



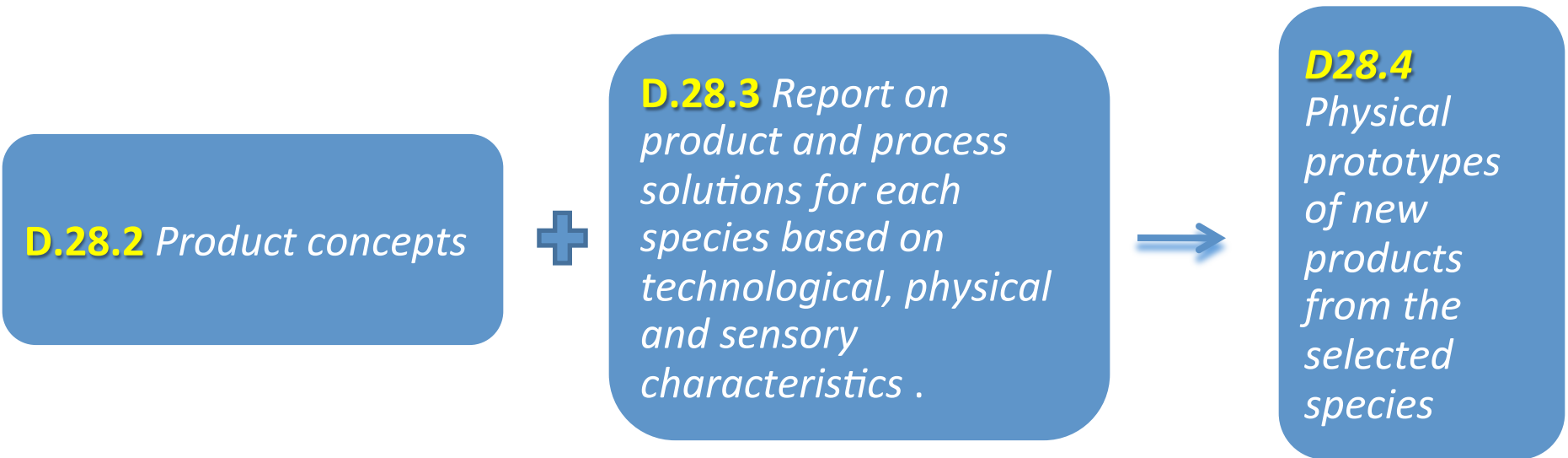
28.2. Product concept development: technical & consumer driven

Working group: Niki Alexi, Kriton Grigorakis

**Other participating scientists: Luis Guerrero, Thanasis
Krystalis, Marija Badovic, Mickel Reinders**

Aims & scope

- to generate and evaluate a list of ideas for new product development (product concepts).



Materials & Methods

Generation of a pool of ideas

Ideas from (D28.1.) Market perceptions



Additional ideas: combining information of the market perceptions (D28.1), the technical limitations and the economical prospect efficiencies, which were included in the socio-techno-economic study of WP27.

Quantitative screening of ideas

6 experts of different fields

M & M: List of concepts

<i>Idea 9</i>	Fish pate/ spreads; AC	Fish pate/ spreads prepared using different recipes. Can be used as starter or incorporated in a sandwich. The product is sustainably produced (containing ASC label). It is labelled as a premium product; the country of origin is EU. The product is included in a tube to facilitate use, extraction of right amount of product as well as prolong shelf life (only outer part of the product will come in contact with air in each use). This idea was an attempt to utilize raw materials that are considered of less value or losses to create added value. Consumer convenience and existence of similar non-fish products were considered. Not something similar has been provided by the focus groups.
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M& M: Screening

19 Screening criteria

1. Nutritional benefit	8. Specific consumer targeting	15. Shelf life
2. Healthiness	9. Familiarity	16. Packaging
3. Convenience in preparation	10. Newness -innovativeness	17. Added value
4. Convenience in consumption	11. Existence of similar products / competition	18. Attractiveness
5. Cost for consumer	12. Shares characteristics with successful products	19. Recipes
6. Technical feasibility (equipment & raw material)	13. Perceived consumer freshness	
7. Technical feasibility (know how)	14. Safety	

