Fish meal and fish oil replacement by vegetable lipid and protein sources in sea bass diets

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Ingredients	P	G	GL
Fish meal	46.1	17.1	17.1
Wheat gluten	1.0	9.3	9.1
Wheat flour	9.2	9.0	9.0
Soybean concentrate		25.4	24.2
Defatted soybean flour	16.6	5.8	8.0
Full fat soybean	12.0	12.0	12.0
Fish oil	9.1	3.9	3.9
Soybean oil		4.4	3.7
Premix			
"Standard"	6.0		
"Medium soya oil"		13.0	
"Medium soya oil" Phospholipid supplemented			13.0
Proximate composition			
Total lipids	15.2	15.6	15.7
Proteins (Nx6.25)	52.9	52.6	53.3
Dry matter	98.7	95.9	93.5
Ash	12.6	11.2	10.8

Table 1 : Composition of the 3 diets.

Three groups of sea bass (initial weight, 6.0±0.20g) were fed to satiety during 7 weeks with three isonitrogenous (53% protein/dry matter) and isolipidic (15.5%) practical diets. Each diet was randomly assigned to triplicate groups of 45 juvenile fish.

The control diet (P) contained mainly fish meal as protein source (providing 2/3 of the protein) and fish meal/oil as lipid source (4/5 of the fat). Experimental premixes were included in diets G and GL to compensate possible essential components lost due to the fish meal and fish oil replacement (1/4 of the protein and 1/3 of the fat).

These premixes contained filler, amino acids, minerals, vitamins, micronutrients, attractive substances, essential fatty acids, without or with the supplementation of phospholipids (G and GL feed, respectively).

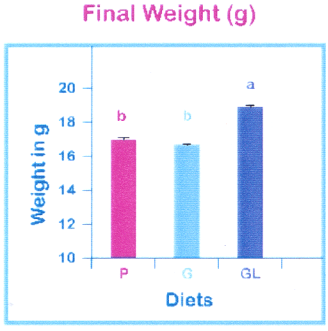
Lipid	P	G	GL
Total body	10.2 ± 0.35 b	11.5 ± 0.36 a	10.4 ± 0.39 b
Liver	17.8 ± 1.72 b	21.9 ± 2.15 a	18.8 ± 1.35 b
Muscle	4.3 ± 0.80	3.9 ± 0.85	4.1 ± 0.56
Transaminases Activities			
GPT	166 ± 11.0 c	280 ± 36.1 a	216 ± 13.4 b
GOT	231 ± 12.8	225 ± 4.6	211 ± 19.4

Table 2 : Lipid content in total body, liver,and muscle (% of wet weight) and transaminase activities (mU/ g liver).

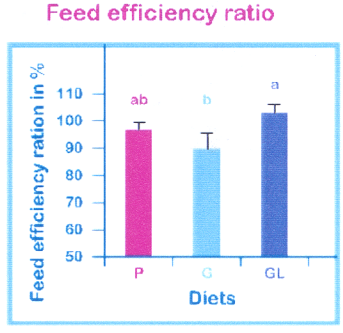
Dietary replacement of fish meal and fish oil by vegetable sources induced an increase in fat deposition in liver. The increase in GPT activity in G group associated to a fattening suggested a saturation of storage capacity and metabolism of amino acids, leading to a peripheric uptake in adipocytes. The phospholipid enrichment allowed to reduce the fat deposition.

The replacement of fish meal/oil by vegetable protein/fat sources in a nutritionally balanced formulation did not result in significant differences in growth and feed effciency.

The dietary supplementation of phospholipids increased the growth performance of the GL feed beyond that of the positive control (P) and improved the feed efficiency compared to the non-supplemented feed (G).



Final weight of sea bass fed the 3 experimental diets during 7 weeks. Data are given as means ± SD (n=3). columns with the same superscript letter are not significantly different (P >0.05).



Feed efficiency ratio of sea bass fed the 3 experimental diets during 7 weeks. Data are given as means ± SD (n=3). columns with the same superscript letter are not significantly different (P >0.05)

In nutritionally balanced feeds, the reduction of fishmeal and fish oil to provide 1/4 of the dietary protein and 1/3 of the dietary fat did not affect growth, feed efficiency and muscle lipid content in juvenile European seabass compared to a standard practical feed.

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