

## GROWTH PERFORMANCE OF *SERIOLA DUMERILI* JUVENILES FED ON DIFFERENT FEEDING FREQUENCIES

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### Introduction

To achieve and increase the profitability of fish commercial culture, it is necessary to establish the feeding strategy (quantity and frequency of feeding) that produces the highest growth rates without compromising fish health and welfare. In this study, different feeding frequencies have been tested in greater amberjack (*Seriola dumerili*) juveniles, evaluating its effect on growth performance.

### Materials and methods

180 *Seriola dumerili* juveniles born in captivity (average weight of  $262.1 \pm 55.5$ g and size  $23.0 \pm 1.7$ cm) were tagged with a passive integrated transponder (PIT) (Jerez *et al.*, 2014) and randomly divided into 12 homogeneous groups of 15 fish each. The groups were maintained in fiberglass tanks (cylindrical  $1\text{m}^3$  and  $4\text{m}^3$  square tanks during the first and second month respectively) with a constant water exchange and aeration, under natural conditions of photoperiod, water salinity (37.5‰) and temperature ( $18.8 \pm 0.4^\circ\text{C}$ ; decreasing from  $19.4^\circ\text{C}$  to  $18.1^\circ\text{C}$  throughout the experiment). Fish were fed a commercial pellet for turbot (3-5 mm diameter; Skretting Ltd, Norway; composition in % dry weight was: 52% crude protein, 20% crude fat, 8.7% ash, 1.7% crude cellulose and 1.4% total phosphorus). The food ration was adjusted to 2.5% of body weight per day. Each three groups were fed at a feeding frequency of either 1, 2, 3 and 7 meals per day, resulting in 4 treatments by triplicate. Feed was supplied daily either at 08:00 h (1 meal/day), 08:00 and 18:30h (2 meals/day), 08:00, 13:30 and 18:30h (3 meals/day) or 08:00, 10:00, 12:00, 13:30, 15:00, 17:00 and 18:30 (7 meals/day). Once a week, feed left uneaten was recovered from the bottom of the tank 30 minutes after its administration to quantify the daily feed intake (FI).

At the beginning (day 0) and at the end of the study (day 60), all fish in each tank were anesthetized with 2-phenoxyethanol, identified according their PIT tag and measured for weight and length. Condition Factor was calculated as  $K = (\text{weight} \cdot \text{size}^{-3}) \cdot 100$ . Specific Growth Rate was calculated as  $\text{SGR} = (\ln \text{final weight} - \ln \text{initial weight}) \cdot \text{days}^{-1} \cdot 100$ . Dead fish during the trial were recorded, measured and observed to check the presence of parasites or other pathologies. The level of parasitization by monogenean was also monitored by dish traps (1.5mm mesh net) placed in the tanks to collect monogenean eggs released by adult parasites (Cejas *et al.*, 2014). Mesh traps were placed every Friday and retired every Monday to count the eggs entangled in the dish traps.

### Results and discussion

Table I shows the biometrical parameters registered at the beginning and at the end of the trial for the different feeding frequencies assayed. At day 0, the 12 fish groups were homogeneous in weight, length and condition factor. Considering all the fish, their weight increased by 19.1% and their length increased by 9.4% during the two months of the trial. At day 60, the SGR tended to increase with the increasing of the feeding frequency, but significant differences were only found between fish groups fed 7 meals per day that showed a higher value than fish groups fed once per day. The condition factor K was also slightly higher in the 7-meals fish groups but without significant differences. On the contrary, the feed intake was significantly lower in the fish groups

fed 7 meals per day respect all the other groups, suggesting a greater feed efficiency for this feeding frequency.

Table I. Weight (g), length (cm), condition factor K ( $\text{g}\cdot\text{cm}^{-3}$ ), specific growth rate SGR ( $\%\cdot\text{day}^{-1}$ ), daily feed intake FI ( $\%\text{biomass}\cdot\text{day}^{-1}$ ) and mortality caused by *Zeuxapta seriolae* Mort.Z (%). Data collected at the beginning and the end of the experiment.

Initial data	1 meal/day	2 meals/day	3 meals/day	7 meals/day
Weight	270.1 ± 53.9	253.4 ± 45.3	262.0 ± 54.9	264.7 ± 67.4
Lenght	23.3 ± 1.6	22.8 ± 1.5	23.1 ± 1.6	23.0 ± 2.0
K	2.12 ± 0.13	2.13 ± 0.13	2.09 ± 0.11	2.14 ± 0.12
Final data	1 meal/day	2 meals/day	3 meals/day	7 meals/day
Weight	322.0 ± 72.2	310.6 ± 50.1	306.5 ± 59.9	311.3 ± 79.1
Lenght	25.5 ± 1.8	25.3 ± 1.4	25.1 ± 1.8	25.0 ± 1.9
K	1.92 ± 0.09	1.91 ± 0.16	1.92 ± 0.12	1.95 ± 0.16
SGR	0.22 ± 0.08 b	0.26 ± 0.09 ab	0.28 ± 0.12 ab	0.32 ± 0.19 a
FI	2.2 ± 0.5 a	2.2 ± 0.7 a	2.1 ± 0.8 a	1.4 ± 0.5 b
Mort.Z	35.7 ± 7.1	26.7 ± 23.1	23.5 ± 11.3 a	22.9 ± 14.8 b

Values are means ± SD (n=3). Different letter indicates significant differences ( $p<0.05$ )

From the 1th to the 4th week of the trial, the presence of eggs of the monogenean *Zeuxapta seriolae* was observed in all tanks, entangled in the dish traps in high quantities. A peak of mortality due to this parasite occurs between the 4th and the 5th week, showing all dead fish an important number of adult worms over their very pale gills. After applying three consecutive formalin baths ( $70\text{cc}\cdot\text{m}^{-3}$ ; 30 minutes) to the tanks, the number of parasite eggs observed on the dish fell sharply after the 5th week to almost disappear and the fish mortality stopped after the 6th week. The weight, length and K of the fish at the beginning of the trial were similar in fish that died due the parasite and fish that survived. Furthermore, no significant differences were found in the level of infestation or mortality between fish tanks fed the different feeding frequencies.

## Conclusions

In general terms, between the feeding frequencies tested here for *Seriola dumerili* juveniles, the better results in growth and feed conversion rates have been obtain with 7 meals per day.

## References

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