Effect of rotifers fatty acid composition on the occurrence of skeletal deformities in red porgy *Pagrus pagrus* (Linnaeus, 1758)

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Introduction

Red porgy has been proposed as a candidate for diversification of marine aquaculture production (Hernández-Cruz *et al*., 1999). However, limited larval survival together with the elevated levels of skeletal deformities occurrence (over 50% of the population), under intensive or semi-intensive systems constitute the major bottlenecks for the production of this species at commercial scale (Roo *et al*., in press). Essential fatty imbalances on early life stages, may alter the osteological development of reared larvae (Cahu *et al*., 2003). The objective of this study was to determine the effect of rotifers enrichment, particularly on DHA, on growth, survival and occurrence of skeleton deformities in red porgy.

Materials and methods

Larval rearing was performed in an intensive system (IS) with 6 tanks of 2m^3 capacity, stocked with 100 eggs.l^{-1}

In trial A DHA Protein Selco ® (DPS-Rot) and Red Pepper Paste ® (RPP-Rot) were tested. In trial B, DHA Protein Selco® was tested in comparison to DHA Protein Selco ® with added purified DHA (MorDHA omega-3 I.Q® Exp-Rot).

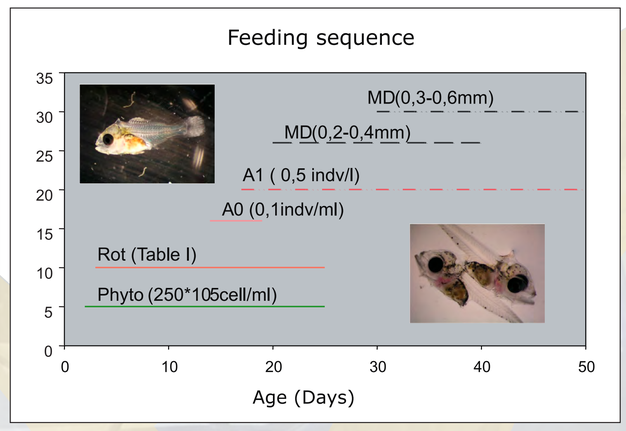
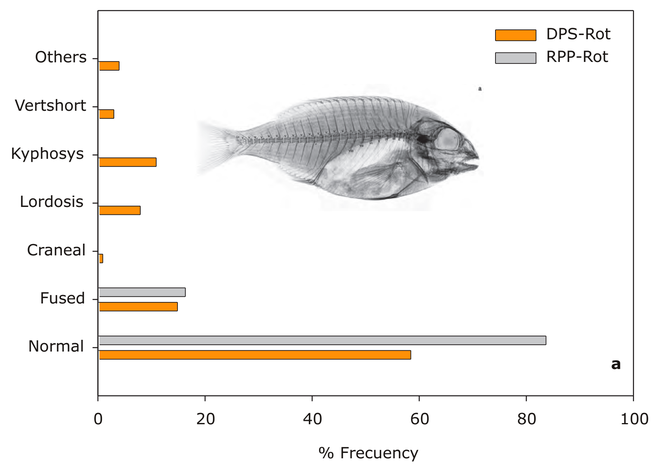


Figure 1

Results

Figures Fry quality evaluation in trials A, B.



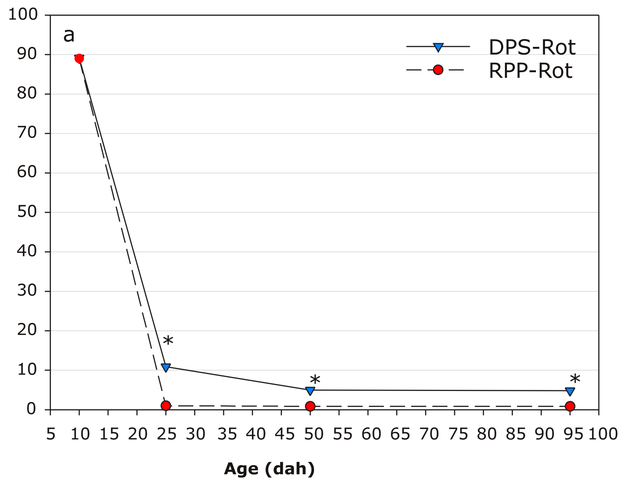


Fig.2 Survival evolution in trial A.

