 | 0.192 | 0.166 | 0.186 | 0.228 |

a-c: Mean values with different superscripts differ significantly (p<0.05).

- Agreement with the previously reported expected liking
Product: **Fresh thin smoked fillets** from grey mullet, which can be used as a starter or incorporated within a sandwich/salad. The product is sustainably produced. It is labelled as a premium product and the country of origin is EU. The packaging is a plastic tray where the fillets are laid covered with a transparent plastic, which allows visibility of the fillets and vacuum or modified atmosphere packaging is used for shelf life prolongation. Ideas concerning the different uses of the fillets are included on the product’s sleeve.

### Results

**Overall liking in the full informed condition**

Mean acceptability values for the different products per country.

<table>
<thead>
<tr>
<th>Product</th>
<th>Overall</th>
<th>DE</th>
<th>ES</th>
<th>FR</th>
<th>IT</th>
<th>UK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish olive oil</td>
<td>6.4&lt;sup&gt;bc&lt;/sup&gt;</td>
<td>6.0&lt;sup&gt;bc&lt;/sup&gt;</td>
<td>7.0&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>6.9&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>6.0&lt;sup&gt;b&lt;/sup&gt;</td>
<td>5.8&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Grilled fillet</td>
<td>7.1&lt;sup&gt;a&lt;/sup&gt;</td>
<td>7.0&lt;sup&gt;a&lt;/sup&gt;</td>
<td>7.3&lt;sup&gt;a&lt;/sup&gt;</td>
<td>7.5&lt;sup&gt;a&lt;/sup&gt;</td>
<td>6.8&lt;sup&gt;a&lt;/sup&gt;</td>
<td>7.1&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Hamburger</td>
<td>6.2&lt;sup&gt;c&lt;/sup&gt;</td>
<td>5.7&lt;sup&gt;bc&lt;/sup&gt;</td>
<td>6.5&lt;sup&gt;b&lt;/sup&gt;</td>
<td>6.8&lt;sup&gt;ab&lt;/sup&gt;</td>
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<td>5.7&lt;sup&gt;bc&lt;/sup&gt;</td>
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<tr>
<td>Pate</td>
<td>5.6&lt;sup&gt;d&lt;/sup&gt;</td>
<td>5.2&lt;sup&gt;c&lt;/sup&gt;</td>
<td>6.5&lt;sup&gt;b&lt;/sup&gt;</td>
<td>6.5&lt;sup&gt;b&lt;/sup&gt;</td>
<td>4.9&lt;sup&gt;c&lt;/sup&gt;</td>
<td>4.8&lt;sup&gt;c&lt;/sup&gt;</td>
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<tr>
<td>Salad</td>
<td>6.3&lt;sup&gt;bc&lt;/sup&gt;</td>
<td>5.9&lt;sup&gt;bc&lt;/sup&gt;</td>
<td>6.4&lt;sup&gt;b&lt;/sup&gt;</td>
<td>7.5&lt;sup&gt;a&lt;/sup&gt;</td>
<td>5.5&lt;sup&gt;bc&lt;/sup&gt;</td>
<td>6.2&lt;sup&gt;ab&lt;/sup&gt;</td>
</tr>
<tr>
<td>Smoked fillet</td>
<td>6.5&lt;sup&gt;b&lt;/sup&gt;</td>
<td>6.5&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>7.1&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>6.9&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>6.2&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>6.1&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

a-d: Mean values in the same column with different superscripts differ significantly (p<0.05).

- Similar to what was observed in the blind tasting
Results

Confirmation/disconfirmation of expectations

- In most cases the difference between the blind and the fully informed tasting was not significant
Results

Product image with full information

- Positive perception

- High discrepancies between countries, perception clearly different when dealing with the main intangible dimensions that might define the different products
## Results

Effect of product perception on acceptability in informed condition

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Overall</th>
<th>DE</th>
<th>ES</th>
<th>FR</th>
<th>IT</th>
<th>UK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Known/Unknown</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Unique/Standard</td>
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<tr>
<td>Safe/Unsafe</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>-</td>
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<tr>
<td>Unhealthy/healthy</td>
<td>+</td>
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<tr>
<td>Expensive/Cheap</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>-</td>
</tr>
<tr>
<td>Bad taste/Good taste</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Low quality/High quality</td>
<td>+</td>
<td>-</td>
<td>+</td>
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<td>+</td>
<td>+</td>
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<tr>
<td>Boring/Stimulating</td>
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<tr>
<td>Artificial/Natural</td>
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<tr>
<td>Environment loading/Environment friendly</td>
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<tr>
<td>Traditional/Contemporary</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

\[ R^2 \]

\[
0.49 \quad 0.67 \quad 0.51 \quad 0.62 \quad 0.34 \quad 0.60
\]

+: significant positive effect on expectations (p<0.05); -: significant negative effect on expectations (p<0.05);
*: All the R^2 values are significant (p<0.0001). Signs marked in green are those with the highest standardised regression coefficient, in orange the second one and in red the third one (in absolute value).
Take-home messages

• Sensory dimension seems to have an important contribution to the overall acceptance of the product and to its purchase probability

• The products already developed were not able to reach the initial expectations that they produced in the participants

• Products with a lower degree of processing were those who generated higher expected scores and higher acceptability in the blind test (recruitment criteria)

• The environmental friendly character of the products did not affect the preference (it was included in the description of the different products)