

Evaluation of Rabbitfish as a Culture Species in Ocean Cages at Hainan, China

Results of ASA/China 2004 Feeding Trial 35-04-106

Michael C. Cremer, Hsiang Pin Lan and Jim Zhang
American Soybean Association
Room 902, China World Tower 2
No. 1 Jianguomenwai Avenue
Beijing 100004, P.R. China

ABSTRACT

Rabbitfish (*Siganus canaliculatus*) growth performance and feeding behavior in coastal cages was evaluated using the ASA LVHD cage production model and ASA extruded, marine fish feeds. Rabbitfish collected from the wild in Xincun Bay were stocked in three, 8.0-m³ cages at a density of 250 fish per m³ (2,000 fish per cage) to evaluate their feeding behavior on extruded pellets and/or their grazing behavior on cage bio-fouling. Juvenile rabbitfish were fed to satiation twice daily with a 47% crude protein and 15% crude fat feed (47/15) to fish size 25 g, and twice daily with a 43% crude protein and 12% crude fat feed (43/12) from fish size >25 g. Both feeds were fed in extruded, floating pellet form. Rabbitfish grew from 13 g to 181 g in 89 days of feeding. Average FCR with the combination of 47/15 and 43/12 feeds was 2.05:1. Rabbitfish survival was 41.5%.

Rabbitfish did not feed aggressively on feed. Fish consumed small quantities of feed, but appeared to browse on bio-fouling organisms on the cage nets more than on feed. Rabbitfish were able to moderately control bio-fouling on the inside of the 8-m³ cages. Cleaning of nets was still required on a monthly basis, but the nets were cleaned only to ensure sufficient water exchange. Results of the trial indicate that rabbitfish may have value as a service species in marine cages based on their ability to graze on net bio-fouling organisms. The non-aggressive feeding behavior of rabbitfish on extruded pellets indicates they would not be significant competitors to a primary species in ocean cages.

INTRODUCTION

The American Soybean Association (ASA), in cooperation with Mr. Liang Xing Xui of Cage Farm No. 0601 in Xincun Bay, Ling Shui, Hainan, conducted a cage feeding trial in 2004 to determine the suitability of rabbitfish (*Siganus canaliculatus*) as a candidate species for culture in ocean cages, either as a fed species or as a service species for controlling cage bio-fouling.

MATERIALS AND METHODS

Three, 8.0-m³ cages at Cage Farm No. 0601 in Xincun Bay at Ling Shui, Hainan Province, were used for the trial. Cages were constructed of nylon mesh netting with a rigid top frame, opaque covers and a feed enclosure to contain floating, extruded feed pellets. Cages were arranged on the perimeter of the farm with a minimum of two meters of open water on all sides of each cage to facilitate water exchange.

Wild rabbitfish juveniles were caught in Xincun Bay by the cooperator from mid-June through mid-July. Fish size varied and required grading. Juvenile rabbitfish of average size 13.4 g were stocked in the three trial cages on 19 July at a density of 250 fish per m³ (2,000 fish per cage).

Fish in all cages were fed the ASA 47/15 (47% crude protein and 15% crude fat) marine fingerling feed in extruded, floating pellet form from fish size 13 g to fish size 25 g (Table 1). When fish reached size 25 g, they were weaned to the ASA 43/12 (43% crude protein and 12% crude fat) marine growout feed (Table 2). The 43/12 growout feed was formulated with 32% dehulled soybean meal, as a partial replacement for fish meal, to reduce feed cost. Both feeds were formulated by ASA and produced by the Fwusow aquafeed mill in Xiamen, Fujian Province. Rabbitfish were fed to satiation twice daily. Fish in all cages were fed identically at each feeding.

Trial management was based on the ASA LVHD cage production model. Fish in all cages were sampled once per month on approximately the same date each month. All cages were harvested at the conclusion of the trial to determine average fish weight, gross and net production, feed conversion ratio (FCR) and survival. Production input costs were recorded throughout the trial and net income and ROI were calculated at the end of the trial.

RESULTS

Rabbitfish were fed 89 days between 19 July and 16 October 2004. Rabbitfish grew from an average weight of 13.4 g to an average weight of 181.3 g during this period (Table 3). Gross fish production per m³ of cage volume at harvest averaged 18.8 kg. Average FCR

ASA FY04 Hainan Rabbitfish Trial

with the combination of 47/15 and 43/12 feeds was 2.059:1. Average fish survival was 41.5%.

SUMMARY AND CONCLUSIONS

Rabbitfish were not aggressive feeders on the extruded feeds. Fish consumed small quantities of feed, but appeared to browse on bio-fouling organisms on the cage nets more than on feed. Rabbitfish were able to moderately control bio-fouling on the inside of the 8-m³ cages. Cleaning of nets was still required on a monthly basis, but the nets were cleaned only to ensure sufficient water exchange. Results of the trial indicate that rabbitfish may have value as a service species in marine cages based on their ability to graze on net bio-fouling organisms. The non-aggressive feeding behavior of rabbitfish on extruded pellets indicates they would not be significant competitors to a primary species in ocean cages.

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ASA FY04 Hainan Rabbitfish Trial

Table 1. Formula for the ASA 47/15 marine fingerling feed used in the 2004 rabbitfish trial conducted in Xincun Bay at Ling Shui, Hainan Province, China.¹

Ingredient	Percentage of feed
Fishmeal 68/10	52.50
Wheat flour	19.70
Wheat gluten meal	10.00
Fish Oil, Unspecified PV=10<20	10.00
Soybean Meal	6.00
Soy lecithin	1.00
Vit PMX F2	0.50
Min PMX T&S 1	0.25
Stable Vit C35	0.03
Ethoxyquin 66	0.02
TOTAL	100.00

¹The numerical component of the feed description refers to the percentage of protein and fat, respectively, in the ration, i.e. 47/15 indicates 47% crude protein and 15% crude fat.

ASA FY04 Hainan Rabbitfish Trial

Table 2. Formula for the ASA 43/12 marine fish growout feed used in the 2004 rabbitfish trial conducted in Xincun Bay at Ling Shui, Hainan Province, China.¹

Ingredient	Percentage of feed
Fishmeal 68/10	40.00
Soybean Meal 44	32.00
Wheat Flour	17.25
Fish Oil, Unspec.	6.95
Corn Gluten Meal	2.00
Soy lecithin	1.00
Vit PMX F-2	0.50
Min PMX F-1	0.25
Stable Vitamin C35	0.03
Ethoxyquin	0.02
TOTAL	100.00

¹The numerical component of the feed description refers to the percentage of protein and fat, respectively, in the ration, i.e. 43/12 indicates 43% crude protein and 12% crude fat.

ASA FY04 Hainan Rabbitfish Trial

Table 3. Results of the 2004 coastal cage trial that evaluated rabbitfish growth performance in 8.0-m³ cages at Xincun Bay, Ling Shui, Hainan Province, China.

Cage No.	Stocking rate (fish/m ³)	Initial fish weight (g)	No. days fed	Fish harvest weight (g)	Survival (%)	P _G ¹ (kg/m ³)	FCR
1	250	14.0	89	178.8	42.8	19.1	2.03:1
2	250	12.5	89	184.8	40.2	18.6	2.05:1
3	250	13.8	89	180.5	41.6	18.8	2.07:1
Mean	250	13.4	89	181.3	41.5	18.8	2.05:1

¹ P_G = Gross Production, expressed as fish weight per cubic meter of cage volume