

# **Growth Performance of Japanese Sea Bass Fed Extruded Feed and Fresh Fish Rations in A Cage Trial at Ningbo, China**

## **Results of ASA/China Feeding Trial 35-00-126**

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### **ABSTRACT**

Japanese sea bass (*Lateolabrax japonicus*) growth in cages was evaluated from fingerling to sub-market size with extruded pellet and fresh fish rations in an ASA feeding trial at Xiangshan, Ningbo along the coast of Zhejiang Province, China. The extruded feed was a soymeal-based ration containing 43% crude protein and 12% fat and fed in extruded, floating pellet form. Fresh fish was fed in chopped form. Sea bass fingerlings were stocked in 8.0-m<sup>3</sup> cages at 200 fish per m<sup>3</sup>. Sea bass grew from 10.6 g to 178.3 g in 102 days on the ASA extruded feed, with an FRC of 1.82:1, and from 11.0 g to 178.3 g in 102 days on the fresh fish ration, with an FCR of 6.78:1. Gross production averaged 31 kg/m<sup>3</sup> with the extruded feed and 29.6 kg/m<sup>3</sup> with the fresh fish ration. Net income and ROI were RMB 478/m<sup>3</sup> and 62.7%, respectively, for sea bass fed the extruded ASA feed, and RMB 341/m<sup>3</sup> and 40.4% for sea bass fed the fresh fish diet. Feed cost per kilogram of fish growth was RMB 9.46 with the ASA feed and RMB 14.92 with the fresh fish diet. Results demonstrated a 40% higher net income, 55% higher ROI, and 37% lower feed cost with the soymeal-based extruded feed than with a traditional fresh fish diet. The added benefits of quality consistency, less nutrient loading of the aquatic environment, ease in shipping and storing, and absence of potential pathogens make manufactured feed a better choice than fresh fish for feeding Japanese sea bass.

### **INTRODUCTION**

The American Soybean Association (ASA), in cooperation with the Ningbo Municipal Fisheries Bureau and the National Fisheries Extension Center in Beijing, conducted a feeding trial to evaluate Japanese sea bass (*Lateolabrax japonicus*) growth in cages using ASA LVHD technology and manufactured feeds. The objective of the trial was to compare sea bass growth and economic performance with an extruded, soy-based feed and a traditional fresh fish diet.

### **MATERIALS AND METHODS**

Six, 8.0-m<sup>3</sup> cages (2 m x 2 m x 2 m) in the vicinity of the Ningbo Haiwan Aqua Stock Breeding Center, Xiangshan County, Ningbo, Zhejiang Province, were used for the trial. Cages were constructed of mesh netting with a rigid top frame and opaque covers. Three of the cages were fitted with feed enclosures to contain floating feed pellets.

Cages were stocked with sea bass fingerlings of size 10.6-11.0 g. Sea bass were stocked in cages at a density of 200 fish per m<sup>3</sup>.

Sea bass fingerlings in three of the cages were fed chopped, wild caught fresh fish. Fish in the other three cages were fed the ASA 43/12 marine feed in extruded, floating pellet form (Table 1). Fish in all cages were fed to satiation twice daily. Fish in replicate cages of each feed treatment were fed identically. Feed treatment replications were randomly assigned to the six trial cages.

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 input costs were recorded throughout the trial and net income and return on investment (ROI) calculated at the end of the trial.

## **RESULTS**

Sea bass were fed for 102 days between 3 July and 15 October 2000. Sea bass fed the ASA extruded feed grew from 10.6 g to 178.3 g with an FCR of 1.82:1 (Figure 1; Table 2). Sea bass fed fresh fish grew from 11.0 g to 178.3 g with an FCR of 6.78:1 (Figure 1: Table 2). Gross and net production were 31.0 kg/m<sup>3</sup> and 28.9 kg/m<sup>3</sup>, respectively, for sea bass fed extruded feed, and 29.6 kg/m<sup>3</sup> and 27.4 kg/m<sup>3</sup> for sea bass fed fresh fish. Average fish survival was 88.2% in the extruded feed treatment and 83.3% in the fresh fish diet treatment (Table 2), and was significantly different (P<0.05).

Net income and ROI were RMB 478/m<sup>3</sup> and 62.7%, respectively, for sea bass fed extruded feed, and RMB 341/m<sup>3</sup> and 40.4% for sea bass fed fresh fish (Table 2). Net income and ROI were 40% and 55% higher, respectively, for sea bass fed extruded feed than for sea bass fed the fresh fish ration.

Feed cost per kilogram of fish growth was RMB 9.46 with the extruded feed, and RMB 14.92 with the fresh fish (Table 2), at prevailing costs of RMB 5.2/kg for the ASA extruded feed and RMB 2.2/kg for fresh fish.

## **SUMMARY AND CONCLUSIONS**

Results of the trial demonstrated equivalent fish growth but significantly better economic return and lower feed cost per unit of fish growth with the soymeal-based, extruded feed than with a traditional fresh fish diet. The added benefits of feed quality consistency, less nutrient loading of the aquatic environment, ease in shipping and storing, reduced labor requirements, and absence of potential pathogens make extruded feed technically and economically superior to fresh fish for feeding Japanese sea bass.

