

Growth Performance of Red Drum Fingerlings in Coastal Cages Using a Two-Stage Production and Feeding Regime

Results of ASA/China Feeding Trials 35-01-124 and 35-01-125

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ABSTRACT

Red drum (*Sciaenops ocellata*) fingerling production in coastal cages was demonstrated using a two-stage cage production regime and extruded aquafeeds in an ASA feeding trial conducted near Ningbo, Zhejiang Province, China. In the first stage of the production regime, red drum were stocked in six, 2.25-m³ cages at a density of 2,500 fish per cage and fed to satiation daily for 30 days with a 47% crude protein and 15% crude fat (47/15 feed) extruded, marine fingerling feed. After 30 days, the fish were transferred to three, 8-m³ cages and stocked at a density of 200 fish per m³ for the second stage of the production regime. Fish in the three 8-m³ cages were fed the 47/15 feed to size 25 g, at which point the fish were weaned to a lower cost 43/12 marine growout feed. Both feeds were fed in extruded, floating pellet form. The 43/12 feed is formulated with 35% soybean meal as a partial replacement for fishmeal. Red drum grew from 0.5 g to 5.6 g in the 30-day, stage one component of the trial. Average FCR with the 47/15 feed during stage one in the 2.25-m³ cages was 1.04:1. Average fish survival was 77.7%. In the second stage, red drum grew from 5.6 g to 92.5 g in 88 days on a combination of 47/15 and 43/12 feeds. Average FCR for the combination of 47/15 and 43/12 feeds in stage two was 1.31:1. Fish survival averaged 51.3% in the stage two component of the trial. Results of the trial indicate that red drum perform well during the first production stage in 2.25-m³ cages, yielding good survival and excellent growth and feed conversion with the 47/15 extruded feed. Growth and FCR continued to be good in the second production stage in 8.0-m³ cages, but survival dropped significantly. Poor survival was believed to result from a combination of poor water quality and parasitic infestation. The two-stage production regime and combination-feeding regime with extruded 47/15 and 43/12 feeds was demonstrated to be a good strategy for producing red drum fingerlings. However, producers should be aware that red drum are sensitive to poor environmental conditions and should be cultured only in areas with good water quality.

INTRODUCTION

The American Soybean Association (ASA), in cooperation with the Ningbo Municipal Fisheries Bureau and the Ping Yang County Fisheries Bureau of Zhejiang Province, conducted a fingerling production demonstration trial with red drum (*Sciaenops ocellata*) using ASA LVHD technology and feeds. The objective of the trial was to demonstrate production performance of red drum during the fingerling production cycle using a two-stage production and feeding regime with high quality, extruded aquafeeds.

MATERIALS AND METHODS

Stage One

Six, 2.25-m³ cages (1.5 m x 1.5 m x 1 m) in the vicinity of the Ningbo Haiwan Aqua Stock Breeding Center in Xiangshan County, Ningbo, Zhejiang Province, were used for the first production stage for red drum. Cages were constructed of nylon mesh netting with a rigid top frame and opaque covers. The six cages were stocked with 0.5-g red drum at a density of 2,500 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 (Table 1). The 47/15 feed was formulated by ASA and produced by the Shanghai DaJiang aquafeed mill. Initial feed pellet size was 1.5 mm. Fish were fed to satiation four times daily, with fish in all six cages fed identically at each feeding. The first stage of the trial was terminated when fish reached an average size of about 5 g.

Stage Two

Fish from the six stage-one trial cages were pooled and 4,800 fish randomly selected and restocked in three, 8.0-m³ cages (2 m x 2 m x 2 m) for the second stage of the production regime. Red drum were stocked in the 8.0-m³ cages at a density of 200 fish per m³. Cages were constructed of nylon mesh netting over rigid frames, with opaque covers and a feed enclosure to contain floating, extruded feed pellets. Cages were positioned in a single row, with a minimum of one cage width between and on all sides of each cage to permit good water exchange.

