

# **Mirror Carp Fingerling to Market Production in Ponds in Harbin with Soy-Based Feeds Results of ASA/China 2002 Feeding Trial 35-02-101**

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## **ABSTRACT**

A feeding trial was conducted in Harbin, Heilongjiang Province, to demonstrate fingerling to market growth performance of mirror carp using the ASA 80:20 pond production model and the ASA all-plant protein, soymeal-based growout feed. Harbin is located at approximately 46° north latitude. Fish were stocked in three ponds of size 5.4-mu per pond at a density of 400 mirror carp and 100 silver carp per mu. Mirror carp grew from 149 g to an average weight of 1,073 g per fish in 140 days of feeding. Gross production averaged 365 kg/mu for mirror carp and 62 kg/mu for silver carp. Average survival rates for mirror carp and silver carp were 86% and 81%, respectively. Mirror carp FCR with the soymeal-based feeds averaged 1.24:1. Average net economic return was RMB 487 per mu, for an average return on investment (ROI) of 23.2%. Results of the feeding demonstration showed that mirror carp exhibited good growth performance and FCR with the ASA soymeal-based feed and 80:20 production technology. Mirror carp reached the target market size and had good meat quality, body color and body conformation. The use of extruded, floating feed significantly reduced labor costs, lowered fish FCR, avoided feed waste, improved water quality, and allowed production of healthy and disease-free fish without the use of drugs or chemicals.

## **INTRODUCTION**

The American Soybean Association (ASA), in cooperation with the Heilongjiang Provincial Fisheries Extension Center and its demonstration fish farm, and the China National Fisheries Extension Center (NEC), conducted a five-month pond feeding trial with mirror carp. The objective of the trial was to demonstrate mirror carp growth and economic performance from fingerling to market stages with the ASA 32/6 soymeal-based growout feed and the ASA 80:20 pond production model.

## **MATERIALS AND METHODS**

Three ponds of average size 5.4-mu at the Demonstration Fish Farm of the Heilongjiang Provincial Fisheries Extension Center in Harbin, Heilongjiang Province, were used for the feeding trial. This farm is located at approximately 46° north latitude. Pond water depth averaged approximately 1.5 m. All ponds were equipped with water exchange and stand-by aeration. The ponds were operated based on the zero water exchange management concept in which water was added during the production cycle only to replace seepage and evaporation losses.

Fish were 149-g mirror carp fingerlings produced at the Experimental Farm of the Heilongjiang Fisheries Research Institute in a 2001 ASA feeding trial. Mirror carp were stocked in the three trial ponds in April at a density of 400 fish per mu, together with 100 silver carp fingerlings per mu. Fish in all three trial ponds were of uniform size and age at stocking. Target market size for the mirror carp was 1,000 g per fish.

Mirror carp were fed the ASA 32/6 all-plant protein growout feed in extruded, floating pellet form (Table 1). The feed was formulated by ASA and produced by Cargill in Jiangsu 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 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 140 days between 6 May and 25 September 2002. Mirror carp grew from 149 g to an average weight of 1,073 g during this feeding period (Figure 1; Table 2). Gross production averaged 365.4 kg/mu (5,481 kg/ha) for mirror carp and 61.6 kg/mu (924 kg/ha) for silver carp (Table 2). Average mirror and silver carp survival rates were 85.5% and 81.3%, respectively. Average FCR for mirror carp with the 32/6 soymeal-based feed was 1.24:1.

Net economic return averaged RMB 487 per mu at a market price of RMB 6.6/kg for mirror carp and RMB 2.8/kg for silver carp (Table 2). ROI averaged 23.2% for the three trial ponds (Table 2).

## **SUMMARY AND CONCLUSIONS**

Mirror carp exhibited excellent growth and feed conversion efficiency using the ASA 80:20 pond production model and the soy-based 32/6 growout feed. Average growth to 1,073 g in 140 days was excellent for the northeastern region of China, where average daily water temperature in the first and last months of the trial was below 20°C. Harbin is located at 46° N. latitude. In addition, well water was used to culture fish. Because the well water was cool, fish grew slowly early in season.

The extruded, soy-based feed yielded lower FCR (1.24) than local sinking feeds (1.6-2.0), and resulted in lower feed cost per kilogram of fish produced. Fish only had to be fed twice daily with the extruded feed, compared to four times daily with local sinking feeds. In addition, no drugs or chemicals were required during the trial, which yielded high quality “green” fish without contamination.

