

# **Production of Red Drum in Near-Shore Ocean Cages: Results of a Feeding Demonstration in Quanzhou, China**

## **Results of ASA/China 2003 Feeding Trial 35-03-124**

Michael C. Cremer, Zhang Jian and Hsiang Pin Lan  
American Soybean Association  
Room 902, China World Tower 2  
No. 1 Jianguomenwai Avenue  
Beijing 100004, P.R. China

### **ABSTRACT**

The growth performance of red drum (*Sciaenops ocellatus*) was evaluated in an ASA coastal cage trial in Quanzhou, China. Red drum were stocked at 312.5 fish per m<sup>3</sup> in three replicate cages of size 6.4-m<sup>3</sup> and fed to satiation twice daily with the ASA extruded marine fish fingerling and growout feeds. Red drum grew from 14 g to 232 g in 103 days, with an average FCR of 1.54:1. Average fish survival was 73%. High mortality early in the trial and strong coastal currents required modifications to trial implementation and construction of the cage frames.

### **INTRODUCTION**

The American Soybean Association (ASA), in cooperation with the Xiaocuo Aquaculture Technology Development Company, conducted a feeding trial in 2003 to evaluate production of red drum (*Sciaenops ocellatus*) in coastal cages using the ASA LVHD cage technology and ASA extruded marine fish feeds.

### **MATERIALS AND METHODS**

Three cages of size 6.4-m<sup>3</sup> each at the Xiaocuo Aquaculture Technology Development Co. fish farm at Xiao Cuo Yang Yu Bay, Xiaocuo, Quanzhou City, were used for the trial. Cages were constructed according to ASA guidelines, and included opaque covers and feed enclosures. Cages were arranged on the perimeter of the cage farm with a minimum of one cage width of open space on all sides of each cage for adequate water exchange.

## **ASA FY03 Quanzhou Red Drum Coastal Cage Trial**

Fish were 13.8-g red drum purchased by the Xiaocuo Aquaculture Technology cage fish farm. Red drum were stocked in the three trial cages at 2,000 fish per cage (312.5 fish per m<sup>3</sup>). Target size for red drum was 500 g per fish.

Red drum were fed the ASA 47/15 (47% crude protein and 15% crude fat) marine fingerling feed in extruded, floating pellet form from fish size 14 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. Fish were fed to satiation twice daily, with fish in all cages fed the same amount at each feeding. Feeding commenced on 18 June 2003.

Red drum in all cages were sampled once per month on approximately the same date each month to monitor growth performance. At the conclusion of the trial, the three trial 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 ROI calculated at the end of the trial.

## **RESULTS**

High mortality occurred early in the trial and necessitated restarting of the trial on 4 July 2003. Red drum were fed a total of 103 days between 4 July and 19 October 2003. Red drum grew from 14 g to 232 g during this period, with an average FCR of 1.54:1 (Table 3). Gross production averaged 339.2 kg per cage, or 53.0 kg/m<sup>3</sup> of cage volume. Fish survival averaged 73% (Table 3).

Net economic return obtained from sales of the 232-g red drum averaged RMB 900 per cage (RMB 140.7/m<sup>3</sup>) at a market price of RMB 14/kg for red drum. Average return on investment was 23.4% (Table 3).

## **SUMMARY AND DISCUSSION**

Red drum did not attain the target market size of 500 g per fish in this trial. Poor growth was attributed in part to strong water currents during tidal flows that caused significant cage compression and net deflation in the trial cages. Strong tidal currents required replacing the original cage support midway through the trial. The original cage support, which was limited to a rigid top frame, was replaced with 2 m x 2 m x 2 m rigid cage frames to eliminate net deflation and maintain a constant cage volume.

## **ACKNOWLEDGEMENTS**

ASA gratefully acknowledges the Xiaocuo Aquaculture Technology Development Company and the National Fisheries Extension Technology Center in Beijing for their assistance and support of this aquaculture feeding trial.

### **Chinese Currency and Production Unit Conversions:**

RMB 8.26 = US\$1.00

1.0 kg = 2.2 lb

# ASA FY03 Quanzhou Red Drum Coastal Cage Trial

Table 1. Formula for the ASA 47/15 marine fingerling feed used in the 2003 red drum trial conducted at Quanzhou, Fujian 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.

# ASA FY03 Quanzhou Red Drum Coastal Cage Trial

Table 2. Formula for the ASA 43/12 marine fish growout feed used in the 2003 red drum trial conducted at Quanzhou, Fujian 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 2003 ASA aquaculture trial at Quanzhou, Fujian Province, that evaluated growth performance of red drum in 6.4-m<sup>3</sup> coastal cages using the ASA LVHD cage production model and soy-inclusion extruded marine fish feeds.

Cage No.	RD <sup>1</sup> stocking size (g)	Stocking rate (fish/m <sup>3</sup> )	No. days fed	Harvest wt. (g)	P <sub>G</sub> <sup>2</sup> (kg/m <sup>3</sup> )	Survival (%)	FCR	Net (RMB/m <sup>3</sup> )	ROI (%)
1	13.9	312.5	103	231.4	52.9	73.2	1.54	139.8	23.3
2	13.5	312.5	103	227.5	53.9	75.8	1.51	153.8	25.6
3	14.0	312.5	103	237.2	52.1	70.4	1.57	128.6	21.4
Mean	13.8	312.5	103	232.0	53.0	73.1	1.54	140.7	23.4

<sup>1</sup>RD = Red Drum

<sup>2</sup>P<sub>G</sub> = Gross Production