	Extremely bad	Really bad	Bad	Neutral	Good	Really good	Excellent
Rating scale	1	2	3	4	5	6	7

Results

- **Mass market products** delivered through several distribution channels; oriented to the widest variety of consumer segments. They can constitute a regular daily meal; price and versatile characteristics allow frequent use; Convenient, healthy with high nutritional value. (24 products)

Fresh fillet products without further processing



Idea 14: *Fresh fish fillet with herbs and spices*

Ready to eat meals



Idea 4: *Ready to eat meal, salad with fish*

Fish stakes or large pieces or roasts



Idea 42: *Fresh fish roast*

Whole frozen fish products



Idea 16: *Frozen whole fish filled with spices and with organic vegetables*

Frozen fish fillets without further processing



Idea 25: *Frozen back fish fillet in transparent packaging & accompanying marinades*

Results

- **Products targeted to specific market segments**
delicacies/high end products, best if delivered to the consumers through specific distribution channels such as specialty stores or delicatessens. The price range is elevated due to their nature, and are oriented mainly to consumer prototypes such as *hedonic consumers* and *variety seeking consumers*. Competitive advantages include innovative nature and packaging; convenience; versatility in use. (6 products)

Fish Carpaccios or tartars

Idea 39: *Bottarga sliced like medallions*

Idea 2: *Fresh thin smoked fillets*

Idea 38: *Fish Carpaccio 2 seasoned with ginger and chilli and presented in the form of fish scales-like cuts*

Results

- **Added value products** convenience; versatility; high nutritional value; affordable price; and high added value. Added value products may not by themselves increase significantly fish consumption, still they should be incorporated in the production parallel to other products. Such a practice could generate significant profits by using industries' low value by-products or discards. (6 products)

Fish burgers, sausages, balls

Idea 6: *Frozen fish burgers in the shape of fish, targeted to children*

Fish spreads, sauces, seasonings etc.

Idea 6: *Fish pate*

- **Convenient product**

Idea 6: *Fresh ready to eat salad that includes fish*







Results

- Products rejected due to technical difficulties – incompatibilities: **6 products in total**

Idea 23: Varied meal with fish fillet, burgers, sausages

This meal contains in the same package three different food types of different spoilage patterns and shelf life, and thus is technically incompatible (wasting two out of the three food items in favor of the one - most probably the burger – with the shortest shelf life)

Results: Technical characteristics

	Commercial sizes	fillet features / growth	propositions
	1-2 Kg (600g - 8Kg)	Low fat (<2%), white flesh, little bones / fast grower,	versatility for products
	Both 1-2 Kg and >10Kg	High fat (3-13%), white-dark muscle / fast grower,	Bottarga potential. (+): smoking, (-): frozen products.
	600g – 3Kg	Low fat (<1%), white flesh, neutral taste and lack of bones	Bottarga potential. versatility for products
	300-500g up to 1Kg	High fat (up to 13%) pinkish- beige flesh, medium firmness	Bottarga, (+): smoking, (-): frozen products, size limitations.
	Large sizes (>5Kg)	Low-medium fat (0.8-4.1%) white firm flesh, flaky with mild flavor / fast grower,	Bottarga potential. Products versatility
	125 g up to 8 kg	Low fat (1-2%), flaky white muscle, with few bones	Bottarga potential. Fillets, cutlets, steaks. Products versatility



28.3. New product development

- **Working group: Kriton Grigorakis, Luis Guerrero, Niki Alexi**
- **Other participating scientists: C. Rodriguez, J. Perez, O. Lazo, A. Claret, R. Robles**

Aims & scope

- Report on product and process solutions for each species (not turbot), based on technical, physical and sensory characteristics

