



## **Consumers' perception of new fish products from new aquaculture species**

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Consumers are the last step in the production chain and those who ultimately decide on the success or failure of a new product launched into the market. It is therefore essential to understand the factors affecting consumer behaviour and the key aspects driving decision-making and product purchasing.

Sensory properties have been identified as one of the main determinants of food selection and consumption. However, sensory perception *per se* might be strongly affected by other aspects such as individual characteristics (e.g. attitudes or expectations) and environmental factors (context, origin, brand name, price, etc.). In the same vein, expected quality seems to be one of the most important factors in consumers' intention to purchase food. It is evident that quality cues are used to infer expected fish quality attributes at the point of sale. These cues can be grouped into intrinsic (colour, odour, eyes shape, brightness) and extrinsic (price, origin, quality labels), and their role in developing expectations depends on the type of fish or fish products and on the context (circumstances in which the product and individuals will interact) in which the product will be used or consumed.

In addition, it is worth making a clear distinction between experiential quality attributes such as convenience, freshness or sensory characteristics that will be experienced and ascertained at the time of consumption, and credence quality attributes, such as healthiness or naturalness, that cannot be experienced directly even after frequent consumption. Both quality attribute types can generate individual expectations, but only quality attributes experienced directly can be assessed, confirmed or disconfirmed. To enhance consumer perception (both expected and experienced) of fish and fish products, additional information provided at the point of purchase through communication (i.e. on the product label/package), may play an important role in reducing uncertainty in the formation of quality expectations. In fact, detailed information seems to be one of the most effective ways to facilitate more appropriate expectations and to improve enjoyment.

In the framework of the DIVERSIFY project, twelve products from new aquaculture fish species have been developed and tested from a technological, physical/chemical, microbiological and sensory perspective:

- (1) Frozen fish fillets (meagre, *Argyrosomus regius*) with different recipes,
- (2) Fish (meagre) burgers shaped as fish,
- (3) Ready to eat meal - salad with fish (meagre),

- (4) Fresh fish fillet (pikeperch, *Sanders lucioperca*) with different “healthy” seasoning and marinades,
- (5) Ready-made fish (pikeperch) tartar with additional soy sauce,
- (6) Fish (pikeperch) spreads/pâté,
- (7) Thin smoked fillets (grey mullet, *Mugil cephalus*),
- (8) Ready-made fish fillets (grey mullet) in olive oil,
- (9) Fresh fish fillet (grey mullet) with different “healthy” seasoning and marinades,
- (10) Frozen fish fillet (greater amberjack, *Seriola dumerili*) that is seasoned or marinated,
- (11) Ready-made fish (greater amberjack) tartar with additional soy sauce
- (12) Fresh fish steak (greater amberjack) for grilling in the pan.

