

Cage Production of Red Drum Weaned From Trash Fish to Extruded Feed at Sub-Market Size

Results of ASA/China Feeding Trial 35-01-127

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ABSTRACT

Weaning of 172-g red drum (*Sciaenops ocellata*) from trash fish to extruded feed, followed by growout to market size on extruded feed, was demonstrated in a cage feeding trial at Longmen Town, Qingzhou City, Guangxi Province, China. Red drum that had only been fed with trash fish were stocked in three, 6.4-m³ cages at a density of 156 fish per m³ and weaned from trash fish to a 35% soymeal extruded feed over a period of one week. After weaning to extruded feed, red drum were fed to satiation twice daily with a 43/12 extruded, floating marine fish feed formulated by ASA. Red drum grew from 172 g to 666 g in 86 days on the ASA feed, with an average FCR of 1.68:1. Average fish carrying capacity at harvest was 53 kg/m³ of cage. The average fish survival rate was 51.5%. Net economic return and return on investment for the trial were RMB 149/m³ and 21.1%, respectively. The trial demonstrated that sub-market size red drum could be weaned from trash fish to extruded feed without difficulty. Feed conversion efficiency with the ASA 43/12 feed in this trial was not as good as in other red drum trials, but was still significantly better than that obtained in the area with trash fish. Feed cost per kilogram of fish growth with the ASA extruded feed was RMB 8.06, which was substantially below the cost of producing red drum with trash fish. Low water salinity at the trial site significantly impacted red drum growth performance, feed conversion efficiency and survival. Red drum exhibited a low tolerance to fluctuating salinity conditions that prevailed at the site throughout the feeding trial. Salinity ranged from 0 ppt to 14 ppt, with rapid fluctuations. The Longmen site was assessed to be a high-risk production site for red drum. It is recommended that cage fish farmers in the Longmen area focus on species with higher tolerance for low and fluctuating salinity, such as red tilapia and Japanese sea bass.

INTRODUCTION

The American Soybean Association (ASA), in cooperation with the Xiou San Cage Fish Farm and the Guangxi Aquaculture Technology Extension Center, Guangxi Province, conducted a cage feeding trial with red drum in 2001 at Longmen Town, Qingzhou City. The objective of the trial was to demonstrate the feasibility of weaning sub-market size red drum from trash fish to extruded aquafeed and completing the culture of the red drum to market size with the extruded feed.

MATERIALS AND METHODS

Three, 6.4-m³ cages (2 m x 2 m x 1.6 m) at the Xiou San cage fish farm at Longmen Town, Qingzhou City, Guangxi Province, were used for the trial. Cages were constructed of nylon mesh netting with a rigid top 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 May with sub-market size red drum (*Sciaenops ocellata*) at a density of 156 fish per m³. The red drum had previously only been fed trash fish. The red drum were weaned over a one-week period from trash fish to the ASA 43/12 (43% crude protein and 12% crude fat) marine fish growout feed in extruded, floating pellet form (Table 1). The ASA 43/12 feed is formulated with 35% soybean meal to reduce feed cost. 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 sea bass were consuming 100% extruded feed. The trial was started after weaning to extruded feed was completed. During the trial the red drum 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

High fish mortality occurred in the three trial cages following a typhoon in July that reduced water salinity to 0 ppt for more than a week. The surviving red drum were consolidated and restocked into two of the trial cages at a density of 156 fish per m³. Red drum were fed for 86 days between 29 July and 23 October 2001. Red drum in the two replicate cages grew from 172 g to an average weight of 666 g during the 86-day feeding period (Figure 1; Table 2). Average FCR with the ASA 43/12 feed for this period was 1.68:1. Average fish carrying capacity at harvest was 53.3 kg/m³. The average fish survival rate was 51.5% (Table 2).

Feed cost per kilogram of fish growth with the ASA extruded feed was RMB 8.06. Average market price for red drum was RMB 16/kg. Net economic return and return on investment (ROI) for the two trial cages averaged RMB 149/m³ and 21.1%, respectively (Table 2).

SUMMARY AND CONCLUSIONS

The trial demonstrated that sub-market size red drum could be weaned from trash fish to extruded feed without difficulty. High fish mortality occurred mid-way into the trial after heavy rain from a typhoon caused the water salinity at the trial site to drop to 0 ppt for an extended period. The high fish mortality rate resulted in the trial being restarted in late July with two, rather than three, replicate cages. Fish growth following the trial restart was good, with red drum increasing body weight an average of 387% in 86 days on the extruded feed. Salinity remained

low, however, and fish mortality continued. An additional 48.5% of the fish died during the second, 86-day trial period.