Materials and methods: sampling

Species	Season	N	Origin – farming conditions	Feed	Fish Size
Greater Amberjack (<i>S. dumerili</i>)	Feb. 2015	10	Farm (Corfu S.A.)-NW Greece - floating sea cages	Commercial extruded feed	1-1.5 kg
Greater Amberjack (<i>S. dumerili</i>)	Apr. 2015	8	Farm (Argosaronikos S.A.) – Attiki, C. Greece - floating sea cages	Commercial extruded feed	15-20 kg
Pikeperch (<i>S. lucioperca</i>)	July 2014	10	France –fresh water intensive farming	Commercial extruded feed	1-2 kg
Grey Mullet (<i>M. cephalus</i>)	Feb. 2015	10	Wild fish. Bay of Cadiz (Spain) –earthen ponds (sea water)	Natural feeding	500g-1 kg
Meagre (<i>A. regius</i>)	Nov. 2014	10	Farm (Andromeda Group), Burriana, Spain – floating sea cages	Commercial extruded feed	1.5-2 kg
Wreckfish (<i>P. americanus</i>)	Febr. 2015	5	2 caught in FAO 34.1.2 ATLANTIC N by Canary Islands fishermen and 3 caught in Azores by Galicia's fisheries	Natural feeding	2-3 kg (x3) 25-30 kg (x2)

Materials and methods

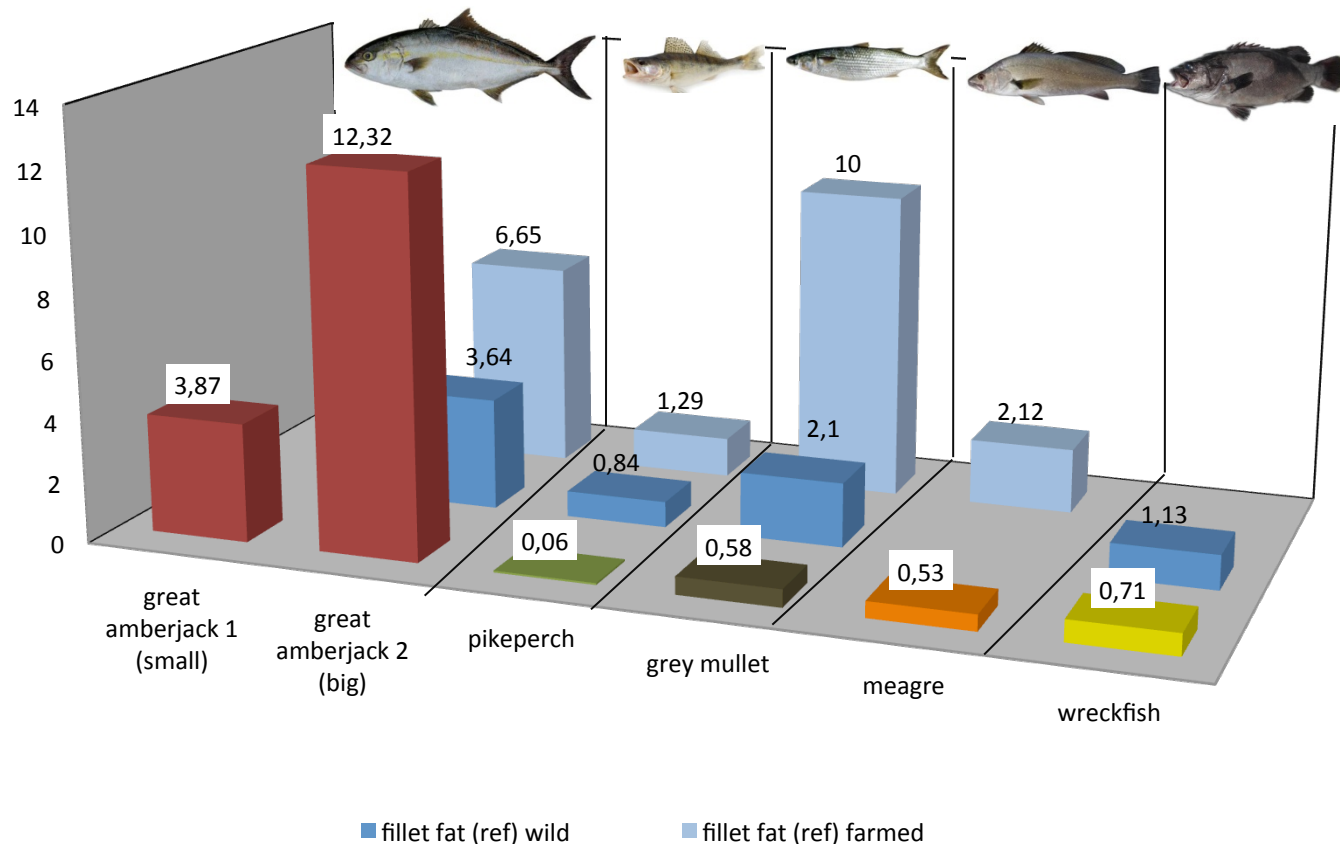
- Somatometry –Yields (CI, DY, FY, VSI, VFI, HIS, GSI).
- Fillet composition
- Sensory analysis of fillets DA (odour, appearance, flavour & texture): a) References & scales. b) 8 experienced panelists assessed all samples.
- Mechanical texture profile analysis (TPA)

