Food Chemistry 124 (2011) 24–28

Contents lists available at ScienceDirect

Food Chemistry

journal homepage: www.elsevier.com/locate/foodchem

Muscle lipids and fatty acid profiles of three edible fish from the Mauritanian coast: *Epinephelus aeneus*, *Cephalopholis taeniops* and *Serranus scriba*

Abdel Wedoud Ould Ahmed Louly [a,b], Emile M. Gaydou [b], Mohamed Vall Ould El Kebir [a,*]

[a] Laboratoire de Biochimie, Faculté des Sciences et Techniques, Université de Nouakchott, BP 798, Nouakchott, Mauritania
[b] Institut des Sciences Moléculaires de Marseille (ISM2), Equipe AD2EM (Groupe Phytochimie), UMR 6263, Université Paul Cézanne, Avenue Escadrille Normandie Niémen, 13397, Marseille Cedex 20, France

ARTICLE INFO

Article history:
Received 18 November 2009
Received in revised form 11 April 2010
Accepted 24 May 2010

Keywords:
Serranidae
Epinephelus aeneus
Cephalopholis taeniops
Serranus scriba
Fatty acids
PUFA
Docosahexaenoic acid
Eicosapentaenoic acid
Mauritania

ABSTRACT

Muscle lipids and fatty acids (FA) of three largely consumed seawater species of Serranidae (*Epinephelus aeneus*, *Cephalopholis taeniops*, and *Serranus scriba*) from the Mauritanian coast, were determined through 1 year. The lipid contents were relatively poor, ranging from 0.8% to 2.3% showing a significant seasonal dependency. Amongst the 35 FA identified, 35–51% were saturated FA (SFA), 21–33% monounsaturated FA (MUFA), and 18–34% polyunsaturated FA (PUFA). Palmitic acid was found to be the main SFA, and was seasonal dependent, with a mean value of 30.5% for *E. aeneus*, 27.9% for *C. taeniops*, and 20.9% for *S. scriba*. Amongst MUFA, oleic acid, with 11–16%, was the main acid in all three species. The *n*6 PUFA level was low, in particular for *C. taeniops* (1.3–1.6%), and a little higher for *S. scriba* (3.6–4.2%). The three species were characterised by high amounts of *n*3 PUFA. Amongst them, docosa-4,7,10,13,16,19-hexaenoic acid (DHA, 22:6*n*3) was the highest with 5–9% for *C. taeniops*, 13–17% for *S. scriba*, and 10–16% for *E. aeneus*. Eicosa-5,8,11,14,17-pentaenoic acid (EPA, 20:5*n*3), was the second highest *n*3 PUFA, with 4–13%.

© 2010 Elsevier Ltd. All rights reserved.

1. Introduction

The Mauritanian coast, with its vast continental shelf, is the richest area of West Africa for seafood resources. Great numbers of seawater fish species are caught, and are commercially important for food in the Tropical East Atlantic. The lipids of fish are known to contain large proportions of long-chain polyunsaturated fatty acids (PUFA), but the levels of these compounds between fish species is subject to various factors, such as season, temperature or food accessibility. Some edible fish from the Senegalese coast, containing high concentrations of *n*3 PUFA, and commonly consumed by the local population have been investigated (Njinkoué, Barnathan, Miralles, Gaydou, & Samb, 2002). Some works have looked at the effect of temperature (Bolgova, Bogdan, & Ripatti, 1983) or the seasonal variation and distribution of eicosapentaenoic acid (EPA, C20:5*n*3) and docosahexaenoic acid (DHA, C22:6*n*3) in seawater fish lipids (Zlatanos & Laskaridis, 2007), or freshwater fish lipids (Rasoarahona, Barnathan, Bianchini, & Gaydou, 2005). The seasonal change in saturated and monoenoic acid contents seems also to be area dependent (Lee et al., 1986; Rasoarahona et al., 2005).

The present paper is concerned with the fatty acid composition of lipids of species belonging to the large family Serranidae (order Perciformes), which are commonly captured and consumed by the Mauritanian local population. Three species are found almost throughout the year: *Epinephelus aeneus* (Saint-Hilaire, 1817), *Cephalopholis taeniops* (Valenciennes, 1828), and *Serranus scriba* (Linnaeus, 1758). *E. aeneus* (the white grouper, locally called "*thiof*") is a species within the subfamily of Epinephelinae. Many Serranidae species are brightly coloured, such as the red *C. taeniops* (the blue spotted sea bass, locally called "*coq rouge*") and the *S. scriba* (synonyms: *Perca marina* or *Sebastus marinus*), the painted comber, locally called "*hajla*" or "*cadi*".

Since nutritional intakes of fatty acids for West-African populations are mainly composed of saturated fatty acid (SFA) from ruminants, unsaturated fatty acids of fish could be an attractive mean to increase the consumption of PUFA by concerned populations. Defining the way to balance the saturated–unsaturated fatty acid ratio in the diet depends on the knowledge of the lipidic composition of the most frequently collected fish species.

