

Grass Carp Fry to Fingerling Growth Performance with Two Soy-Based Feed Regimes

Results of ASA/China 1999 Feeding Trial 35-99-63

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ABSTRACT

Grass carp were grown from fry to fingerlings on two feed regimes using the ASA 80:20 production model and soy-based feeds. Grass carp grew from 0.3 g to 83 g when fed a 36% protein, soy-based diet for the entire production season. Grass carp grew from 0.3 g to 78 g when fed a 36% protein, soy-based diet to size 25 g, followed by feeding with a 32% protein, soy-based diet thereafter. Growth was significantly different with the two feed regimes. FCR for the 36% protein feed regime was 1.12:1 for the 121-day feeding period. FCR for the combination feed regime was 1.19:1. No economic benefit was obtained by reducing the protein content of the feed once grass carp reached 25 g in weight. The reduction in feed cost obtained with the combination feed regime was offset by the better growth performance of fish receiving the 36% protein feed for the duration of the production season.

INTRODUCTION

The American Soybean Association (ASA), in cooperation with the Beijing Xu Xing Zhang Fish Culture Farm and the National Fisheries Extension Center (NEC) and its Beijing Municipal affiliate, conducted a study in 1999 to evaluate grass carp growth performance from fry to fingerling with two soy-based feed regimes. The objective of the study was to determine if fingerling production costs could be lowered by reducing the protein content of the grass carp diet from 36% to 32% after fish reached 25 g in weight. Results of the study are presented in this paper.

MATERIALS AND METHODS

Locally produced summer flower stage grass carp fry were stocked in six, 5.0-mu ponds at the Xu Xing Zhang Fish Culture Farm in Beijing on 10 June 1999. Grass carp fry were stocked at a density of 5,000 fish per mu, together with 1,000 silver carp fry per mu.

Grass carp in all ponds were fed a 41% protein, soy-based crumble feed from the time of stocking to size 5 g (Table 1). At size 5 g, fish in all ponds were weaned to a 36% protein, soy-based diet fed in extruded, floating pellet form (Table 1). Initial extruded pellet size was 1.5 mm. Upon reaching 25 g in weight, fish in three of the ponds were switched to a less expensive 32%

protein, soy-based feed in extruded, floating form (Table 1). Cost of the 32% protein feed was 10.3% less than the 36% protein feed. Fish in the other three ponds remained on the 36% protein feed. The feeds were formulated by ASA and produced by the Shanghai Fwuso aquafeed mill. Feeding rate and frequency followed guidelines contained in the ASA handout *Pond Preparation and Feeding Program for GrC Fry and Fingerlings*.

Fish in all ponds were sampled once per month on the same numerical date to monitor growth performance and adjust feeding. At the conclusion of the trial, all ponds were drained and the grass carp and silver carp in each pond counted and weighed to determine average fish weight, net production, feed conversion and survival.

RESULTS

Grass carp were fed for 121 days, beginning on 12 June and ending on 10 October 1999. Grass carp that received the 36% protein feed for the duration of the trial grew from 0.3 g to 83 g (Table 2; Figure 1). Fish that received the combination of 36% and 32% protein feeds grew to 78 g. Growth of fish fed the two feed regimes was significantly different ($P < 0.05$).

Net production of fish in the 36% protein feed ponds averaged 362 kg/mu of grass carp and 99 kg/mu of silver carp (Table 2). Net production of fish in the combination feed ponds averaged 353 kg/mu of grass carp and 107 kg/mu of silver carp.

FCR for fish receiving the 36% protein feed only was 1.12:1 for the 121-day feeding period (Table 2). FCR for fish receiving the combination of 36% protein and 32% protein feeds was 1.19:1 for the 121-day feeding period. There was no significant difference ($P > 0.05$) in FCR for the two feed regimes. Grass carp survival was 87% with both feed regimes.

Economic analysis showed no significant difference in net return or return on investment (ROI) with the two feed regimes. Net economic return was RMB 212/mu for the 36% protein-feed ponds and RMB 216/mu for the combination-feed ponds. ROI for the 36% protein-feed ponds was 7.5%. ROI for the combination-feed ponds was 8.1%.

SUMMARY AND CONCLUSIONS

No economic benefit was obtained by reducing the protein content of the feed once grass carp reached 25 g in weight. The reduction in feed cost was offset by the significantly better growth performance of fish receiving the 36% protein feed for the duration of the production season.

Soy-based diets were demonstrated to be efficient for producing grass carp fingerlings. Feed conversion efficiencies of 1.12 and 1.19 demonstrated that the nutritional requirements of grass carp were fully met with both feed regimes tested. Preference for one feed regime over the other will be dependent upon the fingerling production goals of individual farms. Use of the 36% protein feed will result in the production of larger fingerlings.

ACKNOWLEDGEMENTS

ASA gratefully acknowledges the Beijing Xu Xing Zhang Fish Culture Farm, the NEC, and the Beijing Municipal Fisheries Extension Center for their close cooperation in conducting this trial. ASA also gratefully acknowledges the soybean farmers of the United States and the United Soybean Board, who provided both the funding and the impetus for the ASA/China aquaculture program.