Results

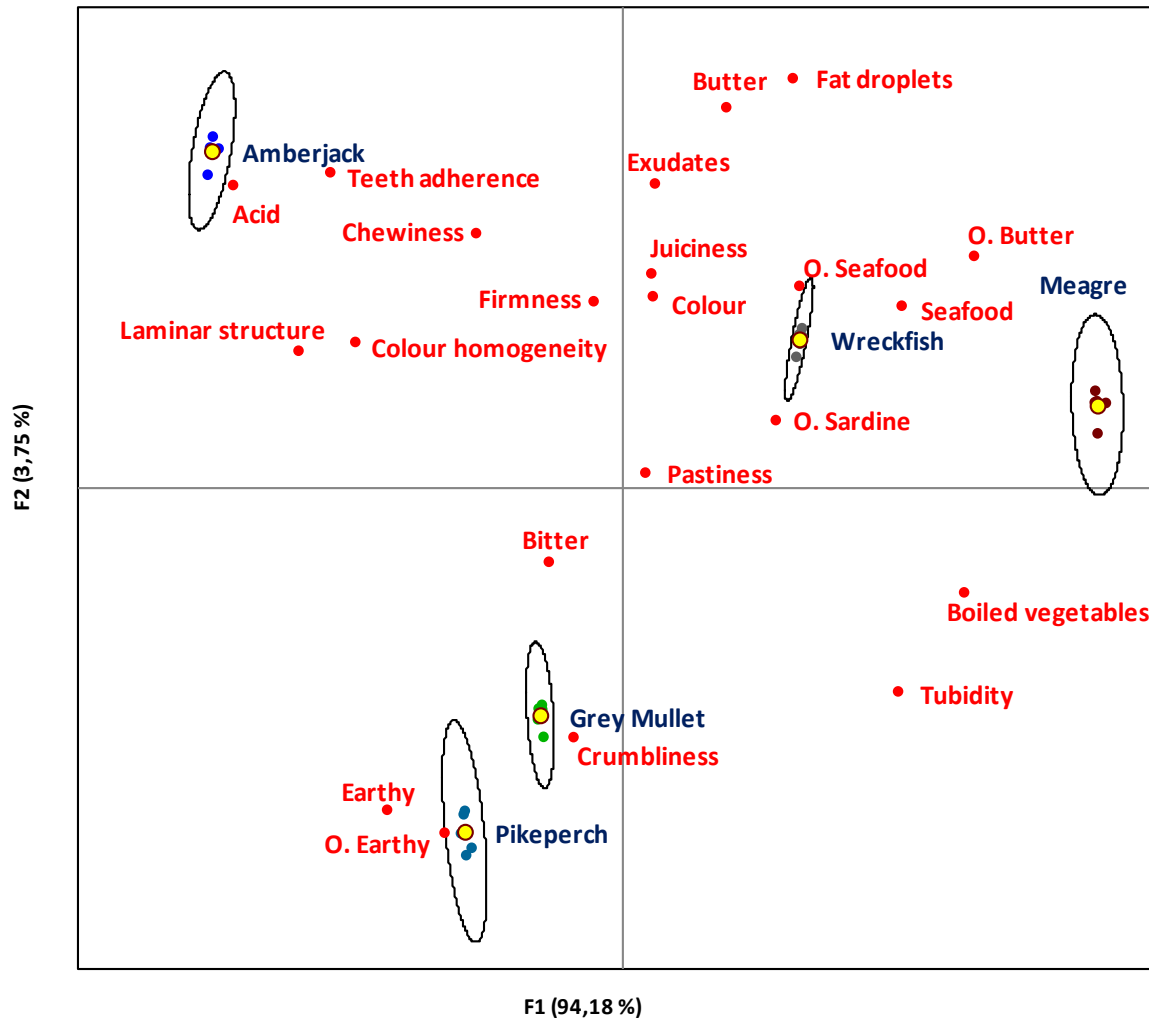
Species	CI	DY	FY	VSI / VFI	HSI	GSI
Greater Amberjack (<i>S. dumerili</i>)	1.90	92.8	50.5	5.60 / 0.39	1.61	
Greater Amberjack (<i>S. dumerili</i>)	1.51	94.7		2.83	1.14	0.77
Pikeperch (<i>S. lucioperca</i>)	0.71	93.5	36.2	5.73	0.81	0.23
Grey Mullet (<i>M. cephalus</i>)	1.09	87.7	36.2	10.3	1.46	0.46
Meagre (<i>A. regius</i>)	0.87	91.1	38.4	5.75	1.17	0.21
Wreckfish (<i>P. americanus</i>)	2.49	91.1	50.6	8.47 / 0.97	1.66	0.30

