

Growth, Survival and Feed Conversion Efficiency of Grouper (*Epinephelus* sp.) Fed with Locally Available Feeds

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ABSTRACT

A preliminary study was conducted on the use of locally available cheap protein sources as feeds for grow-out culture of groupers in floating netcages. Feeds used were golden snail, fish waste and trash fish fed *ad libitum* to groupers once every two days.

Results indicated a daily feed consumption of 4.15 to 4.59 percent fish body weight during the culture period. A significantly higher FCE, FCR, biomass, weight gain, and total length were observed among groupers fed with trashfish and fish waste compared to those fed with golden snail feed. A significantly higher length gain was also noted among groupers fed with trashfish.

Both trashfish and fishwaste are recommended as feeds for groupers. Golden snails can be utilized as a feed ingredient but not as a sole protein source.

Keywords: cage culture, Epinephelus sp., grouper, feeds and feeding, trash fish, golden snail, fish waste

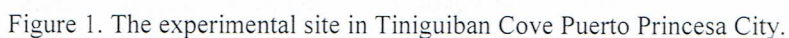
INTRODUCTION

Groupers are popular marine food fishes of high market value in Southeast Asia and they are found to be suitable in intensive cage culture (Chen 1979). Groupers have been farmed in net cages in coastal waters for a long time (Tookwinas 1989) because they are fast growing, euryhaline, hardy and disease resistant (Tamaru 1995). Pascual (1993) stated that groupers comprise about 4.2% of aquaculture fish production in the Philippines in 1991.

The decreasing supply of fish meal concomitant with the rise in price and the increased competition from other livestock feed, manufacturer has made it necessary to seek for an efficient replacement to supply dietary protein in aquaculture feeds (Wee 1991). For some large scale operators, the volume of trashfish needed on daily basis was high and the source becomes a problem (Silapan 1997). The current trend in fish culture is towards the intensification of culture systems whereby provision of feeds becomes necessary.

METHODOLOGY

The study was conducted at the Western Philippines University-Puerto Princesa Campus Fishcage Project at Tiniguiban Cove, Puerto Princesa Bay located at 09°53' to 10°5' N and 118°39' to 119°08' E (Figure 1).



Experimental Treatments

Nine netcages measuring 1.0 x 1.0 x 1.5m made of B-net were prepared and installed into a floating bamboo raft framework. A perimeter net made of Amazon plastic eyerib and sinkers had been provided in every cage.

Three treatments were used in the experiment: Groupers fed with golden apple snails (Treatment I); groupers fed with fish wastes (Treatment II) and groupers feed with trashfish (Treatment III). Each treatment was replicated three times using Complete Randomized Design.

A total of 90 juvenile groupers (*Epinephelus* sp.) ranging from 52 to 76g were conditioned to the new types of feeds for a week. The grouper were then randomly distributed to the nine cages at a stocking density of 10pcs/m³.

Feeds and Feeding

Golden apple snails collected from rice fields were cleaned thoroughly with water before cooking for 15 minutes. Snails were removed from the shell. The visceral parts were separated from the meat before rinsing with water. The snail meat were chopped before feeding.

The fish wastes composed of head, entrails and other internal organs were cleaned several times with water until the unpleasant odor was removed. These were then chopped prior to feeding.

Likewise, fresh trashfish caught from beach seine and lift net operated near the study site were chopped prior to feeding.

Experimental groupers were feed to satiation between 6-9 am or 3-5 pm once every two days. The feeds left in feeding trays were weighed and recorded to determine the amount of feeds consumed.

Fish Sampling

Groupers were sampled individually every month for three months to determine weight and length increase using a Yamato weighing scale and measuring board, respectively.

Data Analysis

Data were analyzed using Analysis of Variance (ANOVA).

RESULTS AND DISCUSSION

Table 1 shows the differences between variables measured for groupers fed with golden snail, fish waste and trash fish. The data revealed that the total feeds consumed were significantly higher for trashfish and fish waste compared to golden snail. Likewise, the feed conversion efficiency and feed conversion ratio of groupers fed with trashfish and fish wastes were significantly higher as compared to groupers fed with golden snails.

In terms of growth, groupers with an initial average body weight of 60.37-68.13 grams grew to a final average body weight of 194.54-272.17 grams after 93 days of culture. The final body weight and weight gain of fish fed with fish wastes and trashfish are significantly higher compared to groupers fed with golden snails (Figure 2). The same trend was observed in the final total length wherein fish fed with fish wastes and trashfish are significantly bigger than those fed with golden snails. In terms of length gain, those fed with trashfish has significantly higher length increment compared to fish fed with fish waste and golden snails. The biomass of groupers fed with trashfish was not significantly different from groupers fed with fish wastes but it is significantly different when compared to groupers fed with golden snails. Daily feed consumption of groupers observed during the culture period ranged from 4.15-4.59%.