Chronic low water salinity at the trial site significantly impacted overall red drum production performance. Red drum growth, feed conversion efficiency and survival were all below standard. However, while feed conversion efficiency with the ASA 43/12 feed in this trial was not as good as in other red drum trials, it was still significantly better than that obtained in the area with trash fish. Feed cost per kilogram of fish growth with the ASA extruded feed was RMB 8.06, which was substantially below the cost of producing red drum with trash fish.

Trial results indicated that red drum have a low tolerance to fluctuating environmental conditions and low salinity. Salinity at the Longmen site oscillated between fresh (0 ppt salinity) and brackish (12-14 ppt salinity). The Longmen site was assessed to be a high-risk production site for red drum. It is recommended that cage fish farmers in the Longmen area focus on the production of species with higher tolerance for low and fluctuating salinity, such as red tilapia and Japanese sea bass.

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Chinese Currency and Production Unit Conversions:

RMB 8.26 = US\$1.00

1.0 kg = 2.2 lb

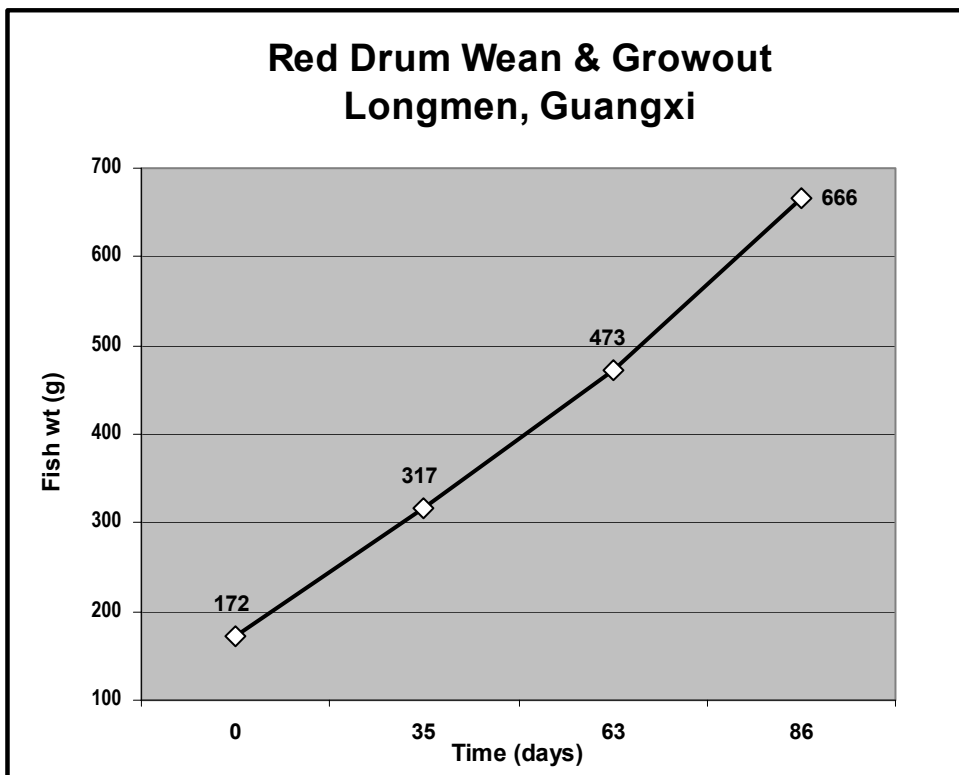


FIGURE 1. Growth curve for red drum cultured with extruded aquafeed following weaning from trash fish. Red drum grew from 74 g to 666 g in 86 days on the ASA 43/12 extruded aquafeed, with an average FCR of 1.68:1. The ASA feed was formulated with 35% soybean meal to reduce cost, and yielded significantly lower FCR and feed cost per unit of fish growth than trash fish. Average feed cost per kilogram of red drum growth with the 43/12 extruded feed was RMB 8.06.

Table 1. Formula for the ASA 43/12 marine fish growout feed used in the 2001 red drum wean and growout trial conducted at Longmen Town, Qingzhou City, Guangxi 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 2. Results of the 2001 ASA aquaculture trial at Longmen, Guangxi Province, that demonstrated weaning of red drum from trash fish to extruded feed, followed by growout to market size in 6.4-m³ cages using the ASA LVHD cage production model and ASA extruded aquafeed.

Cage No.	Feeds	Stocking rate (fish/m ³)	Initial fish weight (g)	No. days fed	Fish harvest weight (g)	Survival (%)	P _G ¹ (kg/m ³)	FCR	Net income (RMB/m ³)	ROI (%)
1	43/12	156	183	86	714	48.4	54.0	1.74:1	160	22.7
2	43/12	156	160	86	618	54.5	52.6	1.61:1	138	19.6
Mean	43/12	156	172	86	666	51.5	53.3	1.68:1	149	21.1

¹ P_G = Gross Production, expressed as fish weight per cubic meter of cage