Results

- Protein stable: 19.5-23 %
- Ash stable: 1.2-1.3%
- Fat:



Results



- i. Five species with completely distinct sensory profiles.
- ii. Pikeperch & grey mullet: “earthy” odours & flavours.
- iii. Mullet: bitter taste.
- iv. Amberjack: “acid” flavour
- v. marine species (greater amberjack, meagre and wreckfish): higher notes of “butter” flavour .
- vi. Meagre: lower chewiness

Conclusions

- The CI is useful only for intra-species comparisons
- Dressing yields $\geq 90\%$
- No fish size-technical yields correlations.
- Fillet fat differs between species & + correlation with fish size.
- Average values of the sensory descriptors, as well as discriminant analysis, show significant differentiation in the sensory properties of the five fish species.
- Texture profile analysis also showed differentiation between fish species and some relevance with the values received for the sensory textural descriptors.

Dissemination

ISI Journals

1. **Grigorakis K.** 2016. Fillet Proximate Composition, Lipid Quality, Yields and Organoleptic Quality of Mediterranean Farmed Marine Fish: A Review with Emphasis on New Species. **Critical Reviews in Food Science & Nutrition**, *in press*, DOI 10.1080/10408398.2015.1081145
2. **Lazo O., Claret A., Guerrero L.** 2016. A comparison of two methods for generating descriptive attributes with trained assessors: Check-All-That-Apply (CATA) vs. Free Choice Profiling (FCP). **Journal of Sensory Studies**, *in press*.

Conferences

1. **Lazo O.**, 2015, 11th **Pangborn Sensory Science Symposium**, 2015, Gothenburg, Sweden.
2. **Alexi N. et al.**, 2015, 11th **Pangborn Sensory Science Symposium**, 2015, Gothenburg, Sweden.
3. **Lazo O. et al.**, 2015, **XV Congreso Nacional y I Congreso Ibérico de Acuicultura** (XV CNA / I CIA), 13-16 October 2015, Huelva, Spain
4. **Lazo O. et al.**, 2015, **I Congreso AEPAS 2015**, 21-23 October, Ciudad Real, Spain.

Thank you for your attention!