No significant difference between treatments was observed on the specific growth rate, condition factor and survival rate.

Cost and return analysis indicated the profitability of the grouper culture in netcages using trashfish and fishwaste (Table 2).

Recommendation

Based on the above findings, the culture of groupers floating netcages fed with fish wastes and trashfish is more feasible compared to groupers fed with golden snails. A longer feeding experiment however is recommended to validate the results.

Table 1. Total Feed Consumed (TFC), Feed Conversion Efficiency (FCE), Feed Conversion Ratio (FCR), final body weight (FBW), weight gain (WG), final total length (FTL), length gain (LG), condition factor (K), specific growth rate (SGR), biomass and survival of groupers fed with locally available cheap protein feeds.

	Golden Snail	Fish wastes	Trash fish
TFC (g)	15,652.5 ^b	19,125 ^a	19,217 ^a
FCE (%)	20.620.56 ^b	30.94 ± 3.56 ^a	32.80 ± 4.46 ^a
FCR	4.85±0.13 ^b	3.26 ± 0.42 ^a	3.09 ± 0.45 ^a
FBW (g)	194.54±1.77 ^b	261.22±28.77 ^a	272.17±17.25 ^a
WG (g)	133.54 ^b	200.85 ^a	204.03 ^a
FTL (cm)	20.96±3.02 ^b	23.39±2.17 ^a	24.12±1.88 ^a
LG (cm)	4.48 ^a	8.10 ^b	4.29 ^a
K	2.11±0.02 ^a	2.03±0.02 ^a	1.94±0.08 ^a
SGR (%g/day)	1.25±0.12 ^a	1.57±0.05 ^a	1.49±0.14 ^a
Biomass (g/m ³)	1,815±217.03 ^b	2,418±144.70 ^a	2,721±172.51 ^a
Survival rate (%)	93.33 ^a	93.33 ^a	100 ^a

*mean values followed with similar superscripts are not significantly different at 0.05 level of significance.

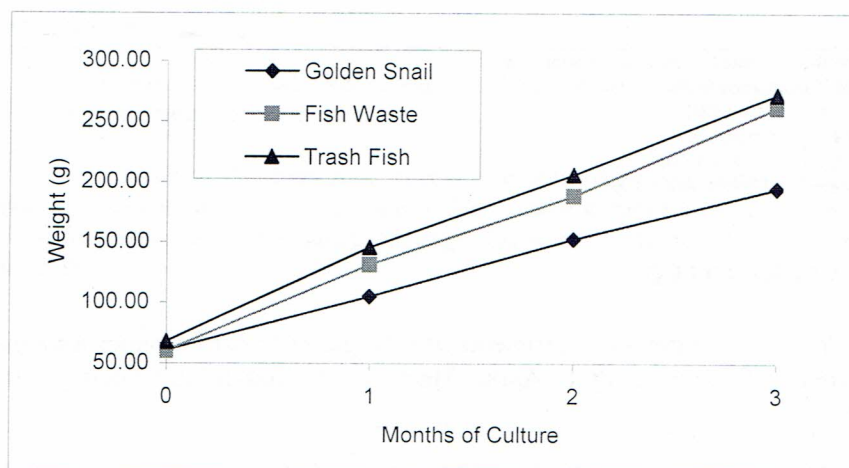


Figure 2. Growth trend of groupers in floating netcages fed with golden snail, fish waste and trash fish.

Table 2. Cost and return analysis of groupers in floating netcages fed with locally available cheap protein feeds.

	Treatments		
	Golden Snail	Fish Waste	Trash Fish
Gross Income			
Biomass (kg) ^a	41.85	41.85	45.00
Price (kg/pc)	400.00	400.00	400.00
Gross Sales (P)	16,740.00	16,740.00	18,000.00
Expenses			
Feeds (P) ^b	1,623.76	2,046.45	2,502.00
Labor & marketing (5% gross)	837.00	837.00	900.00
Depreciation (P) ^c	6,637.57	5,041.19	4,856.35
Total Expenses	10,898.33	9,724.64	10,058.35
Net income ^d	5,841.67	7,015.36	7,941.65
Net profit margin ^e	34.90	41.91	44.12
ROI ^f	25.37	32.10	35.79

a. Based on the computed weight-day relationship.

b. Based on the obtained FCR.

c. Adopted from Palao (2001).

d. Gross sale-Total expenses

e. Net income/Gross sales x 100

f. Net income/Total investment x 100

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