PROXIMATE, FATTY ACIDS AND VOLATILE COMPOUNDS COMPOSITION OF REARED VS. WILD GREATER AMBERJACK (*SERIOLA DUMERILI*) AS AFFECTED BY FISH SIZE

Niki Alexi[1,2], Derek V. Byrne[1], Evagelia Nanou[2] & Kriton Grigorakis [2*]

[1]Food Quality Perception & Society, Department of Food Science, Aarhus University, Kirstinebjergvej 10, DK-5792 Aarslev, Denmark
[2]Institute of Marine Biology, Biotechnology and Aquaculture, Hellenic Centre for Marine Research, Agios Kosmas Hellinikon, 16777, Athens, Greece*kgrigo@hcmr.gr

Introduction

The EU aquaculture is limited in only few fish species and this leads to unfulfilled consumer demands and a rise in imports from third countries (Failler et al., 2007). To cover these demands and to create a sustainable EU aquaculture, new species are introduced to diversify the sector. Greater amberjack is one of the main candidate species for this diversification. The aim of the current study was to investigate proximate composition, fatty acids (FA) and volatile compounds (VC) differences within Greater amberjack (*Seriola dumerili*), as affected by two different factors: fish origin (Wild vs. Reared counterparts) and fish size (Small vs. Big).

Materials and Methods

Study design & sampling: Four groups of G. amberjack specimens were investigated. The study design and sampling of specimens is included inTable I. Sampling was performed on the fillets of the specimens and samples were stored in -20^{o}C prior to proximate composition analyses and in -80^{o}C prior to FA and VC analyses.

Table I: Study design along with number of specimens belonging to each group, average weight, sampling and final number of samples tested.

Greater amberjack (*Seriola dumerili*)	Wild		Reared	
	Small	Big	Small	Big
N specimens	3	1	10	8
Weight specimens	426 ±23 g	9473 g	1118 ±193 g	13000 ±1629 g
Sampling	1/specimen	Front; Middle; Tail fish parts	1/specimen	Front; Tail fish parts
N samples	3	3	10	2

Analyses: Proximate composition analyses were performed according to the standard AOAC (2005) methods. FA composition was analyzed after methylesterification by GC-FID. VC were extracted by dynamic headspace sampling and analyzed by GC-MS.

Results

The proximate composition of the four fish groups is included in Table II. They differed significantly (P<0.05) in all composition variables with the exception of protein content.

Table II: Fillet proximate composition of Greater amberjack groups (mean values ± standard deviation). Feed composition of reared small (RS) specimens is included. Different letters in the same row denote significant differences at P=0.05.

Proximate composition	Reared Small (N=10)	Reared Big (N=2)	Wild Small (N=3)	Wild Big (N=3)	Feed RS
Moisture %	70.76 ±0.94^{b}	65.53 ±0.63^{c}	75.93 ±0.72^{a}	75.12 ±0.21^{a}	8.57
Fat%	3.92 ±1.01^{b}	12.32 ±0.06^{a}	0.27 ±0.13^{c}	0.71 ±0.16^{c}	16.28
Protein%	23.09 ±0.78^{a}	20.51 ±0.63^{b}	21.86 ±0.30^{ab}	22.55 ±0.67^{a}	44.72
Ash%	1.51 ±0.09^{b}	1.31 ±0.03^{c}	1.66 ±0.04^{a}	1.47 ±0.01^{bc}	12.16

The proportion of the total variation for the proximate composition variables, as explained by the design factors is included in Table III.

Table III: Proportion of the total variation of fillet composition explained by each factor (rearing origin, fish size) along with the significance level (*** *P*<0.001; ** *P* <0.01; * *P* <0.05; ns, non-significant)

Experimental factors	Explained variation per factor			
	Moisture %	Fat%	Protein%	Ash%
Rearing	0.939***	0.834***	ns	0.338**
Size	0.157***	0.280***	0.144*	0.539***
Rearing * Size	0.084***	0.226***	0.432**	ns

Fillet FA composition is presented in Table IV. The groups differed significantly (P<0.05) in all FA categories examined. The proportion of the total variation explained for the FA groups was significant (P<0.01) and approximately equally distributed among the design factors (rearing; size; rearing*size), with the exception of n-3/n-6 ratio where rearing origin explained the majority of variability (0.657, P<0.001), whereas size effect was minor (0.020, P <0.01).

Table IV: FA composition of Greater amberjack groups (mean values ± standard deviation). Feed composition of reared small (RS) specimens is included. Different letters in the same row denote significant differences at P=0.05.

FA categories	Reared Small	Reared Big	Wild Small	Wild Big	Feed RS
SFA (mg)	4.33 ±0.34^{b}	93.63 ±4.05^{a}	3.74 ±0.93^{b}	5.89 ±1.40^{b}	2.85
MUFA (mg)	9.10 ±0.45^{b}	142.1 ±3.57^{a}	1.36 ±0.55^{c}	2.78 ±0.50^{c}	7.08
PUFA (mg)	6.46 ±0.41^{b}	116.58 ±6.88^{a}	3.67 ±0.54^{b}	6.56 ±0.92^{b}	4.44
n-9 (mg)	7.72 ±0.35^{b}	116.65 ±3.62^{a}	2.61 ±0.37^{c}	2.61 ±0.69^{c}	5.96
n-6 (mg)	3.45 ±0.20^{b}	41.7 ±2.42^{a}	0.50 ±0.17^{c}	0.74 ±0.17^{c}	2.61
n-3 (mg)	2.85 ±0.24^{b}	72.87 ±9.23^{a}	3.14 ±0.36^{b}	5.77 ±0.81^{b}	1.72
ARA (mg)	0.14 ±0.01^{c}	2.55 ±0.31^{a}	0.30 ±0.06^{b}	0.27 ±0.03^{bc}	0.08
EPA (mg)	0.68 ±0.06^{b}	12.96 ±0.81^{a}	0.37 ±0.10^{b}	0.54 ±0.09^{b}	0.55
DHA (mg)	1.78 ±0.17^{b}	40.40 ±7.21^{a}	2.48 ±0.20^{b}	4.76 ±0.68^{b}	0.88
n-3/n-6	0.83 ±0.05^{c}	1.76 ±0.31^{c}	6.67 ±1.31^{b}	8.01 ±1.49^{a}	0.66

VC composition was similar for all groups. Variations existed mainly in the concentration of compounds.

Discussion-Conclusion

- Protein content was similar in all groups and its variability was mainly explained by the fish size parameter. Fillet fat was higher in reared specimens, particularly in the big fish (Reared Big). Moisture and fat content were explained mainly by rearing.
- FA composition was explained both by rearing and fish size parameters, with the exception of n-3/n-6 ratio that was depended mainly on rearing origin
- The reared big group showed the biggest abundance both in FA and VC content

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References

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