Red drum were fed the ASA 47/15 marine fingerling feed from fish size 5.6-g to fish size 25 g. At fish size 25 g, the red drum were weaned to the ASA 43/12 marine growout feed (Table 2). The 43/12 feed was fed for the remainder of the fingerling production cycle. Both feeds were fed in extruded, floating pellet form. Fish in all cages 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 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

Stage 1 Trial

Red drum were fed the 47/15 feed for 30 days between 14 June and 13 July 2001 in the first stage of the trial. Red drum grew from 0.5 g to an average weight of 5.6 g in the 30-day feeding period (Table 3). Average FCR with the 47/15 feed was 1.04:1 for fish in the six replicate cages. Average fish survival was 77.7%.

Stage 2 Trial

Red drum in two of the three, 8.0-m³ trial cages were fed for 88 days between 14 July and 15 October 2001. Fish in the third cage were fed for 82 days during the same period. Red drum grew from 5.6 g to an average weight of 92.5 g in the two cages fed for 88 days (Table 3). Average FCR for fish in the two cages was 1.31:1. Average fish survival was 51.3%. Red drum in the third cage grew from 5.6 g to 88 g in 82 days of feeding, with an FCR of 1.45:1 and 41.9% survival (Table 3).

Net income and ROI averaged RMB 120.4/m³ and 54.3%, respectively, for fish in the two cages fed for 88 days (Table 3).

SUMMARY AND CONCLUSIONS

Red drum performed well during the first production stage in 2.25-m³ cages, yielding good survival and excellent growth and feed conversion with the 47/15 extruded feed. Growth and FCR continued to be good in the second production stage in 8.0-m³ cages, but survival dropped significantly. Poor survival was believed to result from a combination of poor water quality and parasitic infestation.

The two-stage production regime and combination-feeding regime with extruded 47/15 and 43/12 feeds was demonstrated to be a good strategy for producing red drum fingerlings. However, producers should be aware that red drum are sensitive to poor environmental conditions and should be cultured only in areas with good water quality.

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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 47/15 marine fingerling feed used in the 2001 red drum fingerling demonstration cage trial conducted at Ningbo, Zhejiang Province, China.

Ingredient	Percentage of feed
Fishmeal, anchovy 67/7-8	48.70
Wheat flour 10	20.00
Soybean Meal 43	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

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.

Table 2. Formula for the ASA 43/12 marine fish growout feed used in the 2001 red drum fingerling demonstration cage trial conducted at Ningbo, Zhejiang 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

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 3. Results of the 2001 ASA aquaculture trial at Xiangshan, Ningbo that demonstrated red drum performance in coastal cages using a two-stage fingerling production regime and a combination of 47/15 and 43/12 extruded aquafeeds.

Cage No.	Feed	Stocking rate (fish/m ³)	Initial fish weight (g)	No. days fed	Fish harvest weight (g)	Survival (%)	FCR	Net income (RMB/m ³)	ROI (%)
<u>Stage 1</u>									
1	47/15	1,111	0.5	30	5.3	77.6	1.10		
2	47/15	1,111	0.5	30	5.6	78.4	1.03		
3	47/15	1,111	0.5	30	5.4	77.8	1.08		
4	47/15	1,111	0.5	30	5.9	75.9	1.00		
5	47/15	1,111	0.5	30	5.6	79.4	1.01		
6	47/15	1,111	0.5	30	5.6	77.2	1.04		
Mean	47/15	1,111	0.5	30	5.6	77.7	1.04		
<u>Stage 2</u>									
1	47/15+43/12	200	5.7	88	92.0	51.6	1.31	119.7	53.8
2	47/15+43/12	200	5.6	82	88.0	41.9	1.45	54.2	25.5
3	47/15+43/12	200	5.6	88	93.0	51.0	1.31	121.0	54.8
Mean ¹	47/15+43/12	200	5.6	88	92.5	51.3	1.45	120.4	54.3

¹ Means are for cages 1 and 3 only. Cage 2 was fed for fewer days than cages 1 and 3 and is therefore not included in the means.