Chinese Currency and Production Unit Conversions:

RMB 8.26 = US\$1.00

15 mu = 1.0 hectare (ha)

kg/mu x 15 = kg/ha

1.0 kg = 2.2 lb

6 mu = 1.0 acre (ac)

kg/mu x 13.2 = lb/ac

TABLE 1. Diet formulations for the ASA soy-based 41% protein fry, 36% protein fingerling, and 32% protein growout rations fed in the 1999 grass carp fry to fingerling production study at the Xu Xing Zhang Fish Culture Farm in Beijing, China.

Ingredient	41/11 Fry diet	36/7 Fingerling diet	32/6 Growout diet
Dehulled soybean meal (47.5%)	46.3	46.3	52.8
Corn gluten meal (60%)	15.0	10.0	6.0
Fishmeal, anchovy 65/10	14.0	8.0	-----
Wheat, SWW	13.0	19.0	23.6
Wheat middlings	-----	8.0	10.0
Fish oil	4.03	4.58	3.53
Soy oil	4.0	-----	-----
Ca phosphate mono	1.7	2.2	2.7
Soy lecithin	1.5	1.5	1.0
Mineral premix	0.25	0.25	0.25
Vitamin premix Roche 2118	0.20	0.15	0.10
Ethoxyquin	0.02	0.02	0.02
TOTAL	100.00	100.00	100.00

TABLE 2. Results of the 1999 ASA aquaculture trial to evaluate grass carp fry to fingerling growth performance with two feed regimes using the ASA 80:20 production model and soy-based diets.

Diet regime	Stocking rate (GrC/mu)	No. days fed	GrC ¹ harvest weight (g)	Survival (%)	FCR	Net economic return (RMB)	ROI (%)
36/7 ²	5000	121	83 ^a	87	1.12 ^a	212 ^a	7.5 ^a
36/7 + 32/6 ³	5000	121	78 ^b	87	1.19 ^a	216 ^a	8.1 ^a

¹GrC = grass carp

²36/7 = ASA 36% protein, 7% fat fingerling feed

³32/6 = ASA 32% protein, 6% fat growout feed

Data with different superscripted letters are significantly different (P<0.05); data with the same superscripted letters are not significantly difference (P>0.05)

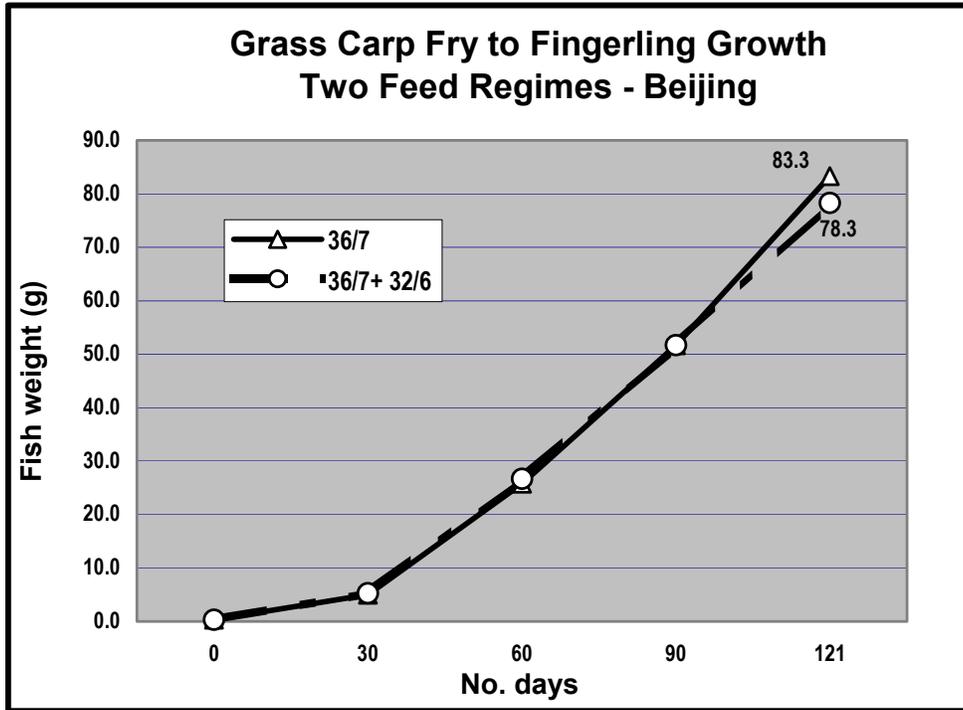


Figure 1. Growth curves for grass carp fed two feed regimes in a 1999 fry to fingerling production trial at the Xu Xing Zhang Fish Culture Farm in Beijing, China. One fish population was fed a 36% protein, 7% fat soy-based feed (36/7) for the entire production season. A second fish population was fed the 36/7 feed to size 25 g, then changed to a 32% protein, 6% fat soy-based feed (32/6). Growth performance of fish fed the 36/7 feed was significantly better ($P < 0.05$) than fish fed the combination of the 36/7 and 32/6 feeds.