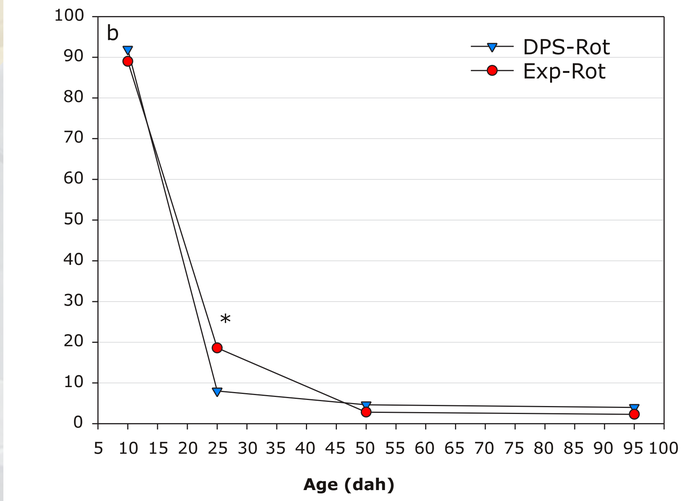


Fig.3 Survival evolution in trial B.

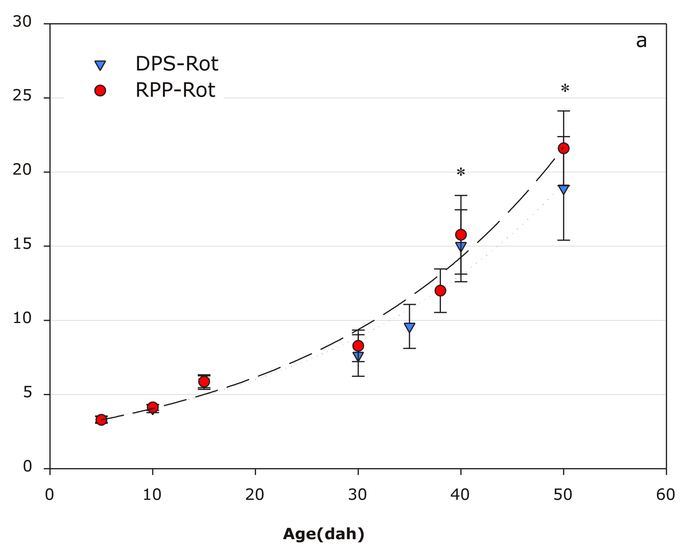


Fig.4 Total length evolution in trial A.

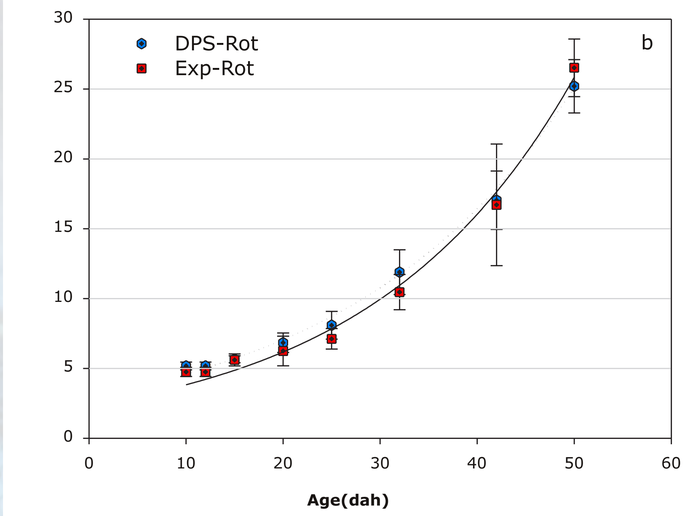


Fig.5 Total length evolution in trial B.

