

# growth under laboratory conditions of wild juvenile black-spot sea bream (*Pagellus bogaraveo* B.)

J.B. Peleteiro, M. Olmedo, R.M. Cal, and G. Gómez

Instituto Español de Oceanografía, Centro Oceanográfico de Vigo  
Apdo. 1.552, E-36280 Vigo, Spain

*As an alternative to the culture of traditional fish, experiments have been started with black-spot sea bream (*Pagellus bogaraveo*) and are summarized here.*

*Two groups of bream (B-1 and B-2) with 63 fish of mean weight 173 g and 67 fish of mean weight 217 g, respectively, were captured on the NW coast of Spain between September and December 1991, transported to the laboratory, and maintained in 12 m<sup>3</sup> tanks.*

*After about 30 days acclimation, lengths and weights of all fish were measured. These measurements were*

*repeated at 2 month intervals, for 14 months in the first group and 10 months in the second. The mean weights reached at the end of these periods were 462 g and 383 g, respectively.*

*Fish were fed with laboratory prepared moist food, and the amount eaten daily was controlled. Survival rate at the end of the experiment was 90.5% in group B-1 and 95.5% in group B-2. Temperature, measured daily, ranged from 12° to 20°C.*

*This paper provides information on the capture, transport, acclimation and maintenance of the fish throughout the experiment.*

## Introduction

The culture of black-spot sea bream (*Pagellus bogaraveo* B.) appears to be an alternative to traditional cultures of marine fish (turbot, *Scophthalmus maximus*; sea bass, *Dicentrarchus labrax*, and gilthead bream, *Sparus aurata*) with a high potential.

This is probably due to its high market value, its scarcity on the market, and its

good biological characteristics for cultivation.

The results obtained in experiments of growth in captivity (Chereguini O., C.A. Fernández-Pato, and Martínez-Tapia; 1990), spawning, and larval culture (Fernández-Pato C.A., C. Fernández-Tapia, O. Chereguini, and I. García-Banda, 1990; Martínez-Tapia C., C. Fernández-Pato, and O. Chereguini, 1990) led us to select it as a priority species for future research.

Wild juveniles were captured to continue investigations on fattening, and to establish a future brood stock. This species is a protandrous hermaphrodite. Field populations do not reach sexual maturity until 5 years old (Sánchez F., 1983) at an average weight of 650 g and a mean length of 35 cm. Captive specimen reach maturity when they are 4 years old (Fernández-Pato C.A., C. Fernández-Tapia, O. Chereguini, and I. García-Banda, 1990) and have an average weight of 800 g and length of 30 cm.

