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Miguel D Visca Jr

College of Fisheries, Romblon
State University-Santa Fe
Campus, Santa Fe, Romblon,
Philippines

Randy M Gallano

College of Fisheries, Romblon
State University-Santa Fe
Campus, Santa Fe, Romblon,
Philippines

Rick Vincent S Liberato

College of Fisheries, Romblon
State University-Santa Fe
Campus, Santa Fe, Romblon,
Philippines

Rey P Rasgo

College of Fisheries, Romblon
State University-Santa Fe
Campus, Santa Fe, Romblon,
Philippines

Comparative analysis on the growth performance of rabbitfish (*Siganus canaliculatus*) in fixed and floating net cages fed with commercial feeds

Miguel D Visca Jr, Randy M Gallano, Rick Vincent S Liberato and Rey P Rasgo

Abstract

This study determined the growth performance in terms of weight gain, length increment and survival of rabbitfish (*S. canaliculatus*) in fixed and floating net cages fed with commercial pellets. Net cages with a dimension of 2.5m x 2.5m x 3m were utilized and stocked with 50 pieces fingerlings/cage, replicated three times. Average body weight (ABW) and length increment (TBL) were recorded during sampling every fifteen days. The fish were fed three times daily at 5% of the body weight.

Study showed that treatment I (fixed cage) obtained higher ABW and TBL of 60.5 g, 13.54 cm compared to treatment II (floating cage) with 52.67 g, 12.73 cm, respectively. Results showed no significant differences between treatments for sixty days. In terms of survival, data showed that Treatment I obtained 95.33% (SR) while treatment II had 80% but not differ significantly. It is recommended that further study in the same culture system with varying stocking densities and location be conducted to compare the results of this study.

Keywords: Rabbitfish *Siganus canaliculatus*, growth performance, net cages

1. Introduction

Rabbitfishes or siganids belong to the genus *Siganus* of the family Siganidae (Woodland, 1990^[18]). About 15 species are found in Philippine waters (Herre and Montalban, 1928^[5]). Among the rabbitfish species, *Siganus guttatus*, *S. argenteus*, *S. canaliculatus*, *S. javus*, and *S. rivalutus* are good candidates for culture because of their high tolerance to disturbances in environmental conditions, ability to surmount stress, and crowding potential (Carumbana and Luchavez, 1979^[3]; Saoud *et al.*, 2008^[11]; Ayson *et al.*, 2014^[2]).

Siganids are a small family of marine herbivorous are widely-distributed in the Indo-West Pacific region (Woodland, 1983^[17]). Rabbitfishes are considered to be excellent food fish in many parts of the world especially in the eastern Mediterranean and Indo-Pacific regions (Lam, 1973^[8]). They are economically-important and relatively easy to rear, and thus considered suitable for aquaculture (Juario *et al.*, 1984^[7]; Hara *et al.*, 1986^[4]). Siganids are endemic in most countries and *S. canaliculatus* is the most commonly cultured species (SEAFDEC-AQD, 1995^[13]).

In Philippines, rabbitfish is commercially-important aquaculture species contributing 560 MT/year of the total fishery production, in which juveniles account for 60 MT (Soliman *et al.*, 2008^[12]). Moreover, in the province of Romblon siganid culture is not very familiar due to lack of technical know-how in the culture system. This study aims to contribute ideas in siganid culture and maintain the sustainable production in the province.

2. Materials and Methods

2.1 Experimental Fish

A total of 300 siganid (*S. canaliculatus*) fingerlings with an average weight and length of 12.33 g and 7.20 cm, respectively were employed. These were taken from the university mariculture project.

2.2 Experimental Set-up

This study employed two treatments (T₁=Fixed; T₂=Floating Cage) replicated three times with 50 pieces/cage stocking density for 60 days.

Correspondence

Miguel D Visca Jr

College of Fisheries, Romblon
State University-Santa Fe
Campus, Santa Fe, Romblon,
Philippines

Six P.E. (#17) net cages with dimensions 2.5 m x 2.5 m x 3 m were used. The water depth of the cultured area was 2.2 meters during low tide.

2.3 Sampling Design

Ten percent of the population were sampled from each cage for monitoring of weight and length gains using dip net, scale balance (1 kg capacity) and ruler (cm). Sampling was conducted every 15 days interval to adjust feeding rates. The fish were then returned to their respective cages immediately after sampling to avoid stress and mortality. Mortality rate and water parameters were monitored daily.

2.4 Feeding and Monitoring

Commercial feed was given to the experimental fish three times a day (0730 H, 1230 H and 0430 H) through broadcasting method. Feed determination was based on 5% of the total body weight of a stock. Regular inspection of the nets was done to ensure non-escape of fish.

2.5 Data Analysis

Data gathered were analyzed using T-Test.

3. Result and Discussion

The treatment I obtained the higher ABW of 60.5 g compared to treatment II with 52.67 g. The present study further showed that treatment I obtained 5.62 g/week weight gains while treatment II with 4.71 g/week. Result of the study were supported by the findings of Horstman (1975^[6]), Carumbana and Luchavez (1979^[3]), Ponce (1983^[10]), Abalos (2015^[1]). In terms of length increment, treatment I showed better result than treatment II with 13.54 cm and 12.73 cm, respectively. However, no significant differences observed ($P < 0.05$) both in ABW and TBL means throughout the culture period. In the present study, the TBL increased by 5.53 cm to 6.34 cm for two-month culture period, while Carumbana and Luchavez (1979^[3]) obtained a TBL increased from 4.71 cm to 8.72 cm after two months using *S. guttatus*. This might be attributed by the stress caused by water movement.

In 60 days culture, treatment I obtained a survival rate of 95.33% (143 pcs) while treatment II with 80% (120 pcs). But, no significant difference observed. Results of Abalos (2015^[1]) obtained 90-96% SR and Carumbana and Luchavez (1979^[3]) with 80-100% SR. showed the same survival rate obtained by the present study. Culture system in relation to water flow plays an important role in siganid culture. The difference on the growth and survival of the fish might be attributed by flow of water through enclosures that is affected by drag forces exerted by the framework and netting (Wheaton, 1977^[16], Wee, 1979^[15]), swimming behaviour of the culture fish, and movement preference in the culture system (Mukherjee, 1990^[9], Yu, 1979^[14]).

The water quality parameters recorded during the entire culture period were observed to be in the optimum levels and tolerable (Carumbana and Luchavez, 1979^[3]; Abalos, 2015^[1]) by stocked fish. The water salinity ranged from 20.56-34.23 ppt and the water temperature (27.50-30.47 °C), pH (6.7-9.4), and dissolved oxygen (6.7-7.5 ppm).

4. Conclusion and Recommendation

Siganid can be reared in both fixed and floating cages. However, stock in fixed cages obtained better growth performance in terms of body weight and length and survival.

From the results obtained, covering the upper part of the floating net cages to avoid birds attack on the stock especially king fisher is hereby recommended. Further, monitoring and cleaning the nets should be done regularly to maintain the condition of the stock. Finally, it is recommended that further study of the same culture system with different stocking densities, location, and use of formulated diet using alternative protein sources be conducted to compare the results of this study.

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