Mirror carp were reported to have excellent meat quality and good body color and conformation. Meat quality was reported to be better than with local sinking feed. The fish had good consumer acceptance in the Harbin market.

The cooperators applied zero water exchange technology to the trial to reduce water use. No disease problems were encountered and water quality remained good without flushing. Better water quality management was obtained by using a dissolved oxygen meter to monitor pond oxygen content on a daily basis. This resulted in energy savings from reduced pump and aerator use.

The cooperators stated it was more practical to stock larger fingerlings to advance the market time and increase economic return, and that this should be applied to other culture species to yield better market value.

## 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

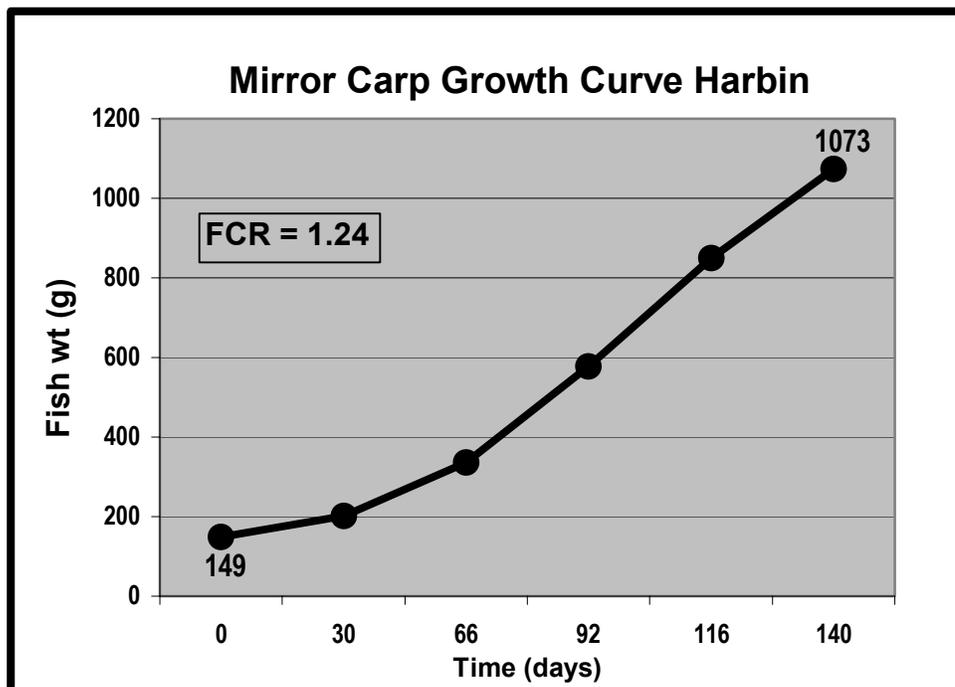


FIGURE 1. Growth curve for mirror carp produced in Harbin, northeastern China, with an all-plant protein, soymeal-based aquafeed. Mirror carp grew from 149 g to 1,073 g in 140 days with an average feed conversion ratio of 1.24:1.

Table 1. Formula for the ASA 32/6, soymeal-based growout feed used in the 2002 mirror carp demonstration feeding trial in Harbin, Heilongjiang Province, China. Cargill feed mill produced the feed in extruded, floating pellet form.

Ingredient	32/6 Growout Feed <sup>1</sup>
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

<sup>1</sup>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 in Harbin that demonstrated fingerling to market pond growth performance of mirror carp using the ASA 80:20 production model and soymeal-based growout feed.

Pond No.	CoC <sup>1</sup> stocking size (g)	Stocking rate (fish/mu)	No. days fed	Harvest wt. (g)		P <sub>G</sub> <sup>3</sup> (kg/mu)		Survival (%)		FCR	Net (RMB/mu)	ROI (%)
				CoC	SiC <sup>2</sup>	CoC	SiC	CoC	SiC			
1	149	400	140	1040.9	753	357.0	62.5	85.8	83	1.27	434	20.7
2	149	400	140	1175.7	749	372.7	64.4	79.3	86	1.21	543	25.9
3	149	400	140	1001.3	770	366.5	57.8	91.5	75	1.23	484	23.1
Mean	149	400	140	1072.6	757	365.4	61.6	85.5	81	1.24	487	23.2

<sup>1</sup>CoC = Mirror carp

<sup>2</sup>SiC = Silver carp

<sup>3</sup>P<sub>G</sub> = Gross Production