Table II EFA levels (% TFA) in enriched rotifers tested. Different superscripts for the same row between column from each trial, reflects significant differences (P<0.05).

Treatments	Trial A		Trial B	
Rotifers	DPS-Rot	RPP-Rot	DPS-Rot	Exp-Rot
ARA	1.46±0.73	2.88±0.85	1.83±0.23^a	1.33±0.10^b
EPA	6.51±0.62^a	3.99±0.61^b	6.63±0.34	6.83±0.57
DHA	9.68±0.93^a	20.52±2.8^b	10.11±0.32^a	22.51±2.06^b
DPA	0.44±0.07^a	6.43±0.50^b	0.45±0.04^a	0.92±0.45^b
EPA/ARA	5.45±2.99	1.48±0.45	3.68±0.59^b	5.16±0.39^b
n-3/n-6	2.02±0.43	2.05±0.39	1.94±0.21^a	4.08±0.44^b
Lipids (dw)	22.05±3.84	27.31±4.05	23.32±2.25	23.80±1.66

Table III EFA levels (% TFA) in 12dah red porgy larvae. Different superscripts in the same column reflects significant differences (P<0.05).

Treatments	Trial A		Trial B	
Larvae	DPS-Rot	RPP-Rot	DPS-Rot	Exp-Rot
ARA	1.92±0.19^a	3.47±0.05^b	1.82±0.03	2.07±0.20
EPA	5.56±0.14^a	3.83±0.06^b	4.59±0.13	3.77±0.29
DHA	16.13±0.18 ^{a}	25.41±1.11 ^{b}	16.30±0.25^a	25.76±2.66 ^{b}
DPA	0.63±0.01^a	5.73±0.23^b	0.54±0.02	1.03±0.10
DHA/EPA	2.90±0.10^a	6.64±0.39^b	3.56±0.15^a	6.83±0.18^b
EPA/ARA	2.92±0.38^a	1.10±0.00^b	2.53±0.11^a	1.82±0.04^b
n-3/n-6	2.30±0.05^a	2.47±0.10^b	2.15±0.01	3.61±0.10
Lipids (dw)	18.40±0.52^a	16.25±0.69^b	20.45±1.03	19.03±1.81

Discussion

A reduction in the incidence of skeleton deformities was found in larvae fed RPP-rot in trial A, which could be related to its higher DHA content, despite other differences in the enrichment composition. However, since the only difference between rotifers of trial B was its DHA content, the reduction in the number of deformed fish for each deformity studied (about 50%) when larvae were fed higher DHA levels demonstrates the important role of this FA in the prevention of deformities at the rotifer feeding stage.

DHA content in the rotifers in both trials (1.8 and 4.7% dw DHA in DPS and in RRP, in trial A and 2.0 and 4.5% dw DHA in DPS and DHA-Rot in trial B) fulfil the DHA requirements for maximum growth.

A marked positive effect of DHA on survival was found in the trial B, with larvae fed DHA-Rot (4.5% dw DHA) achieved a significantly higher survival than larvae fed DPS-Rot (2.0% dw DHA).

DPA was accumulated in red porgy larval tissues in high levels (5,73% TFA) (12dah) when rotifers rich in DPA and DHA also were the main source of food (RPP-rotifers) and it could be related to the low larval survival, as obtained in other sparids (Roo et al., 2005).

Acknowledgements

Funding was partially provided by the Spanish Ministries of Science and Education (AGL2003–09131) and the Ministry of Agriculture, Fisheries and Food (Jacumar: Promoción del cultivo de nuevas especies de espáridos: Ensayos piloto y transferencia tecnológica). J.Roo, thanks the financial support provided by the Spanish Ministry of Science and Education and European Social Funds through the program “Incorporación de técnicos de apoyo de infraestructuras”.