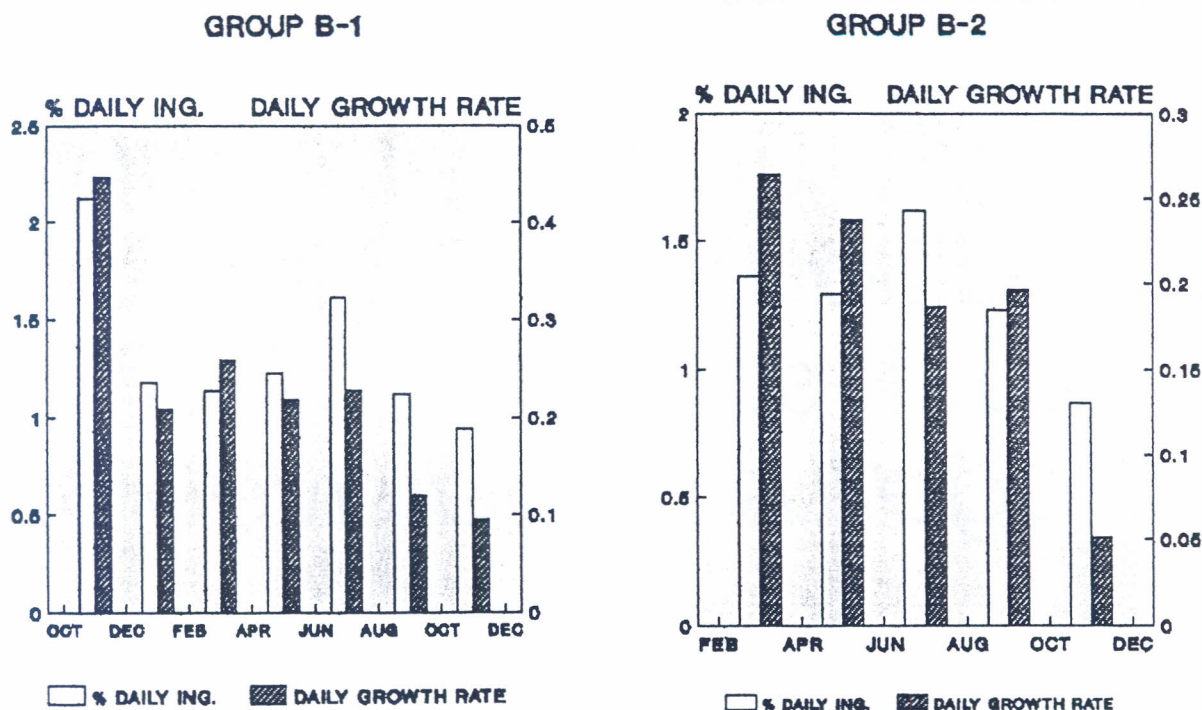


Fig. 1. Percentage ingestion and daily growth rate in groups B-1 and B-2.

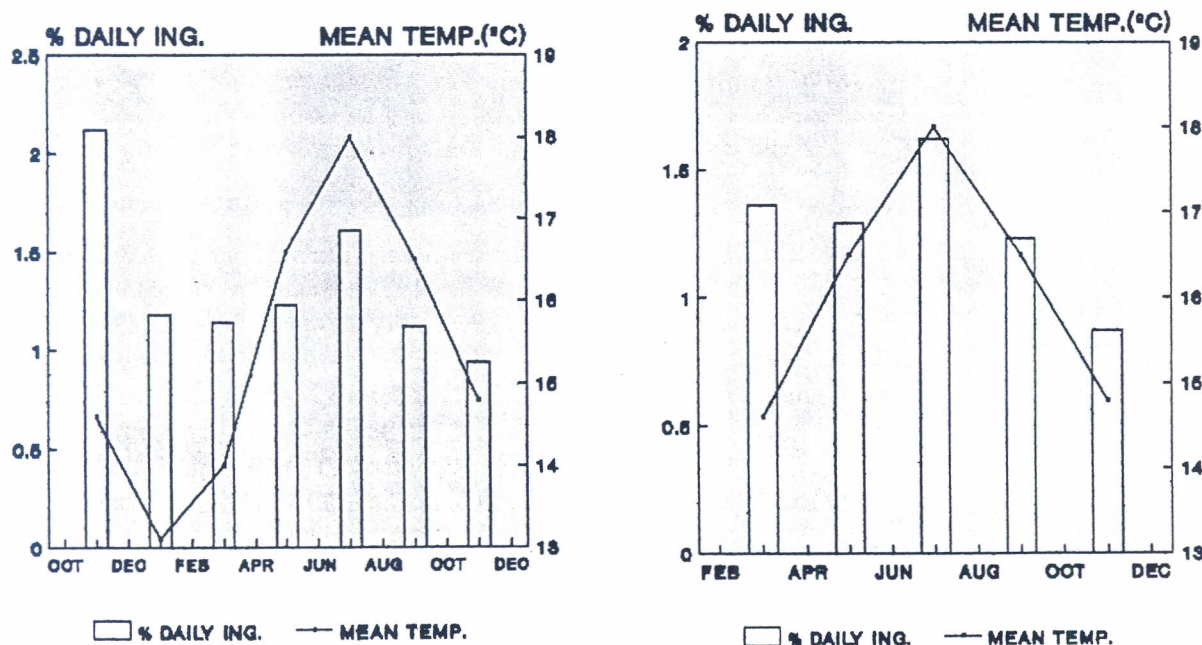


Fig. 2. Relation between daily ingestion and temperature during experiments with groups B-1 and B-2.

