Fishburger from aquacultured European species: nutritional quality and future prospective

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European sea bass, gilthead sea bream, and rainbow trout are common species in the Mediterranean area, generally marketed as whole or as refrigerated fillets whilst few derived products are currently commercialized. After the recent economical crisis, the saturation of market and the strong foreign competition are pushing seafood industry toward new marketing approaches and strategies such as product diversification. Recently, some technologies, such as the mechanical separation process (MSM), have demonstrated to be successfully applied to fish by-products for increasing processing yield. Nevertheless, the information on nutritional quality of MSM from species of interest for European aquaculture are scarce. The present study aimed to evaluate nutritional characteristics of fishburger obtained from mechanical separation process applied on damaged or out-size European sea bass, gilthead sea bream, and rainbow trout.

MATERIAL & METHODS

n. 33 European sea bass (*Dicentrarchus labrax*)
n. 33 gilthead sea bream (*Sparus aurata*)
n. 33 rainbow trout (*Oncorhynchuss mykiss*)

→ Mechanical separation process → preparation of n. 15 burger /species (100 g)

Chemical analyses

- *Total lipids* by Folch et al. (1957)
- *Fatty acids profile* by modified method of Morrison & Smith (1964) of the total lipids extract
- *Mineral composition* by inductively coupled plasma - optical emission spectrometry (ICP-OES)

Calculation of

Atherogenic index (**AI**), Thrombogenic index (**TI**) (Ulbricht & Southgate, 1991), Hypocholesterolaemic/Hypercholesterolaemic (**HH**) (Santos-Silva et al., 2002)

RESULTS

Tab.1. Total lipids and fatty acid profiles (g FAs/100g total FAs) of burgers from sea bass, sea bream, and rainbow trout.

	Sea bass	Sea bream	Rainbow trout
Total lipids (%)	10.49	7.76	6.65
C14:0	3.43	4.10	1.44
C16:0	13.72	12.59	10.40
C16:1ω7	4.43	6.36	2.37
C18:0	2.46	2.61	2.98
C18:1ω9	18.94	14.83	23.77
C18:2ω6	8.67	8.02	26.24
C18:3ω3	1.91	1.31	4.23
C20:1ω9	3.73	1.53	1.36
C20:5ω3	9.52	10.32	3.13
C22:1ω11	3.38	1.41	0.70
C22:5ω3	2.85	7.37	1.64
C22:6ω3	15.75	16.90	11.95
ΣSFA	20.47	20.32	15.35
ΣMUFA	34.68	28.07	30.94
ΣPUFAω6	10.89	10.44	30.17
ΣPUFAω3	32.67	38.71	22.76
ΣPUFA	44.85	51.60	53.71

Despite the high percentage of fat contained in 100 g of fish muscle (more than 6% in all the considered species), the characteristics of intramuscular fat resulted very interesting for human nutrition as a consequence of the predominance of PUFAω3, especially in the seawater species (**Tab. 1**).

Tab. 2 reveals that a portion (100 g) of MSM burger of E. sea bass and gilthead sea bream may provide 2150 and 1978 mg of EPA+DHA, respectively (suggested intake by EFSA: 250 mg per day), together with a high ω3/ω6 ratio. Rainbow trout instead would provide for around 700 mg EPA+DHA/100 g, but with a poor ω3/ω6 ratio. Very low AI and TI values were observed for all the analyzed species. HH value was higher in R. trout than in the others, mainly due to the prevalence of C18:2ω6 in this species

Tab. 2 Nutritional indexes of burgers from sea bass, sea bream, and rainbow trout.

	Sea bass	Sea bream	Rainbow trout
EPA (mg/100 g)	826.94	773.66	157.34
DHA (mg/100 g)	1322.83	1204.98	580.98
ω3/ω6	2.96	3.64	0.75
AI	0.35	0.38	0.19
TI	0.16	0.14	0.15
HH	3.42	3.60	6.08

Finally, mineral composition is reported in **Tab. 3**. Burgers of the considered species represent a good sources of K and P, whereas the microelement selenium was only found in trace. Specifically, around 360 and 220 mg of K and P /100 g were quantified in the observed seawater species, whereas rainbow trout contained approximately 440 and 217 mg /100 g of the same elements.

Tab. 3. Mineral composition (mg/100 g) of burgers from sea bass, sea bream, and rainbow trout.

	Sea bass	Sea bream	Rainbow trout
Ca	85.47	29.00	16.72
Fe	0.46	0.59	0.67
K	385.65	363.43	442.91
Mg	36.51	33.30	32.41
Na	27.45	29.59	32.88
P	248.18	224.39	217.75
Zn	0.53	0.53	0.43

CONCLUSION

Mechanical separated meat from species of interest for Mediterranean aquaculture resulted in a high nutritional quality raw material for new products, such as fishburger. However, further investigations on consumers acceptance and preference are suggested together with the analysis of the impact of different cooking methods on product characteristics.

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