

Mirror Carp Fry to Fingerling Growth Performance in Ponds in Harbin with Soymeal-Based Feeds

Results of ASA/China 2001 Feeding Trial 35-01-104

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ABSTRACT

A feeding trial was conducted in Harbin, Heilongjiang Province, located at 46° north latitude, to demonstrate fry to fingerling growth performance of mirror carp using the ASA 80:20 pond production model and soymeal-based fry and fingerling feeds. Fish were stocked in two ponds of size 6.0-mu and 7.8-mu, respectively, at a density of 3,000 mirror carp and 1,000 silver carp fry per mu, and in one pond of size 6.5-mu at an estimated density of 4,600 mirror carp and 1,000 silver carp fry per mu. Mirror carp stocked at 3,000/mu grew from 0.6 g to an average weight of 165 g per fish in 85 days of feeding. Gross production averaged 406 kg/mu for mirror carp and 94 kg/mu for silver carp. Average survival rates for mirror carp and silver carp were 82% and 75%, respectively. Mirror carp FCR with the soymeal-based feeds averaged 1.24:1. Average net economic return was RMB 1,305 per mu, for an average return on investment (ROI) of 53.3%. Mirror carp stocked at the estimated density of 4,600/mu grew from 0.6 g to 96 g in 85 days, with an FCR of 1.26:1 and an ROI of 48.6%. Results of the feeding demonstration showed that mirror carp exhibited excellent growth performance, FCR, survival and economic return with the ASA soymeal-based feeds and 80:20 production technology. The use of extruded, floating feed significantly reduced labor costs, lowered fish FCR, avoided feed waste, improved water quality, and made it easier to observe fish feeding behavior and health.

INTRODUCTION

The American Soybean Association (ASA), in cooperation with the Experimental Farm of the Heilongjiang Fisheries Research Institute in Harbin, the Heilongjiang Provincial Fisheries Extension Center, and the China National Fisheries Extension Center (NEC), conducted a three-month feeding trial with mirror carp. The objective of the trial was to demonstrate mirror carp growth and economic performance from fry to fingerling stages with soymeal-based fry and fingerling feeds and the ASA 80:20 pond production model.

MATERIALS AND METHODS

Three ponds of size 6.0-mu, 6.5-mu and 7.8-mu at the Experimental Farm of the Heilongjiang Fisheries Research Institute in Harbin, Heilongjiang Province, were used for the feeding trial. This farm location is situated at approximately 46° north latitude. Pond water depth averaged approximately 1.5 m. All ponds were equipped with water exchange and stand-by aeration.

Fish were 0.6-g mirror carp fingerlings produced at the Experimental Farm of the Heilongjiang Fisheries Research Institute. Mirror carp were stocked in two of the trial ponds in June 2001 at a density of 3,000 fish per mu, together with 1,000 silver carp fry per mu. Mirror carp in the third trial pond were mistakenly stocked at approximately 4,600 per mu. Fish in all three trial ponds were of uniform size and age at stocking.

Mirror carp were fed a 41% crude protein, 11% crude fat (41/11) aquafeed in crumble form from the time of fish stocking in ponds until fish size 2 g (Table 1). At fish size >2 g, mirror carp were fed the ASA 36% crude protein and 7% crude fat (36/7) fingerling feed in extruded, floating pellet form (Table 2). Both feeds were formulated by ASA and produced by Fwusow Group in their aquafeed mill in Xiamen, Fujian Province. Feeding rate and frequency were in accordance with the ASA standard feeding table for common carp, with fish in the three replicate ponds scheduled to receive an identical amount of feed each day.

Trial management was based on the ASA 80:20 pond production model. Fish in all ponds were sampled once per month on the same date each month. At the conclusion of the trial, all ponds were drained and the mirror 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 ROI were calculated at the end of the trial.

RESULTS

Mirror carp were fed a total of 85 days between 30 June and 23 September 2001. Mirror carp grew from 0.6 g to an average weight of 165 g during this feeding period in the two ponds stocked with 3,000 mirror carp per mu (Figure 1; Table 3). Gross production averaged 405.5 kg/mu (6,083 kg/ha) for mirror carp and 92.3 kg/mu (1,385 kg/ha) for silver carp (Table 3). The ratio of fed mirror carp to filtering silver carp at harvest was 81:19. Average mirror and silver carp survival rates were 82.2% and 75.0%, respectively. Average FCR for mirror carp with the soymeal-based feeds was 1.24:1.

Net economic return was RMB 1,305.50 per mu at a market price of RMB 8.0/kg for mirror carp and RMB 4.0/kg for silver carp (Table 3). ROI averaged 56.4% for the two trial ponds (Table 3).

Mirror carp grew from 0.6 g to 95.8 g in the one pond stocked at approximately 4,600 mirror carp per mu. Gross production was 358 kg/mu (5,370 kg/ha) for mirror carp and 90 kg/mu (1,350 kg/ha) for silver carp (Table 3). The ratio of fed mirror carp to filtering silver carp at harvest was 80:20. FCR for mirror carp with the soymeal-based feeds was 1.26:1. Net economic return and ROI for this trial pond were RMB 1,055 per mu and 48.6%, respectively.

SUMMARY AND CONCLUSIONS

Mirror carp exhibited excellent growth, FCR, survival and economic return when cultured using the ASA 80:20 pond production model and the combination of soy-based 41/11 fry and 36/7 fingerling feeds. Average growth to 165 g in 85 days was excellent for the northeastern region of China, where average morning water temperature was only 18.5° C in the last 23 days of the mirror carp culture period. Harbin is located at 46° N. latitude.