### Description of the experiment

Two groups of bream (B-1 and B-2) were individually captured with hooks on the NW coast of Spain at 100 m depth in September and December 1991. Fishing was carried out very slowly to avoid problems associated with decompression. Fish were kept on board in six cylindrical 500 l polyester tanks with open water

circulation. After landing, they were transported in the same tanks by road (2 km) to the laboratory.

In the laboratory, fish were kept in 12 m<sup>3</sup> rectangular tanks with open water circulation at room temperature, and low light to avoid stress. They were immediately treated with a preventive bath of furazolidone (40 g.m<sup>-3</sup>), and the same treatment was repeated every time the fish was handled.

The two groups, B-1 and B-2, composed of 63 and 67 specimen respectively, were sampled for the first time one month after capture, when they were already adapted to captivity. Subsequent sampling was bimonthly to avoid excessive stress, because it was observed that the effect of the anaesthetic together with manipulation, provoked starvation in the fish for the next 2-3 days.

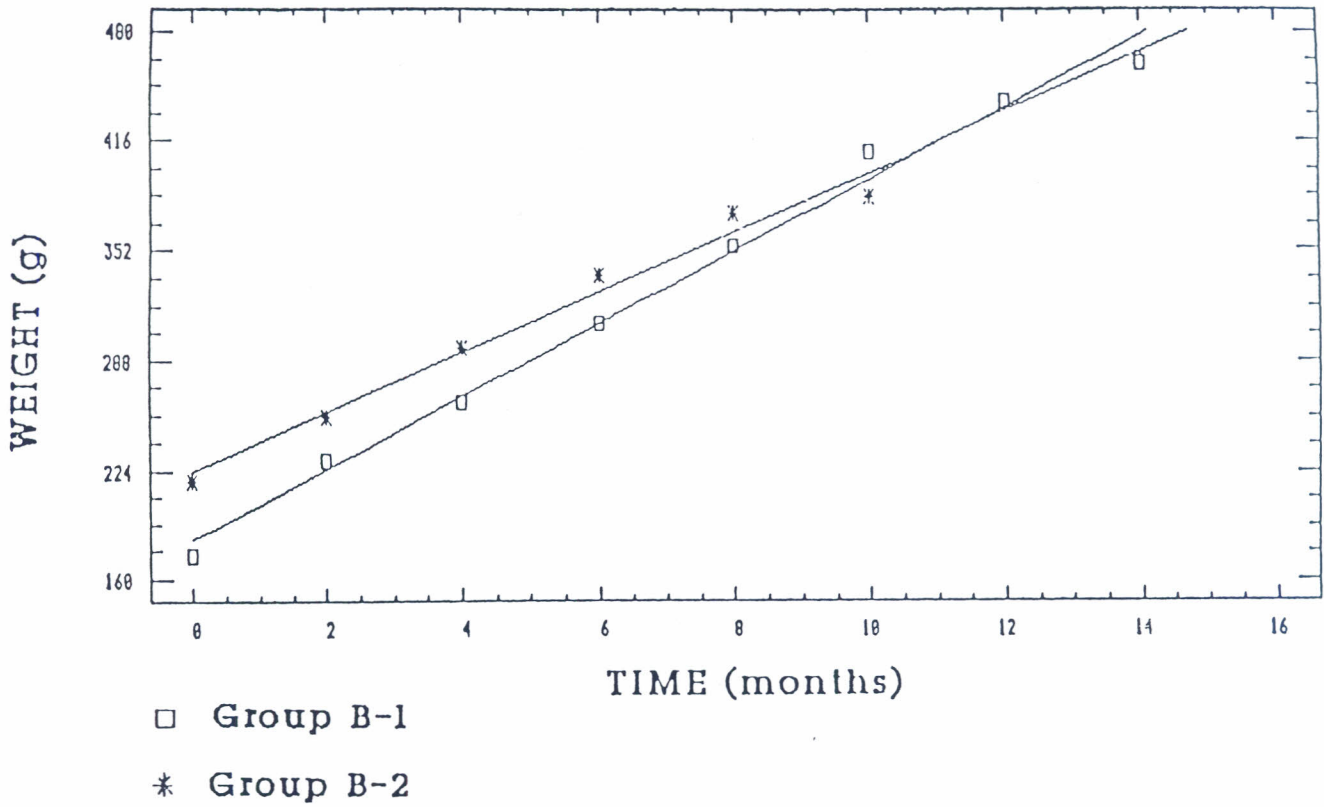


Fig. 3. Growth in mean weight in groups B-1 and B-2.