The consumption of fish has been associated with *n*3 polyunsaturated fatty acids (*n*3 PUFA) consumption, and has various beneficial effects, ranging from foetal development to cancer prevention (Connor, 2000). *n*3 PUFA provide several benefits to the human health (Le Néchet, Dubois, Gouygou, & Bergé, 2007; Navarro-Garcia, Pacheco-Aguilar, Bringas-Alvarado, & Ortega-Garcia, 2004).

* Corresponding author. Tel.: +222 241 25 30.
E-mail address: kebirvall@gmail.com (M.V. Ould El Kebir).

0308-8146/$ - see front matter © 2010 Elsevier Ltd. All rights reserved.
doi:10.1016/j.foodchem.2010.05.097

These PUFA are essential for the development and function of certain organs (Bergé & Barnathan, 2005). They can be beneficial for the prevention of human coronary artery disease (Mozaffarian, Bryson, Lemaitre, Burke, & Siscovick, 2005; Ward & Singh, 2005), and have been recognised to prevent inflammatory conditions, arrhythmias, hypertension and triacylglycerolemia, atherosclerosis, and autoimmune disorders (Mnari et al., 2007).

Furthermore, since fish need PUFA to provide tolerance to low water temperature (Bolgova et al., 1983), low amounts should be expected in warmer waters, such as in tropical areas, like Mauritania. The objective of this study is to generate more knowledge on the *n*3/*n*6 ratio (Ward & Singh, 2005) and the muscle lipid content of these consumed species, belonging to the family Serranidae.

2. Materials and methods

2.1. Sampling

Every 2 months, samples consisting of five fish for each species, were purchased directly by local fishermen at the Nouakchott craft harbour. In all cases, sampling targeted fish of the most commonly found size, i.e. 30–43 cm length, 400–1050 g weight for *E. aeneus*, 26–28 cm length, 320–900 g weight for *C. taeniops*, and 23–25 cm length, 160–250 g weight for *S. scriba.* All were roughly 9–16 months old. Individual fish were dissected and portions of muscle tissue below the dorsal fin (skin on) were kept on ice for less than 4 h, before lipid extraction. The sex distribution of the fish was not determined.

Table 1
Total lipids in the muscle tissue of the three fish investigated at different months[a].

Fish	January	March	May	July	September	November	Mean
E. aeneus	2.33 ± 0.35	2.41 ± 0.27	1.97 ± 0.19	1.72 ± 0.25	1.98 ± 0.28	2.03 ± 0.23	2.1
C. taeniops	1.31 ± 0.21	0.82 ± 0.12	0.79 ± 0.11	0.72 ± 0.12	1.15 ± 0.19	1.22 ± 0.21	1.0
S. scriba	1.55 ± 0.25	1.34 ± 0.19	1.58 ± 0.22	1.62 ± 0.33	1.75 ± 0.31	1.93 ± 0.27	1.6

[a] Percent w/w of muscle tissue, mean ± SD (mean of five fish samples).

Table 2
Seasonal change in the fatty acid composition[a] of *Epinephelus aeneus* muscle[b].