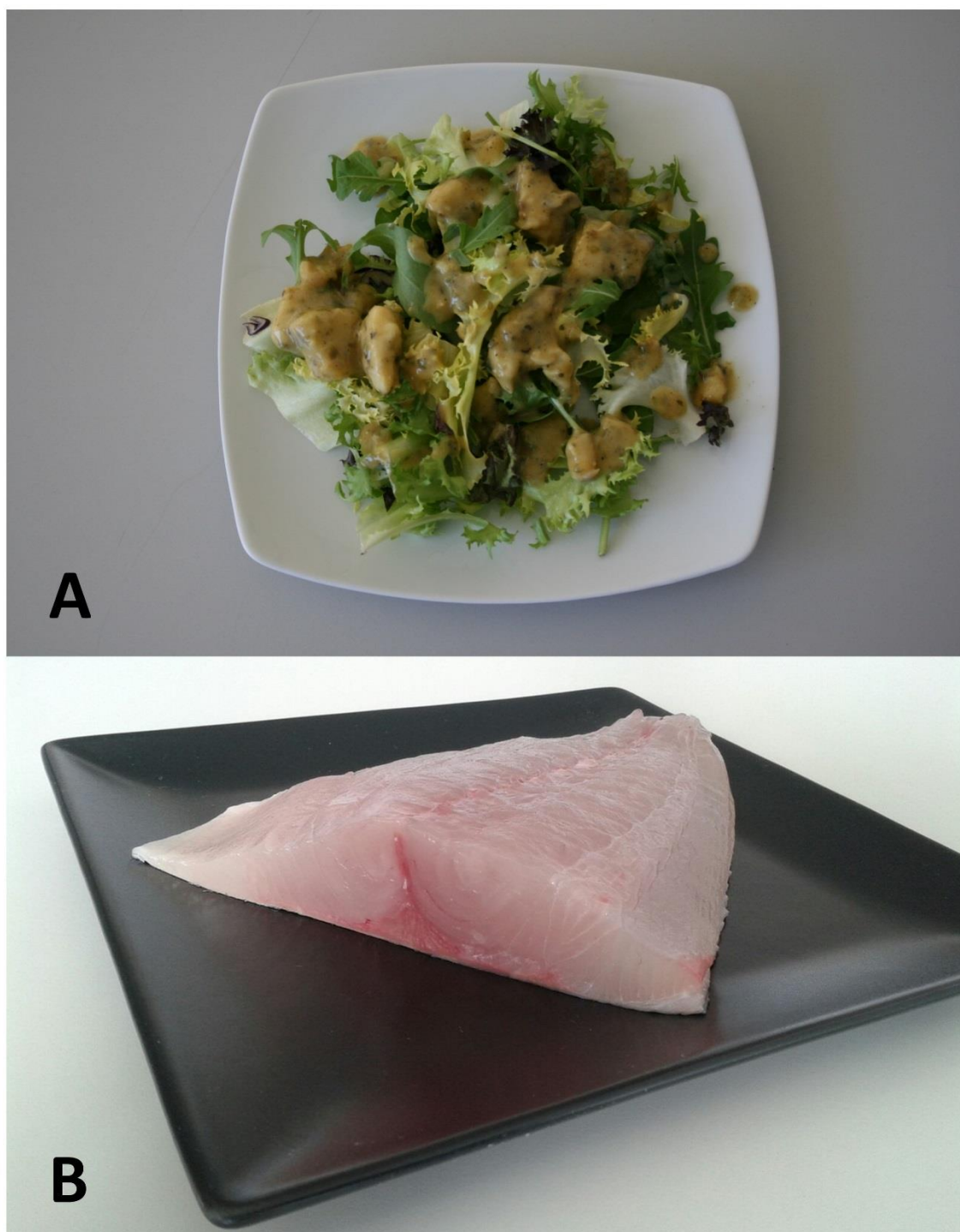
These products were selected from a pool of 41 concepts based on their different degree of technological complexity and processing and taking into account the appropriateness for each of the species under study.

Intrinsic (sensory properties) and extrinsic characteristics (information provided) of the selected products/concepts were assessed by consumers in five countries (France, Germany, Italy, Spain and UK), thus focussing in both experiential and credence quality attributes. One hundred participants were recruited in each of the five selected countries according to the following criteria: regular fish consumers (farmed and wild), evenly distributed by age and gender and without any food allergy or food intolerance. Purchase probability (willingness to buy) was also evaluated in order to estimate those aspects having a major impact on the individuals’ buying intention. Extrinsic properties were evaluated for the twelve developed new products meanwhile, for practical reasons, intrinsic attributes were only assessed for 6 of them ((2) Fish burgers shaped as fish, (3) Ready to eat meal - salad with fish -, (6) Fish spreads/pâté, (7) Thin smoked fillets, (8) Ready-made fish fillets in olive oil and (12) Fresh fish steak for grilling in the pan). Figure 1 shows two of the selected products for tasting.

Products with a lower degree of processing were those who generated higher expected acceptance. Consumers involved in the present study were selected based on their regular consumption of fish (wild or farmed). This recruitment procedure could explain the higher preference for those products having the genuine sensory properties of fish, without any interference. Probably, products having a higher degree of processing would be more appropriate for consumers who do not like fish because of its taste, presence of bones, odour, etc. In these cases, the existence of different processed alternatives could be a good solution for those individuals looking for a more convenient and less “fishy” product. In general, and despite of the lower expected liking for the processed products all of them were perceived positively. Hamburger and fish pâté were the two products that were worst perceived regarding the presence of additives and naturalness. Grilled fillet was in all cases the best perceived product in agreement with its higher expected acceptance. The most important parameter affecting liking expectations was the expected taste of the product. Health, nutritional and well-being related issues were relevant as well in order to increase individuals’ expectations, but to a lower extent. These findings seems to indicate that, in general, consumers are unwilling to sacrifice taste by an improvement in health or functional properties. In a general sense, the perception of these products was similar across countries.