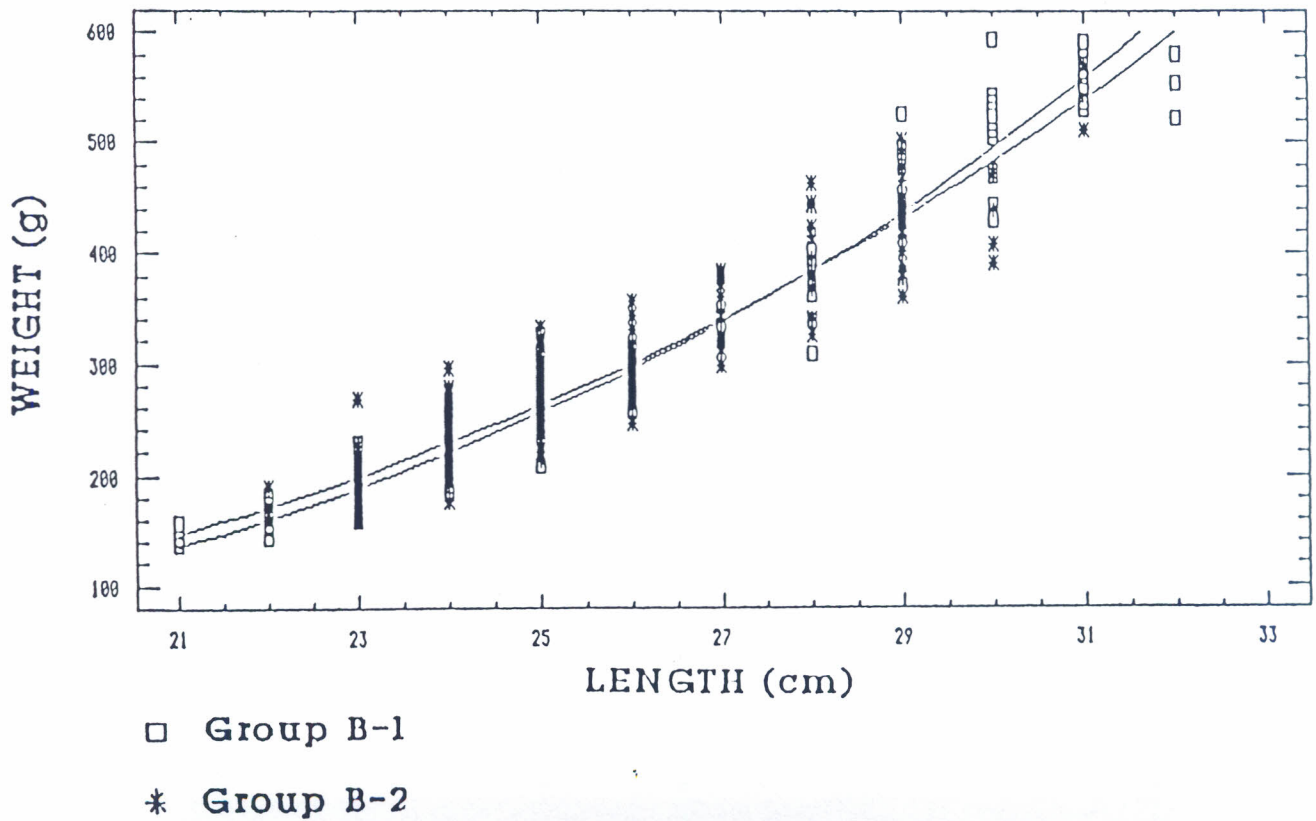


Fig. 4. Relation between length and weight in groups B-1 and B-2.

Food provided to the fish two days after capture was immediately accepted. The food consisted of pellets prepared in the laboratory, with a composition of 32% total protein, 4.8% total fat, and 45.5% humidity and 7.8% ashes.

It was prepared with fish meal (40%), fresh fish (55%) and a vitamin and mineral supplement (5%). Temperature in the tanks and food ingested were recorded daily.

## Results

### Diseases

Very marked exophthalmia in one or both eyes together with darkening of the skin occurred gradually during the experiment. Sick fish were kept apart in 3 m<sup>3</sup> round

tanks where they continued to be fed. Despite their bad sight, feeding proceeded normally, and completely blind fish picked their food from the bottom of the tank.

To reduce the exophthalmia, a puncture under the eye ball was practised, and the air extracted. The normal aspect, but not always the sight, were recovered.

The proportion of fish affected by exophthalmia during the experiment was similar in both groups (B-1 = 4.7%, B-2 = 4.5%), but was higher in group B-1 (11.1%) than in B-2 (0%) during the adaptation period. This may have been due to an improvement in the means of capture.

It was also observed during sampling in October and December 1992 that some specimens appeared with tail damage and loss of appetite. These fish were

