

# **Growth Performance of Emperor Snapper Fed Soy-Inclusion, Extruded Feed in Coastal Cages at Hainan, China**

## **Results of ASA/China Feeding Trial 35-02-124**

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### **ABSTRACT**

Emperor snapper (*Lutjanus sebae*) growth performance in coastal cages was evaluated from fingerling to sub-market size using the ASA LVHD cage production model and ASA soy-inclusion, extruded marine fish feeds. The cage trial was conducted at Ling Shui, Hainan, China. Snapper were stocked in three, 8.0-m<sup>3</sup> cages at a density of 2,000 fish per cage (250 fish/m<sup>3</sup>). Snapper were fed to satiation daily with a 47% crude protein and 15% crude fat feed (47/15) to fish size 25 g, and 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. Fish in all trial cages were fed to satiation, three times daily for the first month, and twice daily thereafter. Pompano grew from 1.4 g to 77 g in 124 days of feeding. Average FCR with the combination of 47/15 and 43/12 feeds was 1.76:1. Average fish survival was 81%. Fish in one of the three trial cages were lost when raft supports were destroyed in a typhoon and the cage submerged, allowing the fish to escape. Results of the trial indicate that emperor snapper perform well on extruded feed. Growth performance and FCR were acceptable, but high cost of juvenile fish (RMB 2.3 per 1-g fish) resulted in net economic loss. Emperor snapper exhibited good potential for LVHD cage culture, but production will depend on availability of lower cost and higher quality fish.

### **INTRODUCTION**

The American Soybean Association (ASA), in cooperation with Mr. Liang Xing Xui of Cage Farm No. 0601, Ling Shui, Hainan and the Hainan Provincial Fisheries Extension Station, conducted a cage feeding trial with emperor (*Lutjanus sebae*) in 2002. The objective of the trial was to evaluate emperor snapper growth performance and economic return from fingerling to sub-market stages using the ASA LVHD cage production model and ASA soy-inclusion, extruded marine fish feeds.

### **MATERIALS AND METHODS**

Three, 8.0-m<sup>3</sup> cages at Cage Farm No. 0601 in the 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. The cages were stocked in late June with emperor snapper at a density of 250 fish per m<sup>3</sup> and the trial commenced on June 29.

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 1.4 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 35% dehulled soybean meal, as a partial replacement for fish meal, to reduce feed cost. Both feeds were formulated by ASA and produced by the Shanghai DaJiang aquafeed mill. Snapper were fed to satiation three times daily for the first month, and twice daily thereafter. 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.

## **RESULTS**

Emperor snapper were fed for 144 days between 29 June and 31 October 2002. Snapper grew from 1.4 g to an average weight of 77 g in the 124-day feeding period (Figure 1; Table 3). Average FCR with the combination of 47/15 and 43/12 feeds was 1.76:1 for pompano in two of the three replicate cages. Fish in one of the three trial cages were lost when raft supports were destroyed in a typhoon and the cage submerged, allowing the fish to escape. Average fish survival in the two remaining cages was 80.7%. Carrying capacity at harvest averaged 15.5 kg of snapper per m<sup>3</sup> (124 kg/cage) for the two cages (Table 3).

Net income and return on investment (ROI) were both negative for the trial. Net income averaged -RMB 174/m<sup>3</sup> and -22%, respectively, at a market price of RMB 40/kg for the sub-market size snapper (Table 3).

## **SUMMARY AND CONCLUSIONS**

Emperor snapper growth performance and FCR were acceptable in the trial, but the high cost of juvenile fish (RMB 2.3 per 1-g fish) resulted in a net economic loss. Emperor snapper exhibited good potential for LVHD cage culture, but production will depend on availability of lower cost and higher quality juvenile fish.

The trial cooperator reported emperor snapper quality was poor in 2002, compared to 2001. Emperor snapper juveniles for the 2002 trial were obtained at the end of the breeding season (mid-June), and the cooperator felt the quality of the fish was substandard. Emperor snapper exhibited dermal ulcerations and hemorrhaging that may have been related to poor stock quality and/or declining water quality in Xinchun Bay.

At present, poor availability and high cost of juveniles limit production of emperor snapper in the Hainan area. However, emperor snapper were judged to be a promising cage culture species, and additional feeding trials are recommended to determine optimum fish stocking density and fish growth performance with this species. Juvenile fish should be obtained in May, with particular attention paid to stock quality.

High feed shipping costs and management of feed shipments from Shanghai limit feed availability to most farmers in the Hainan region. Local production of ASA feeds is recommended to improve feed availability and reduce feed cost for Hainan marine fish producers.