Once the product was blind tested, the most preferred product was the grilled fillet and the least appreciated the fish pâté in agreement with the previously reported expected

liking. The same pattern was observed in all the studied countries with the sole exception of Spain, where the least preferred product was the fish salad. The acceptability results obtained confirm those previously reported regarding consumers' expectations, and also seems to indicate a tendency to prefer the low processed fish products; although, fish hamburgers were the product that most improved their valuation compared to their expected liking. Based on the segmentation analysis carried out, all the selected fish product assessed in the present study seems to have a specific niche within the European market.



**Figure 1. Example of two of the selected products for tasting: (A) salad with fish (meagre) and (B) fresh fish steak for grilling in the pan (greater amberjack).**

Even though the different products were perceived similarly in the different locations regarding the acceptability ratings, they were described in a clearly different way when dealing with the main intangible dimensions that might define them (taste, convenience, environmental impact, etc.). Generally speaking, the sensory dimension seems to have an important contribution to the overall acceptance of the product (Figure 2) and to its purchase probability. Importantly, the stimulating character of the product also seems to play an important role. On the contrary, it is worth mentioning the case of the environmental friendly character of the products that was always irrelevant. The most plausible explanation for this finding is that most of the different products assessed included in their description “sustainably produced” or “produced in an environmentally sustainable way”, which could have minimised the perceived differences between products. In any case, noticeable differences between products regarding environmental friendliness were observed, especially in UK and Germany.

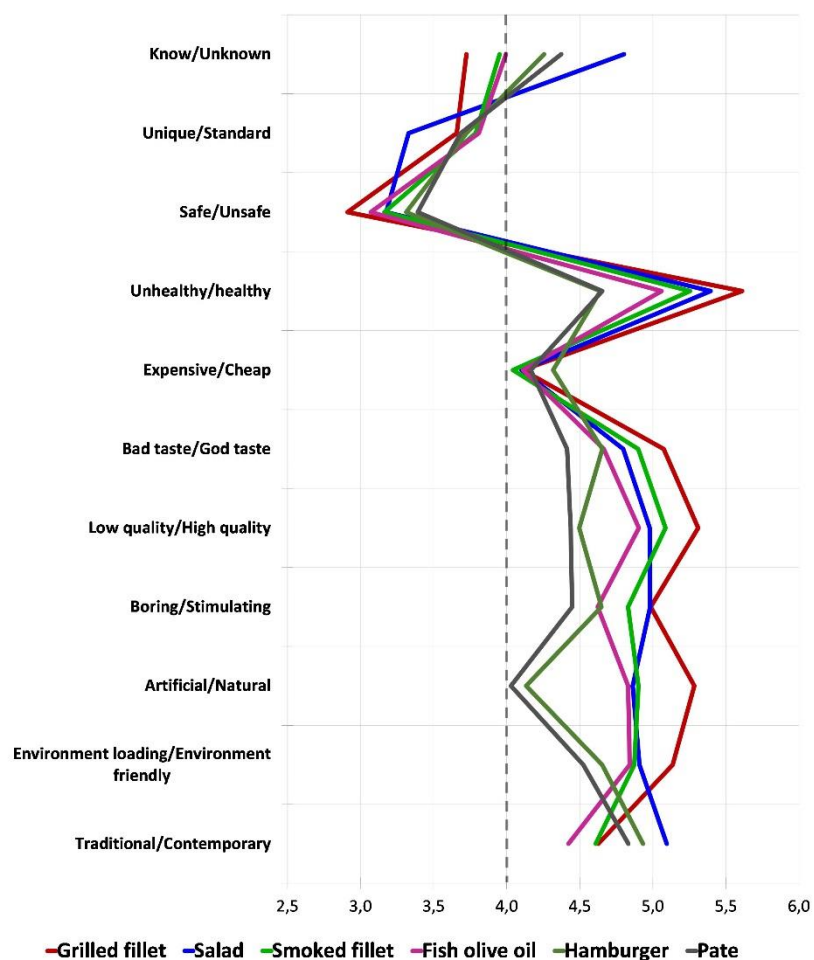


Figure 2. Semantic profiles obtained for the pooled data set (5 countries).

These results open a new framework of research aimed to understand the rationale behind the observed differences between countries and how they can be exploited to better design and commercialise the new products already developed. This information will be essential in order to build different business models aimed to develop launching strategies for the different tested new products in different markets.



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