subsequently treated with Sulfatrim (Peter Hand Animal Health Ltd). They reacted positively to the treatment and no losses were caused by this infection.

### Mortality

There were no deaths in either group during the adaptation period. During the experiment itself, 9.5% of group B-1 and 4.4% of B-2 died, normally after sampling. This suggests that deaths were due to the stress caused by handling.

### Sexual behaviour

The black-spot sea bream, a protandrous hermaphrodite, reaches sexual maturity when 4-5 years old (22-25 cm) in nature. Sánchez F. (1982) reported herma-

Table 1. Biological measures in experiment B-1.

### GROUP B-1

SAMPLING DATA	MEAN LENGTH (cm)	MEAN WEIGHT (g)	CONDITION FACTOR
15/OCT	22.75±0.699	173.27±14.351	1.47
18/DEC	24.19±0.895	230.64±21.953	1.63
21/FEB	24.98±0.896	264.22±29.640	1.69
22/APR	25.72±0.979	309.53±34.701	1.82
22/JUN	26.54±1.066	353.79±36.796	1.89
26/AUG	26.63±0.871	410.15±40.661	2.16
21/OCT	28.14±1.058	438.52±50.015	1.97
14/DEC	28.34±1.207	461.50±55.483	2.03

SAMPLING PERIOD	CONVERSION INDEX	DAILY GROWTH RATE	% DAILY INGESTION	MEAN TEMP.(°C)
OCT/DEC	4.56	0.4469	2.12	14.6
DEC/FEB	5.39	0.2091	1.18	13.1
FEB/APR	4.22	0.2593	1.14	14.0
APR/JUN	5.50	0.2192	1.23	16.6
JUN/AUG	6.88	0.2274	1.61	18.0
AUG/OCT	9.02	0.1195	1.12	16.5
OCT/DEC	9.68	0.0946	0.94	14.8

Table 2. Biological measures in experiment B-2.