## **ACKNOWLEDGEMENTS**

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### Chinese Currency and Production Unit Conversions:

RMB 8.26 = US\$1.00

1.0 kg = 2.2 lb

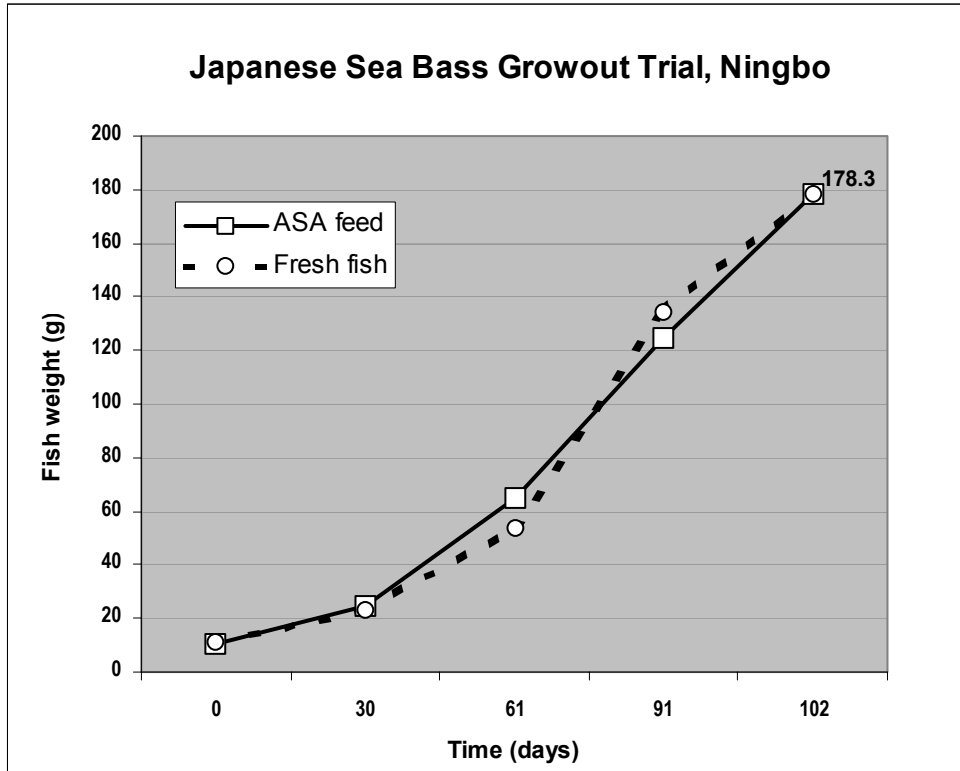


Figure 1. Growth curves for Japanese sea bass fed a soymeal-based extruded feed (ASA Feed) and chopped fresh fish (Fresh Fish) in a cage culture trial conducted at Xiangshan, Ningbo, China. Sea bass grew from approximately 11 g to 178 g in 102 days on both diets.

Table 1. Formula for the ASA 43/12, soymeal-based marine fish feed used in the 2000 Japanese sea bass growout trial conducted at Xiangshan, Ningbo.

| Ingredient              | Percentage of feed |
|-------------------------|--------------------|
| Soybean Meal 47.5       | 40.00              |
| Fishmeal, anchovy 65/10 | 34.00              |
| Wheat, SWW              | 16.50              |
| Fish Oil, Unspec.       | 8.03               |
| Corn gluten meal        | 1.00               |
| Vit PMX Roche 2118      | 0.20               |
| Min PMX F-1             | 0.25               |
| 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 2000 ASA aquaculture trial that evaluated Japanese sea bass growth performance in 8.0-m<sup>3</sup> cages with a soymeal-based, extruded feed and fresh fish at Xiangshan, Ningbo.

| Feed type       | Stocking rate (fish/m <sup>3</sup> ) | Initial fish weight (g) | No. days fed | Fish harvest weight (g) | P <sub>G</sub> <sup>1</sup> kg/m <sup>3</sup> | P <sub>N</sub> <sup>2</sup> kg/m <sup>3</sup> | Survival (%) | FCR  | Net income (RMB/cage) | Net income (RMB/m <sup>3</sup> ) | ROI (%) | Feed cost per kg fish growth |
|-----------------|--------------------------------------|-------------------------|--------------|-------------------------|---|---|--------------|------|-----------------------|----------------------------------|---------|------------------------------|
| Extruded Pellet | 200                                  | 10.6                    | 102          | 178.3                   | 31.0  | 28.9  | 88.2         | 1.82 | 3,820                 | 478                              | 62.7    | 9.46                         |
| Fresh fish      | 200                                  | 11.0                    | 102          | 178.3                   | 29.6  | 27.4  | 83.3         | 6.78 | 2,728                 | 341                              | 40.4    | 14.92                        |

<sup>1</sup>P<sub>G</sub> = Gross fish production

<sup>2</sup>P<sub>N</sub> = Net fish production