ACKNOWLEDGEMENTS

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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

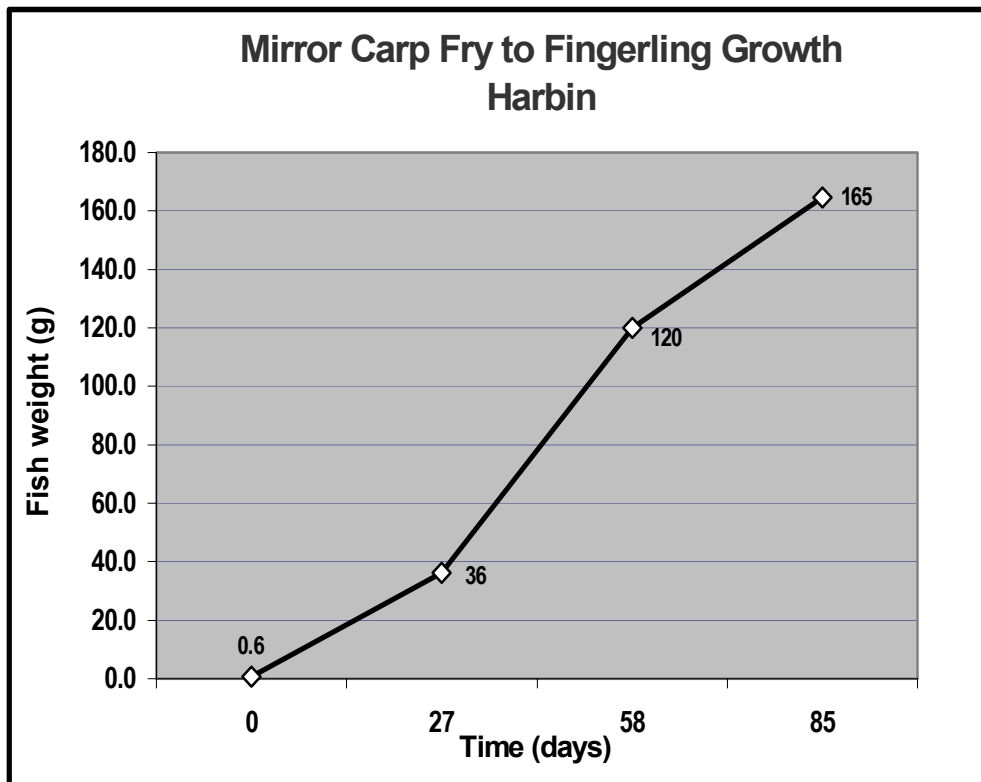


FIGURE 1. Growth curve for mirror carp fingerlings produced in Harbin, northeastern China, with soymeal-based fry and fingerling aquafeeds. Mirror carp grew from 0.6 g to 165 g in 85 days with an average feed conversion ratio of 1.24:1.

Table 1. Formula for the ASA 41/11, soymeal-based fry feed used in the 2001 mirror carp demonstration feeding trial at the Experimental Farm of the Heilongjiang Fisheries Research Institute in Harbin, Heilongjiang Province, China. The feed was fed in crumble form to fish from size 0.6 g to 2.0 g.

Ingredient	41/11 Fry Feed ¹
Soybean meal 47.5	46.3
Corn gluten meal 60%	15.0
Fishmeal, Anchovy 65/10	14.0
Wheat, SWW	13.0
Fish oil	4.03
Soy oil	4.00
Soy lecithin	1.50
Ca phosphate mono	1.70
Vit PMX Roche 2118	0.20
Min PMX F-1	0.25
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. 41/11 indicates 41% crude protein and 11% crude fat.

Table 2. Formula for the ASA 36/7, soymeal-based fingerling feed used in the 2001 mirror carp demonstration feeding trial at the Experimental Farm of the Heilongjiang Fisheries Research Institute in Harbin, Heilongjiang Province, China. The feed was fed in extruded, floating pellet form to fish from size 2.0 g.

Ingredient	36/7 Fingerling Feed ¹
Soybean meal 47.5	46.3
Wheat, SWW	19.0
Corn gluten meal 60%	10.0
Fishmeal, Anchovy 65/10	8.0
Wheat midds 15%	8.0
Fish oil	4.58
Soy lecithin	1.50
Ca phosphate mono	2.20
Vit PMX Roche 2118	0.15
Min PMX F-1	0.25
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. 36/7 indicates 36% crude protein and 7% crude fat.

TABLE 3. Results of the 2001 ASA aquaculture trial at the Experimental Farm of the Heilongjiang Fisheries Research Institute in Harbin that demonstrated fry to fingerling pond growth performance of mirror carp using the ASA 80:20 production model and soymeal-based fry and fingerling aquafeeds.

Pond No.	CoC 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 (%)
				CoC	SiC ²	CoC	SiC	CoC	SiC			
2	0.6	3,000	85	159	172	394	95	82.6	74	1.26	1223	52.9
3	0.6	3,000	85	170	162	417	92	81.8	76	1.22	1388	59.9
Mean	0.6	3,000	85	165	167	405	94	82.2	75	1.24	1305	56.4
1	0.6	4,600	85	96	158	358	90	----	76	1.26	1055	48.6

¹CoC = Mirror carp

²SiC = Silver carp

³P_G = Gross Production