Fatty acid	January	March	May	July	September	November	Mean
12:0	0.12 ± 0.02	0.21 ± 0.02	0.18 ± 0.02	0.23 ± 0.03	0.27 ± 0.03	0.15 ± 0.02	0.19
13:0	0.08 ± 0.01	0.12 ± 0.03	0.15 ± 0.02	0.13 ± 0.02	0.15 ± 0.02	0.10 ± 0.02	0.12
14:0	3.45 ± 0.22	3.51 ± 0.25	3.38 ± 0.23	3.35 ± 0.28	3.83 ± 0.32	3.91 ± 0.35	3.57
i-15:0	0.11 ± 0.02	0.15 ± 0.02	0.23 ± 0.01	0.17 ± 0.03	0.19 ± 0.02	0.21 ± 0.03	0.18
15:0	0.56 ± 0.03	0.65 ± 0.02	0.53 ± 0.03	0.71 ± 0.06	0.65 ± 0.03	0.83 ± 0.02	0.66
i-16:0	0.65 ± 0.03	0.52 ± 0.03	0.66 ± 0.05	0.41 ± 0.02	0.38 ± 0.02	0.29 ± 0.02	0.49
16:0	27.2 ± 1.37	31.4 ± 1.21	33.3 ± 1.41	31.7 ± 1.53	30.2 ± 1.31	29.1 ± 1.39	30.48
i-17:0	Tr	0.01 ± 0.01	0.08 ± 0.02	Tr	Tr	Tr	Tr
17:0	0.65 ± 0.05	0.78 ± 0.06	0.81 ± 0.05	0.61 ± 0.04	0.55 ± 0.03	0.48 ± 0.03	0.65
i-18:0	0.11 ± 0.03	0.21 ± 0.04	0.25 ± 0.01	0.12 ± 0.02	0.35 ± 0.02	0.23 ± 0.02	0.21
18:0	8.03 ± 0.45	8.57 ± 0.67	9.10 ± 0.71	8.91 ± 0.83	9.30 ± 0.75	8.72 ± 0.81	8.77
20:0	0.58 ± 0.12	0.61 ± 0.03	0.66 ± 0.08	0.42 ± 0.05	0.39 ± 0.03	0.55 ± 0.03	0.54
22:0	0.23 ± 0.04	0.32 ± 0.04	0.41 ± 0.06	0.38 ± 0.05	0.63 ± 0.04	0.39 ± 0.05	0.39
23:0	0.15 ± 0.03	0.15 ± 0.02	0.22 ± 0.03	0.08 ± 0.02	0.12 ± 0.02	0.28 ± 0.03	0.17
24:0	0.18 ± 0.05	0.21 ± 0.05	0.35 ± 0.05	0.26 ± 0.03	0.11 ± 0.02	0.15 ± 0.02	0.21
ΣSFA	*42.10*	*47.42*	*50.31*	*47.48*	*47.12*	*45.39*	*46.64*
16:1*n*7	9.32 ± 0.65	10.1 ± 0.72	8.85 ± 0.68	7.22 ± 0.71	6.53 ± 0.49	8.85 ± 0.75	8.48
17:1*n*8	0.25 ± 0.08	0.31 ± 0.10	0.12 ± 0.02	0.25 ± 0.03	0.15 ± 0.02	0.17 ± 0.03	0.21
18:1*n*9	12.3 ± 0.75	13.5 ± 0.98	11.7 ± 0.67	11.2 ± 0.69	10.8 ± 0.72	11.1 ± 0.75	11.77
18:1*n*7	1.25 ± 0.12	0.92 ± 0.13	1.02 ± 0.11	1.18 ± 0.11	0.96 ± 0.10	0.76 ± 0.09	1.02
20:1*n*9	0.22 ± 0.08	0.35 ± 0.05	0.15 ± 0.02	0.11 ± 0.02	0.18 ± 0.03	0.21 ± 0.02	0.20
22:1*n*9	0.08 ± 0.04	0.12 ± 0.02	0.05 ± 0.01	0.08 ± 0.01	0.10 ± 0.02	0.05 ± 0.01	0.08
24:1*n*9	Tr	0.01 ± 0.01	Tr	Tr	Tr	Tr	Tr
ΣMUFA	*23.42*	*25.31*	*21.89*	*20.04*	*18.72*	*21.14*	*21.75*
18:2*n*6	1.42 ± 0.15	1.67 ± 0.19	1.53 ± 0.15	1.39 ± 0.12	1.55 ± 0.10	1.12 ± 0.13	1.44
18:3*n*6	0.27 ± 0.09	0.51 ± 0.08	0.72 ± 0.10	0.65 ± 0.09	0.58 ± 0.05	0.42 ± 0.05	0.52
20:2*n*6	0.34 ± 0.01	0.32 ± 0.03	0.39 ± 0.06	0.56 ± 0.05	0.62 ± 0.06	0.57 ± 0.03	0.46
20:4*n*6	0.28 ± 0.11	0.27 ± 0.10	0.42 ± 0.02	0.63 ± 0.07	0.78 ± 0.06	0.42 ± 0.03	0.46
22:4*n*6	0.32 ± 0.02	0.41 ± 0.06	0.46 ± 0.05	0.33 ± 0.05	0.41 ± 0.06	0.37 ± 0.03	0.38
22:5*n*6	0.08 ± 0.02	0.12 ± 0.05	0.10 ± 0.02	0.15 ± 0.02	0.13 ± 0.02	0.11 ± 0.02	0.12
18:3*n*3	0.69 ± 0.08	0.72 ± 0.09	0.59 ± 0.08	0.45 ± 0.07	0.36 ± 0.05	0.53 ± 0.04	0.56
18:4*n*3	0.11 ± 0.02	0.22 ± 0.03	0.19 ± 0.03	0.08 ± 0.02	0.21 ± 0.03	0.33 ± 0.04	0.19
20:3*n*3	3.42 ± 0.28	4.25 ± 0.33	5.31 ± 0.29	3.88 ± 0.32	2.76 ± 0.23	3.04 ± 0.25	3.78
20:4*n*3	Tr	0.01 ± 0.01	Tr	Tr	Tr	Tr	Tr
20:5*n*3	4.32 ± 0.33	5.31 ± 0.35	4.25 ± 0.38	6.15 ± 0.42	5.85 ± 0.38	4.98 ± 0.45	5.14
22:5*n*3	Tr	Tr	0.02 ± 0.01	Tr	0.01 ± 0.01	Tr	Te
22:6*n*3	14.2 ± 1.23	10.3 ± 1.01	13.1 ± 1.31	16.3 ± 1.42	19.2 ± 1.33	15.6 ± 1.43	14.78
ΣPUFA	*25.45*	*24.11*	*27.08*	*30.57*	*32.46*	*27.49*	*27.86*

[a] Percent w/w of total fatty acids.
[b] Mean of five fish samples.

Download English Version:

https://daneshyari.com/en/article/1187622

Download Persian Version:

https://daneshyari.com/article/1187622

Daneshyari.com