

Production of Red Sea Bream in 6.4-m³ Cages In Coastal Waters in Quanzhou, China

Results of ASA/China 2004 Feeding Trial 35-04-101

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ABSTRACT

A feeding trial was conducted in Quanzhou, Fujian Province, China to demonstrate growth performance of red sea bream from sub-market to market size in near-shore coastal cages with a high soybean meal inclusion feed. Sea bream were stocked in three, 6.4-m³ cages at a density of 1,000 fish per cage. Sea bream were fed a 43% crude protein, 12% crude lipid diet formulated with soybean meal at a 32% inclusion rate as partial substitution for fish meal.

Sea bream grew from 257 g to an average weight of 930 g per fish in 118 days of feeding. Gross production averaged 98.2 kg/m³ (628 kg per cage) in the three trial cages. The average survival rate for fish in the three cages was 67.6%. Average FCR was 3.4:1. Average net economic return was RMB 1,839 (\$222) per cage, yielding a 14% return on investment.

Sea bream growth was rapid on the high soy-inclusion feed, with fish growing to nearly twice the 500-g target size in 118 days of the 180-day production schedule. FCR, however, was significantly impacted by a chronic eye disease and by high fish mortality following fish handling during a net change on day 60 of the trial.

INTRODUCTION

The American Soybean Association (ASA), in cooperation with Quanzhou Fisheries Technology Extension Center and the China National Fisheries Extension Center (NEC), conducted a cage feeding trial with red sea bream (*Pagrus major*). The objective of the trial was to demonstrate sea bream growth and economic performance from sub-market to market stages in low volume high density (LVHD), near-shore ocean cages with a high soybean meal inclusion feed.

MATERIALS AND METHODS

Three cages of average size 6.4-m³ (underwater volume) at the Xiaocuo Aquaculture Technology Development Company cage fish farm at Xiao Cuo Yang Yu Bay, Xiaocuo, Quanzhou City, Fujian Province, were used for the feeding trial. Cages were constructed of nylon netting over a rigid cage frame. Cages were individually fitted with an opaque cover and a feed enclosure to contain extruded, floating feed pellets. Cage placement was at the perimeter of the cage farm, with a minimum spacing of two meters between and on all sides of each cage.

Fish were 257-g red sea bream produced locally in the Quanzhou area. Sea bream were stocked in the three trial cages on 23 May at a density of 1,000 fish per cage. Fish in all three trial cages were of uniform size and age at stocking. Target market size for sea bream was 500 g per fish in a 180-day production cycle.

Sea bream were fed a modified form of the ASA 43/12 marine growout feed in extruded, floating pellet form (Table 1). The feed was modified from the standard ASA 43/12 formula to use regular, 44% crude protein soybean meal instead of dehulled, 47.5% crude protein soybean meal. Dehulled soybean meal was not available in the China market due to high soybean meal prices prevalent in 2004. The modified feed was formulated with soybean meal at a 32% inclusion rate as partial replacement for fishmeal. Fish were fed to satiation twice daily, with fish in all three cages fed identically at every feeding. Feed pellet size was increased as the fish grew so that the maximum size pellet that all fish could consume was being fed.

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. At the conclusion of the trial, all cages were emptied and the fish in each cage counted and weighed 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) were calculated at the end of the trial.

RESULTS

Red sea bream were fed a total of 118 days between 23 May and 20 September 2004. Sea bream grew from 257 g to an average weight of 930.5 g during this feeding period (Table 2). Gross production averaged 628 kg per cage, or 98.2 kg/m³ (Table 2). Average sea bream survival rate was 67.6%. Average FCR for sea bream was 3.4:1.

Average feed cost per kilogram of fish growth was RMB 20.4 (\$2.47/kg)¹. Net economic return for the 118-day production cycle averaged RMB 1,929 per cage (\$233.60) at a sea bream market price of RMB 25/kg (\$3.02/kg) (Table 2). Return on investment averaged 14% for the three trial cages (Table 2).

SUMMARY AND CONCLUSIONS

Sea bream exhibited rapid growth with the 43/12 high soy-inclusion feed, but overall feed conversion was poor due to high fish mortality. Sea bream grew to nearly twice the 500-g target market size in 118 days of the planned 180-day trial. FCR was significantly impacted by high fish mortality that occurred following a net change after day 60 of the trial. Mortality was believed to be related to fish handling stress. Fish stress from a chronic eye disease and declining water quality in Xiao Cuo Yang Yu Bay were also believed to have impacted sea bream production performance.

This was the first time the trial cooperator had used manufactured feed for the full second year production cycle for sea bream. Use of the extruded ASA feed significantly reduced labor requirements and cage management for the cooperator. The cooperator was able to reduce the labor requirement for feeding his 50-cage operation to a single person. The trial cooperator indicated that sea bream growth on the ASA soy-inclusion feed was faster than for sea bream fed trash fish in nearby cages.

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¹ RMB 8.26 = \$1.00

Table 2. Formula for the 43/12,, high soy-inclusion marine fish feed used in the 2004 sea bream trial conducted at Cuo Yang Yu Bay, Quanzhou City, Fujian 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 Lecitin	1.00
Vit PMX F-2	0.50
Min PMX F-1	0.25
Stay C 35	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.

Table 2. Results of the 2004 ASA aquaculture trial in Cuo Yang Yu Bay, Quanzhou that demonstrated sub-market to market growth performance of red sea bream in 6.4-m³ coastal cages with a high soy-inclusion feed.

Cage No.	Fish stocking size (g)	Stocking rate (fish/cage)	No. days fed	Fish harvest wt. (g)	Fish production kg/cage	kg/m ³	Survival (%)	FCR	Net (RMB/cage)	ROI (%)
1	249	1,000	118	940.5	608.6	95.1	64.7	3.5	1,430	10.4
2	253	1,000	118	914.8	651.5	101.8	71.2	3.2	2,507	18.2
3	268	1,000	118	936.1	625.3	97.7	66.8	3.5	1,853	13.4
Mean	257	1,000	118	930.5	628.5	98.2	67.6	3.4	1,930	14.0