### ACKNOWLEDGEMENTS

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### Chinese Currency and Production Unit Conversions:

RMB 8.26 = US\$1.00

1.0 kg = 2.2 lb

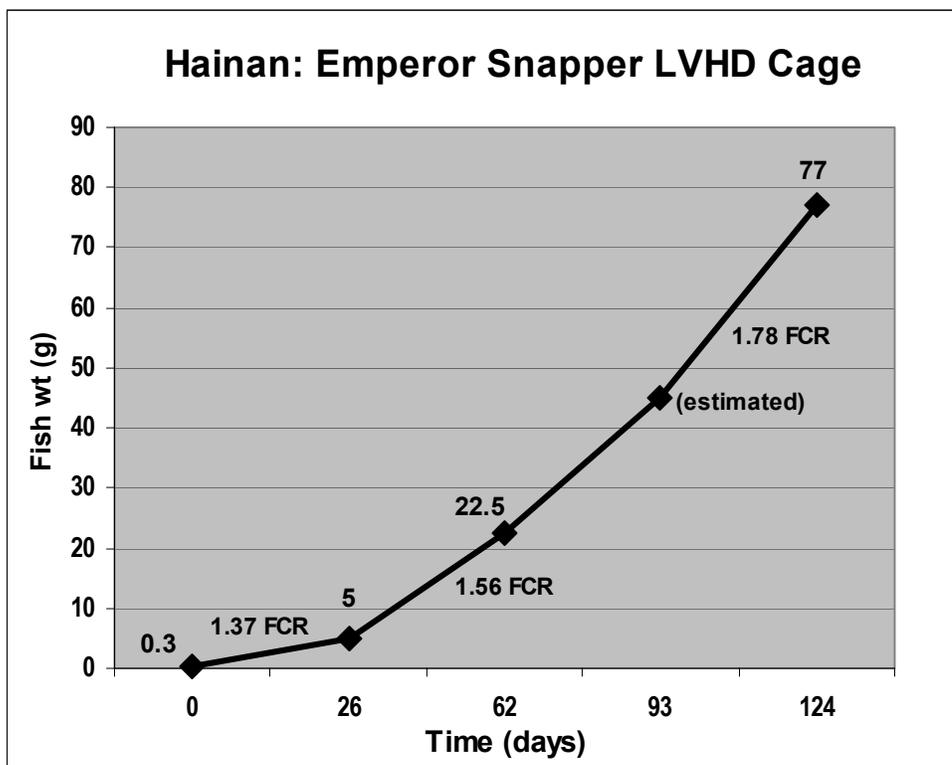


FIGURE 1. Growth curve for emperor snapper fed ASA extruded feeds in a cage production trial conducted at Ling Shui, Hainan, China. Snapper exhibited good growth performance and acceptable FCR when fed extruded aquafeeds, but high cost and poor quality of juvenile fish currently limit production in the Hainan area. Dehulled soybean meal was used as a partial replacement for fishmeal in the ASA feeds to reduce feed cost.

Table 1. Formula for the ASA 47/15 marine fingerling feed used in the 2002 emperor snapper trial conducted at Ling Shui, Hainan Province, China.<sup>1</sup>

Ingredient	Percentage of feed
Fishmeal, anchovy 67/7-8	48.70
Wheat flour 10	20.00
Soybean Meal	10.00
Wheat gluten 68	10.00
Fish Oil, Unspecified PV=10<20	10.50
Min PMX T&S 1	0.25
Vit PMX F2	0.50
Stable Vit C35	0.03
Ethoxyquin 66	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. 47/15 indicates 47% crude protein and 15% crude fat.

Table 2. Formula for the ASA 43/12 marine fish growout feed used in the 2002 emperor snapper trial conducted at Ling Shui, Hainan Province, China.<sup>1</sup>

Ingredient	Percentage of feed
Soybean Meal	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 3. Results of the 2002 ASA aquaculture trial that evaluated emperor snapper growth performance in 8.0-m<sup>3</sup> cages with 47/15 and 43/12 extruded aquafeeds at Ling Shui, Hainan Province, China.

Cage No.	Feeds <sup>1</sup>	Stocking rate (fish/m <sup>3</sup> )	Initial fish weight (g)	No. days fed	Fish harvest weight (g)	Survival (%)	P <sub>G</sub> <sup>2</sup> (kg/m <sup>3</sup> )	FCR
1	ASA	250	1.3	Lost in typhoon				
2	ASA	250	1.3	124	79.6	75.1	14.9	1.82:1
3	ASA	250	1.5	124	74.4	86.4	16.1	1.69:1
Mean	ASA	250	1.4	124	77.0	80.7	15.5	1.76:1

<sup>1</sup> Snapper were fed a combination of the ASA 47/15 marine fingerling and 43/12 marine growout feeds in extruded, floating pellet form

<sup>2</sup> P<sub>G</sub> = Gross Production, expressed as fish weight per cubic meter of cage