

# **Cage Production of Red-Purple Snapper Weaned from Trash Fish to Extruded Feed in Shenzhen, China**

## **Results of ASA/China Feeding Trial 35-01-130**

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### **ABSTRACT**

Weaning of sub-market size snapper (*Lutjanus sp.*), locally known as red-purple snapper, from trash fish to extruded feed, followed by growout to market size on extruded feed, was demonstrated in an ASA cage trial conducted in Dong Shan Bay, Long Gang, Shenzhen. Snapper that had previously been fed with trash fish were stocked in three, 4.5-m<sup>3</sup> cages at a density of 150 fish per m<sup>3</sup> and weaned from trash fish to extruded feed over a period of one week. After weaning to extruded feed, snapper were fed to satiation twice daily with a 43/12 extruded, floating feed. Snapper grew from 233 g to 522 g in 118 days on the ASA feed, with an average FCR of 1.96:1. Average fish carrying capacity at harvest was 55.8 kg/m<sup>3</sup> of cage. The average snapper survival rate was 71.3%. The approximately 29% mortality rate was attributed to fish injuries sustained during a series of typhoons in June and July. Net economic return and return on investment for the trial were RMB 727/m<sup>3</sup> and 48.5%, respectively. Results of the trial demonstrated that *Lutjanus sp.* snapper could be successfully weaned from trash fish to extruded feed at a large size. Cage production of snapper was demonstrated to be technically and economically feasible with the ASA extruded feed under proper environmental conditions. The ASA 43/12 marine fish feed is formulated with 35% dehulled soybean as a partial replacement for fishmeal. The dehulled soybean meal inclusion rate is 35% by weight. Despite a significant fish mortality rate, snapper yielded a 48.5% return to investment in this trial.

### **INTRODUCTION**

The American Soybean Association (ASA), in cooperation with the Long Gang Fisheries Research Institute of Shenzhen, Guangdong Province, conducted a cage feeding trial with a local snapper species in 2001 in Dong Shan Bay at Nan Ao, Long Gang, Shenzhen. The objective of the trial was to demonstrate the feasibility of weaning sub-market size snapper from trash fish to extruded aquafeed and completing the culture of the snapper to market size with the extruded feed.

### **MATERIALS AND METHODS**

Three, 4.5-m<sup>3</sup> cages at the Long Gang Fisheries Research Institute cage fish farm at Dong Shan Bay, Long Gang City, Shenzhen were used for the trial. Cages were constructed of nylon mesh

netting with a rigid frame, opaque cover and feed enclosure to contain extruded, floating feed pellets. The three cages were positioned in a single row on the outside edge of the farm, with a minimum of one cage width between and on all sides of each cage to allow good water exchange.

The three trial cages were stocked in late May with sub-market size red-purple snapper (*Lutjanus* sp.) at a density of 150 fish per m<sup>3</sup>. The snapper had previously only been fed trash fish. The snapper were weaned over a one-week period from trash fish to the ASA 43/12 marine fish growout feed. The ASA 43/12 feed is a 43% crude protein and 12% crude fat ration that is formulated with 35% soybean meal to reduce feed cost (Table 1). It was fed to the snapper in an extruded, floating pellet form. The Shanghai DaJiang aquafeed mill produced the feed. Weaning was accomplished by replacing a portion of the trash fish each day with extruded feed until the snapper were consuming 100% extruded feed. The trial was started after weaning to extruded feed was completed. During the trial the snapper in all trial cages were fed to satiation twice daily with the extruded feed. Fish in all trial 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 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 costs were recorded throughout the trial to permit calculation of net economic return and return to investment (ROI) at the end of the trial.

## RESULTS

Snapper were fed for 118 days between 30 May and 25 September 2001. Snapper grew from 233 g to 522 g during this feed period (Table 2). Fish survival in the three trial cages averaged 71.3%. Overall FCR was 1.96:1. FCR adjusted for surviving fish only was 1.43:1. Average snapper carrying capacity at harvest was 55.8 kg/m<sup>3</sup>.

Feed cost per kilogram of fish growth for snapper was approximately RMB 6.68. Average market price for snapper was RMB 40/kg. Net economic return and return on investment (ROI) averaged RMB 727/m<sup>3</sup> and 48.5%, respectively.

## SUMMARY AND CONCLUSIONS

The trial demonstrated that sub-market size *Lutjanus* sp. snapper could be successfully weaned from trash fish to extruded feed and cultured to market size with the manufactured feed. Snapper exhibited acceptable growth performance and FCR, but fish survival was low due to damage to the cages and injury to the fish caused by a series of typhoons. Results of the trial indicate that cage production of snapper is technically and economically feasible with the ASA extruded feed under proper environmental conditions. Despite a 29% mortality rate, snapper yielded a 48.5% return to investment in this trial. Feed cost per kilogram of snapper growth was less than RMB 7 with the ASA 43/12 feed, and was significantly less than the cost of production with trash fish. This snapper species appears to be a promising species for culture in coastal cages. ASA recommends continued feeding trials with this snapper species to quantify production performance in LVHD cages.

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### Chinese Currency and Production Unit Conversions:

RMB 8.26 = US\$1.00

1.0 kg = 2.2 lb

Table 1. Formula for the ASA 43/12 marine fish growout feed used in the 2001 snapper trial conducted at Dong Shan Bay, Shenzhen, Guangdong Province, China.

Ingredient	Percentage of feed
Soybean Meal 43	35.00
Fishmeal, anchovy 63/6.5	37.00
Wheat Flour 10	14.20
Wheat Gluten	4.60
Fish Oil, Unspec.	8.40
Vit PMX	0.50
Min PMX	0.25
Stable Vitamin C35	0.03
Ethoxyquin	0.02
TOTAL	100.00

<sup>1</sup>The 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.

Table 2. Results of the 2001 ASA aquaculture trial at Dong Shan Bay, Shenzhen, Guangdong Province, that demonstrated weaning of *Lutjanus sp.* snapper from trash fish to extruded feed, followed by growout to market size in 4.5-m<sup>3</sup> cages using the ASA LVHD cage production model and ASA extruded aquafeed.

Cage No.	Feeds	Stocking rate (fish/m <sup>3</sup> )	Initial fish weight (g)	No. days fed	Fish harvest weight (g)	Survival (%)	P <sub>G</sub> <sup>1</sup> (kg/m <sup>3</sup> )	FCR	Net income (RMB/m <sup>3</sup> )	ROI (%)
1	43/12	150	234	118	527	72.2	57.0	1.87:1	776.4	51.6
2	43/12	150	223	118	514	68.7	52.9	2.09:1	614.2	40.9
3	43/12	150	242	118	527	72.9	57.6	1.92:1	789.6	53.1
Mean	43/12	150	233	118	522	71.3	55.8	1.96:1 <sup>2</sup>	726.7	48.5

<sup>1</sup> P<sub>G</sub> = Gross Production, expressed as fish weight per cubic meter of cage

<sup>2</sup> FCR adjusted for dead fish was approximately 1.43:1