

Production of Red Tilapia in Ponds in Beijing with Soy-Maximized, Extruded Feed

Results of ASA/China 2004 Feeding Trial 35-04-96

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ABSTRACT

A feeding trial was conducted to demonstrate advanced fingerling to market growth performance of red tilapia in the Beijing, China region using a soy-maximized, all-plant protein feed. Fish were stocked in three, 2-mu (0.13-ha) ponds at a density of 1,000 red tilapia and 50 silver carp per mu (15,000 tilapia and 750 silver per ha). Red tilapia grew from approximately 150 g to an average weight of 495 g per fish in 75 days of feeding. Gross production averaged 484 kg/mu (7,260 kg/ha) for red tilapia and 52 kg/mu (788 kg/ha) for silver carp. Average survival rates for red tilapia and silver carp were 97.8% and 98.7%, respectively. The soy-maximized feed, formulated to have 32% crude protein and 6% crude fat with soybean meal as the primary protein source, yielded an average estimated FCR with red tilapia of 1.51:1. Average net economic return was RMB 1,239 per mu (\$2,249/ha). Average return on investment was 33%.

INTRODUCTION

The American Soybean Association (ASA), in cooperation with the Beijing Municipal Fishery Extension Center Demonstration Fish Farm in Beijing and the China National Fisheries Extension Center (NEC), conducted a pond feeding trial with red tilapia. The objective of the trial was to demonstrate red tilapia growth and economic performance from advanced fingerling to market stages with the ASA 32/6 soy-maximized feed and the ASA 80:20 pond production model.

MATERIALS AND METHODS

Three ponds of average size 2.0-mu (0.13-ha) at the Beijing Municipal Fishery Extension Center Demonstration Fish Farm in Beijing were used for the feeding trial. Pond water depth varied between 0.8 m and 1.5 m. All ponds were equipped with water exchange and stand-by aeration.

Fish were red tilapia produced at the Beijing Municipal Fishery Extension Center Demonstration Fish Farm. Red tilapia were stocked in the three trial ponds in mid May at an average size of 111 g and at a density of 1,000 fish per mu (15,000/ha)¹, together with 50 silver carp fingerlings per mu (750/ha). Silver carp were scheduled to be stocked at 100/mu, but a shortage of silver carp fingerlings limited stocking to half the target density. Fish in all three trial ponds were of uniform size and age at stocking. Red tilapia were sampled on 15 June, at the commencement of feeding, and were estimated to have an average size of 150 g. Target market size for red tilapia was 500 g per fish.

Red tilapia were fed the ASA 32/6 all-plant protein feed in extruded, floating pellet form (Table 1). The feed was formulated by ASA to maximize soybean meal use. The feed was produced by Fwusow feed mill in Xiamen, Fujian Province. Fish were fed to satiation twice daily, with fish in all three ponds fed identically at each feeding.

Trial management was based on the ASA 80:20 pond production model. Fish in all ponds were sampled once per month on approximately the same date each month. At the conclusion of the trial, all ponds were drained and the red tilapia and silver carp in each pond 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 tilapia were fed a total of 75 days between 15 June and 29 August 2004. Red tilapia grew from an estimated average size of 150 g to an average weight of 495 g during this

¹ 15 mu = 1 ha

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period (Table 2). Gross production averaged 484 kg/mu (7,260 kg/ha)² for red tilapia and 52.5 kg/mu (787.5 kg/ha) for silver carp (Table 2). Average red tilapia and silver carp survival rates were 97.8% and 98.7%, respectively. Average FCR for red tilapia was 1.51:1.

Average feed cost per kilogram of fish growth was RMB 6.95 (\$0.84/kg)³. Net economic return for the 74-day production cycle averaged RMB 1,238.5 per mu (\$2,249/ha) at a market price of RMB 10/kg (\$1.21/kg) for red tilapia and RMB 3/kg (\$0.36) for silver carp (Table 2). ROI averaged 33% for the three trial ponds (Table 2).

SUMMARY AND CONCLUSIONS

Red tilapia exhibited slow growth in response to low water temperatures that prevailed during much of the 75-day culture period at the Beijing farm. Water temperatures were low due to frequent water additions from a coldwater well to counter seepage in the trial ponds. Average daily water temperatures in the second half of June and for the 29 culture days in August were only 25.8°C and 25.1°C, respectively. Severe water seepage in pond 3, in particular, required frequent adding of cool well water that significantly reduced tilapia growth in this pond. Tilapia in pond 3 were 10% smaller than fish in the other two ponds (Table 2). Tilapia growth in all ponds was also impacted by adverse weather that halted feeding for five days during the second half of August.

The Beijing Municipal Fishery Extension Center Demonstration Fish Farm was assessed to be a marginal facility for market production of red tilapia in ponds. Cool well water is the only water supply, and poor soil quality results in excessive water seepage from ponds on the station. Resulting pond water temperatures remain below the optimal range for tilapia production for the majority of the summer production season.

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² Kg/mu x 15 = kg/ha

³ RMB 8.26 = \$1.00

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Table 1. Formula for the ASA 32/6¹, soy-maximized feed used in the 2004 red tilapia demonstration feeding trial near Beijing, China. Fwusow/Xiamin feed mill in Fujian Province produced the feed in extruded, floating pellet form.

Ingredient	Percent of total
Soybean meal 47.5	52.8
Wheat, SWW	23.2
Wheat middlings	10.0
Corn gluten meal 60%	6.0
Fish oil	3.5
Soy lecithin	1.00
Ca phosphate mono	2.70
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 lipid, respectively, in the ration, i.e. 32/6 indicates 32% crude protein and 6% crude lipid.

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Table 2. Results of the 2004 ASA aquaculture trial near Beijing that demonstrated advanced fingerling to market pond growth performance of red tilapia using a soy-maximized 32/6 feed and the ASA 80:20 production model.

Pond No.	RTP ¹ stocking size (g)	Stocking rate (fish/mu)	No. days fed	Harvest wt. (g)		P _G ³ (kg/mu)		Survival (%)		FCR	Net (RMB/mu)	ROI (%)
				RTP	SiC ²	RTP	SiC	RTP	SiC			
1	150	1,000	75	512	1,283	500.3	64.2	97.7	100	1.43	1436	38.2
2	150	1,000	75	510	1,263	500.8	61.9	98.2	98	1.43	1435	38.2
3	150	1,000	75	463	643	451.0	31.5	97.6	98	1.67	845	22.5
Mean	150	1,000	75	495	1,063	484.0	52.5	97.8	98.7	1.51	1239	33.0

¹RTP = Red Tilapia

²SiC = Silver carp

³P_G = Gross Production