## GROUP B-2

SAMPLING DATA	MEAN LENGTH (cm)	MEAN WEIGHT (g)	CONDITION FACTOR
21/FEB	24.12±1.480	218.00±46.220	1.55
22/APR	24.72±1.314	256.03±45.637	1.69
22/JUN	25.27±1.420	295.93±47.302	1.83
26/AUG	25.40±1.339	337.96±50.049	2.06
21/OCT	27.05±1.302	372.87±53.068	1.88
14/DEC	27.08±1.311	383.33±56.159	1.93

SAMPLING PERIOD	CONVERSION INDEX	DAILY GROWTH RATE	% DAILY INGESTION	MEAN TEMP.(°C)
FEB/APR	5.03	0.2636	1.36	14.6
APR/JUN	5.30	0.2374	1.29	16.5
JUN/AUG	17.65	0.1860	1.62	18.0
AUG/OCT	6.97	0.1968	1.23	16.5
OCT/DEC	16.57	0.0513	0.87	14.8

We may therefore conclude that the black-spot sea bream is a potential candidate for cultivation because:

- It has a high commercial value throughout the year (1500 to 2000 Pts.kg<sup>-1</sup>).
- It has a low mortality rate during the fattening period despite some acclimation problems.
- It adapts well to captivity.
- It grows reasonably well and can be commercialized from 500 g onwards. Since this species readily accepts inert food, future studies should seek a balanced diet that gives higher yields.

This experiment indicates also that it is more convenient to acclimate and fatten juveniles to sexual maturity, than to capture sexually mature individuals, since in the latter mortality is much higher due to the stress of capture at high depth (450 m).

phrodites in the size range 24 to 30 cm. In this experiment, all specimens were hermaphrodites, each gonad had one half as a testicle and the other half as an ovary, but no production of gonad products was seen until sampling in February 1993 (not included in this paper), when functionally differentiated males started to appear (29-30 cm).

### Growth

Growth parameters of the two groups are shown in Tables I and II. It can be seen that in the samplings of both groups from October to December there are considerable variations in conversion indices, growth rates and daily ingestion (Figures 1 and 2) as a consequence of the infections already mentioned. Specimens with damaged tails were not used for the calculations of length:weight ratio. Temperature ranged between 13°C and 18°C during the experiment.

To estimate growth, a linear regression analysis was applied, and the following equations were obtained (Figure 3):

$$\text{Group B-1: } y = 182.708 + 21.607x ; r = 99.5419$$

$$\text{Group B-2: } y = 223.601 + 17.417x ; r = 98.9602$$

For the length:weight ratio, the best fit was given by (Figure 4):

$$\text{Group B-1: } y = 0.002241 \cdot x^{3.618290} ; r = 97.3183$$

$$\text{Group B-2: } y = 0.005880 \cdot x^{3.322754} ; r = 93.0340$$

### Bibliography

- Chereguini O., C.A. Fernández-Pato, and C. Martínez-Tapia. 1990. Growth of wild black-spot sea bream (*Pagellus bogaraveo* B.) from Cantabrian Sea under laboratory conditions. Some interesting parameters. ICES, C.M. 1990/F:32.
- Martínez-Tapia C., C. Fernández-Pato, and O. Chereguini. 1990. Comparative study of larvae survival and growth in sea bream (*Pagellus bogaraveo* B.) using microencapsulated or living-food. ICES, C.M. 1990/F:31.
- Fernández-Pato C.A., C. Fernández-Tapia, O. Chereguini, and García-Banda. 1990. Spawn, hatching, and larvae rearing of black-spot sea bream (*Pagellus bogaraveo*) first experiences in the Oceanographic Center of Santander (Spain) in order to its culture. ICES, C.M. 1990/F:30.
- Sánchez F. Preliminary fishing and biological data about red sea-bream (*Pagellus bogaraveo* B.) in the Cantabrian Sea (N. Spain). ICES, C.M. 1982/G:39.
- Sánchez F. Biología y pesca del besugo (*Pagellus bogaraveo* B.) en las subáreas VI, VII y VIII del ICES. ICES, C.M. 1983/G:38.

