

ONGROWING AND BIOCHEMICAL COMPOSITION OF BLACKSPOT SEA BREAM (*PAGELLUS BOGARAVEO*) JUVENILES FED WITH DIFFERENT DRY FOOD

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Introduction

Blackspot sea bream, *Pagellus bogaraveo*, ranks as one of the potentially farmable species at commercial level. Over the past few years, considerable progress has been made in terms of reproduction, pre-fattening and ongrowing in tanks and cages (Fernández-Pato et al., 1990; Linares et al., 2001; Olmedo et al., 1997, 2000; Peleteiro et al., 1994, 1997). One of the problems with rearing, particularly at the ongrowing stage, is the amount of fat that builds up in individuals around the inner organs (perivisceral fat) and on the muscle and liver (Linares et al., 2000). This problem is directly linked to feed, so that the solution involves obtaining a suitable diet able to cover the nutritional requirements of Blackspot sea bream.

This work is a comparative study on growth and the biochemical composition of Blackspot sea bream juveniles, fed with four different types of dry feed as regards protein and fat content.

Materials and methods

This experiment conducted over a six month period, was carried out on the premises of the Luso-Hispana de Acuicultura Company in Valdoviño (A Coruña) with a batch of 1200 juveniles, with an initial average weight of 25.06±0.889g, from the Oceanographic Centre in Vigo. Fish were introduced into 8 circular tanks measuring 4m³, in groups of 150, with a density of 1kg.m⁻³. Each two groups were fed with a different feed. Feeds, supplied by Trouw, had the following composition in terms of percentage protein/fat content: D1

(54/16); D2 (50/24); D3 (42/14) and D4 (43/22). Likewise, the quality of the protein in the feeds was the same and better in feeds D1 and D2, in comparison with feeds D3 and D4, which had a lower quality protein content. Sampling of weight (g) and size (mm) was conducted on a monthly basis, and 3 individuals were extracted from each batch for dissection. Perivisceral fat weight was noted for percentage monitoring of fat in terms of body weight ($PF = \text{perivisceral fat weight} \cdot \text{body weight}^{-1} \times 100$) and the liver, to calculate the hepatosomatic index ($HIS = \text{liver weight} \cdot \text{body weight}^{-1} \times 100$). Samples were taken of muscle and liver to subsequent biochemical analysis. Analysis was also made of proteins (Bradford, 1976), total lipids by extraction with chloroform:methanol (2:1) (Blight and Dyer, 1959, modified by Fernández Reiriz et al., 1989) and gravimetric determination. Fatty acids prior to transesterification and methylation (Lepage and Roy, 1986) were analyzed by Gas Chromatography.

Comparison of the results from the groups fed with different feeds was conducted by variance analysis ($P < 0.05$).

Results and Discussion

Figure 1 shows juvenile growth throughout the experience. The juveniles fed with feed D1, at the end of the experience, presented an average weight of 72g, which is significantly higher than that obtained in the juveniles fed with feeds D2, D3, and D4: 41.6, 40.6, and 46.1g, respectively. These results also indicate that the protein quality of the diet exerts an important influence on the growth of juvenile Blackspot sea bream when accompanied by adequate fat content. In the case of the batch fed with D2, despite this having the same protein quality as feed D1, the fat content is excessive, leading to poor growth results.

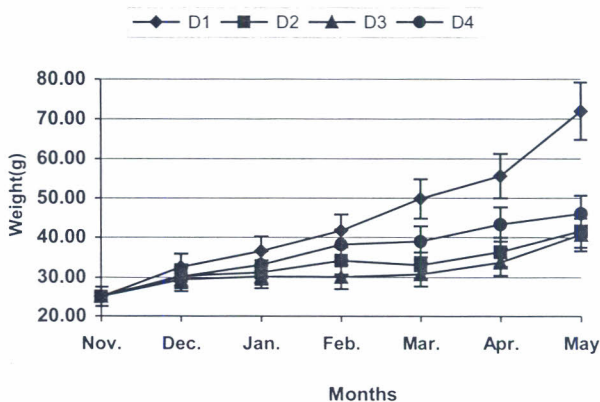


Fig. 1. Growth of juvenile Blackspot sea bream fed with different feeds.

As regards content in perivisceral fat, there appears to be no relationship between the fat content of the diet and the percentage of perivisceral fat found in the juveniles, which ranges from 2.2 to 4.5% of body weight. Nor are there significant differences between the hepatosomatic indices of the juveniles fed with the different diets. The HSIs range from 0.9 to 2%.

In terms of the biochemical composition of juveniles (Table I), the protein content of the liver in the batch fed with diet D1 generally shows slightly higher values than those obtained with the other diets, reaching 30.5% dry weight by the end of the experiments. In the muscle, protein ranged from 64-80%, no differences being noted between the juveniles fed with the different feeds.

Table I. Protein, lipid, and PUFA composition of in Blackspot sea bream juvenile liver.

Feed		Nov	Dec	Jan	Feb	Mar	Apr	May
D1	Proteins (%DW)	24.46	37.26	33.1	24.76	31.48	35.13	30.48
	Lipids (%DW)	55.98	33.65	45.44	37.96	40.97	41.26	43.06
	PUFA (ng.µg ⁻¹ DW)	23.92	53.45	92.55	63.8	61.45	55.1	61
D2	Proteins	24.46	32.46	32.55	28.32	25.36	29.28	24.15
	Lipids	55.98	37.37	38.08	45.39	50.69	51.49	53.62
	PUFA	23.92	74.05	78.3	100	111.6	88.65	98.3
D3	Proteins	24.46	34.6	32.77	32.53	27.01	27.98	27.22
	Lipids	55.98	42.55	31.49	46.52	55.41	52.62	46.74
	PUFA	23.92	53.8	61.1	71.85	96.3	102.9	77.5
D4	Proteins	24.46	30.51	33.62	23.58	28.17	24.57	30.84
	Lipids	55.98	53.33	44.99	59.66	51.69	57.13	54.57
	PUFA	23.92	68.95	122.2	108.1	91.15	117.2	80.95

The percentage of lipids in liver decreased at the end of the experience in terms of the initial value in the juveniles fed with feeds D1 and D3, from 56 to 43 and 47%, respectively. Conversely, in juveniles fed with more fatty feeds (D2 and D4), although there was an initial reduction in lipids as fish size increased, an increase was subsequently observed. Muscle in juveniles fed with D2 and D4 showed slightly higher lipid values than those fed with D1 and D3. As regards fatty acids, there is no clear relationship between the higher growth obtained with the D1 diet and the content in PUFAs in the liver. In all cases, an increase was noted relative to the initial value (24 ng.µg⁻¹ dry weight), and throughout the experience this ranged between 53.5 and 122ng. µg⁻¹ dry weight.

Conclusions

- Protein quality in the diet exerts a clear influence on the growth of Blackspot sea bream juveniles.
- A high fat content in the diet delays growth of Blackspot sea bream juveniles.

- There appears to be no relationship between perivisceral fat content and the weight of liver in juveniles with the fat content in the diet administered.
- Protein composition in the juveniles liver is slightly higher in those fed with a diet with a better balance in protein/fat content than in those fed with the other diets.

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