Cage Growth Performance of Red Tilapia in Brackish Water On Soy-Based Feed

Results of ASA/China 2002 Feeding Trial 35-02-120

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ABSTRACT

Growth performance of red tilapia was demonstrated from fingerling to market stages in an ASA LVHD coastal cage trial using an all-plant protein, soy-based growout feed. Red tilapia in three replicate cages of size 6.4-m^3 were fed to satiation twice daily with the ASA 32/6 soybean meal-based feed in extruded, floating pellet form. Average monthly salinity in the Longmen area was 7.5 ppt, within a range of 0 ppt to 19 ppt. Tilapia grew from 64 g to 493 in 124 days, with an average FCR of 1.41:1. Fish survival averaged 91.7%. Fish production averaged 724 kg per cage (113 kg/m^3). Net economic return averaged RMB 1,080 per m^3, at an average market price of RMB 16/kg for red tilapia cultured in brackish water. Return to investment averaged 48.3% for the three trial cages. The trial demonstrated the feasibility of culturing red tilapia in cages in a coastal area with fluctuating salinity and overall brackishwater conditions.

INTRODUCTION

The American Soybean Association (ASA), in cooperation with the Guangxi Aquaculture Technology Extension Center and cage operator Mr. Xiou San of Longmen Town, Qingzhou City, conducted a feeding trial in 2002 to assess growth performance of red tilapia from fingerling to market size in coastal LVHD cages. The objective of the feeding trial was to demonstrate the technical and economic feasibility of culturing red tilapia in a coastal area with fluctuating, but overall low salinity.

MATERIALS AND METHODS

Three cages of size 6.4-m^3 each at the Longmen Town cage farm of Mr. Xiou San 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.

Fish were 64-g red tilapia purchased from the Nanning Xihuide Company Fish Farm in Nanning, Guangxi Province. Red tilapia were acclimatized to the salinity conditions prevalent at the Longmen cage culture site prior to stocking in the trial cages. Red tilapia were stocked in the three trial cages at 250 fish per m^3 (1,600 fish per cage). Fish ranged in size from 59 g to 72 g at stocking. Target market size for the red tilapia was 500 g per fish.

Red tilapia were fed the ASA 32/6 growout feed in extruded, floating pellet form (Table 1). Fish were fed to satiation twice daily, with fish in all cages fed the same amount at each feeding.

Tilapia 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 red tilapia 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

Red tilapia were fed a total of 124 days between 8 June and 9 October 2002. Tilapia grew from 64 g to 493 g with an FCR of 1.41:1 (Figure 1; Table 2). Average survival for red tilapia was 91.7%. Gross production averaged 723.8 kg per cage (113.1 kg/m^3) for red tilapia (Table 2).

Net economic return averaged RMB 1,080.80 per m^3 for the 19.2-m^3 of trial cages. Return on investment (ROI) was 48.3% at a market price of RMB 16/kg for red tilapia cultured in brackish water (Table 2). Feed cost per kilogram of fish growth was RMB 4.51 at a FOB feed cost of RMB 3.20/kg.

SUMMARY AND CONCLUSIONS

Trial results indicate that red tilapia can be cultured in coastal LVHD cages with high economic return. Red tilapia were shown to be a suitable culture species in coastal regions with prevailing low salinity conditions. Tilapia growth, survival and FCR were acceptable despite fluctuating salinity conditions at the Longmen trial site (Figure 2). Tilapia cultured in saline water received a premium market price.

Typhoons caused significant salinity fluctuations at the Long site during June and July, and resulted in reduced feed intake and some fish mortality. Fish growth was the poorest (percent weight gain) from the 5 July to 6 August sampling period when the salinity range was the greatest (0-19 ppt). There was also elevated FCR during this period, indicating a correlation with salinity fluctuation.

Delays in shipping trial feed to Longmen resulted in lowering the feeding rate to below optimum level from 20 June to 2 July. Local production of the ASA feed would significantly improve feed availability to Guangxi fish farmers.

Further feeding trials are recommended to identify optimum tilapia stocking density and growth performance parameters.

ACKNOWLEGEMENTS

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Chinese Currency and Production Unit Conversions:

RMB 8.26 = US$1.00
1.0 kg = 2.2 lb

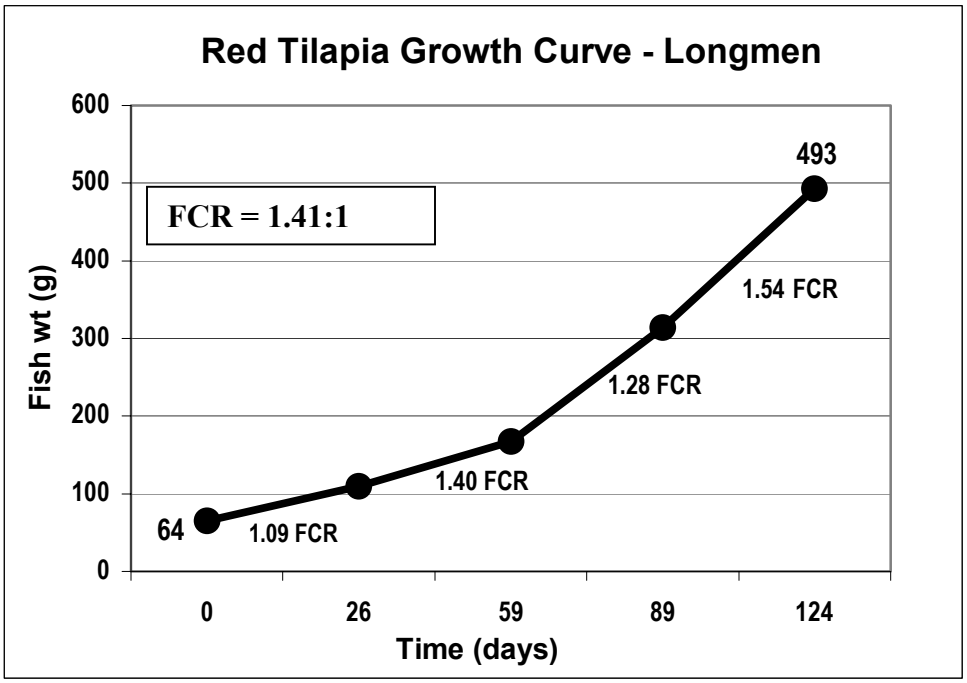

Figure 1. Growth curve for red tilapia cultured in 6.4-m^3 LVHD cages in a coastal bay near Longmen, Guangxi Province. Red tilapia grew from 64 g to 493 g in 124 days when fed to satiation twice daily with the ASA 32/6 soy-based feed in extruded, floating pellet form. Tilapia were cultured at a stocking density of 1,600 fish per cage. Average FCR for the duration of the trial was 1.41:1. FCR for each sampling period is shown below the growth curve line and indicates variation due to fish age and fluctuating salinity conditions.

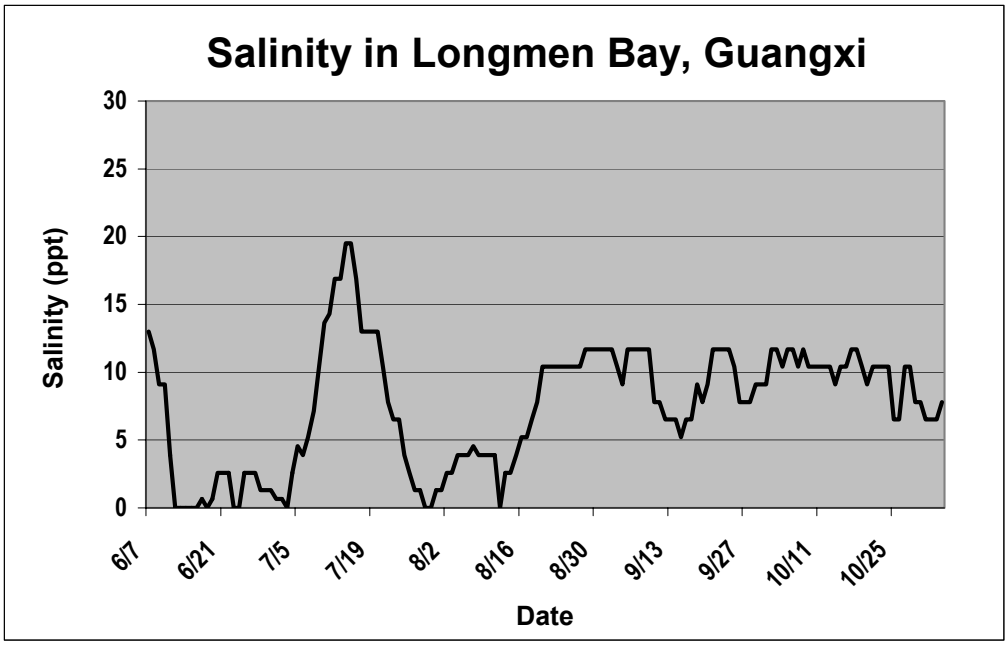

Figure 2. Salinity at the Longmen tilapia cage trial site fluctuated throughout the production season, from a low of 0 ppt to a high of 19 ppt. Tilapia growth was the poorest (percent weight gain) from the 5 July to 6 August sampling period when the salinity range was the greatest (0-19 ppt). There was also elevated FCR during this period, indicating a correlation with salinity fluctuation.

Table 1. Formulation for the ASA 32/6, soy-based growout feed used in the 2002 red tilapia coastal cage feeding trial in Longmen Town, Qingzhou City, Guangxi Province, China. The feed was manufactured by Cargill in extruded, floating pellet form.

Ingredient	32/6 Growout Feed[1]
Soybean meal 47.5	52.8
Wheat, SWW	23.6
Wheat middlings	10.0
Corn gluten meal 60%	6.0
Fish oil	3.53
Soy lecithin	1.00
Ca phosphate mono	2.70
Vit PMX Roche 2118	0.10
Min PMX F-1	0.25
Ethoxyquin	0.02
Total	100.00

[1]The numerical component of the feed description refers to the percentage of protein and lipid, respectively, in the ration, i.e. 32/6 indicates 32% crude protein and 6% crude lipid.

TABLE 2. Results of the 2002 ASA aquaculture trial at Longmen Town, Qingzhou City, Guangxi Province, that demonstrated fingerling to market growth performance of red tilapia in coastal cages using the ASA LVHD cage production model and soymeal-based growout aquafeed.

Cage No.	NiT[1] stocking size (g)	Stocking rate (fish/m^3)	No. days fed	Harvest wt. (g)	P_G[2] (kg/m^3)	Survival (%)	FCR	Net (RMB/mu)	ROI (%)
1	63	250	124	499	115.2	92.0	1.37	1114	52.9
2	72	250	124	502	111.4	88.8	1.46	1053	44.6
3	59	250	124	478	112.7	94.4	1.39	1074	47.4
Mean	64	250	124	493	113.1	91.7	1.41	1080	48.3

[1]NiT = Red Tilapia

[2]P_G = Gross Production