

# **Black Carp Fingerling Production with Soy-Maximized Feeds**

## **Results of ASA/China 2004 Feeding Trial 35-04-82**

Michael C. Cremer, Zhang Jian and Zhou Enhua  
American Soybean Association  
Room 902, China World Tower 2  
No. 1 Jianguomenwai Avenue  
Beijing 100004, P.R. China

### **ABSTRACT**

A feeding demonstration was conducted in Harbin, Heilongjiang Province, to evaluate fry to fingerling production of black carp using the ASA 80:20 pond production model and soy-maximized feeds. Fish were stocked in three, 5-mu (0.33-ha) ponds at a density of 4,000 black carp and 1,000 silver carp per mu (60,000 black carp and 15,000 silver carp per ha). Black carp grew from 0.06 g to an average weight of 37.4 g per fish in 99 days of feeding. Gross production averaged 141 kg/mu (2,115 kg/ha) for black carp and 25.4 kg/mu (381 kg/ha) for silver carp. Average survival rates for black carp and silver carp were 94.3% and 67.5%, respectively. FCR for black carp fed the soy-maximized fry and fingerling feeds averaged 0.95:1. Black carp weaned to extruded feed in 4-5 days, and fed aggressively on floating feed pellets. Production results suggest that stocking density in fingerling production ponds can be at least doubled, from 4,000 to 8,000 fish per mu.

## INTRODUCTION

The American Soybean Association (ASA), in cooperation with the Heilongjiang Provincial Fisheries Extension Center and the China National Fisheries Extension Center (NEC), conducted a pond feeding demonstration with black carp. The objectives were to demonstrate black carp feeding performance on extruded floating feed, and to evaluate black carp growth and economic performance from fry to fingerling stages with soy-maximized feeds using the ASA 80:20 pond production model and zero water exchange.

## MATERIALS AND METHODS

Three earthen ponds of size 5.0-mu (0.33-ha)<sup>1</sup> each at the demonstration fish farm of the Heilongjiang Provincial Fisheries Extension Center in Harbin, Heilongjiang Province, were used for the feeding demonstration. Pond water depth averaged approximately 1.5 m. All ponds were equipped with water exchange and stand-by aeration.

Fish were 0.06-g black carp purchased by the Heilongjiang demonstration fish farm from Shanghai. Black carp were stocked in the three trial ponds at a density of 4,000 fish per mu (60,000/ha), together with 1,000 silver carp per mu (15,000/ha). Fish in all three trial ponds were of uniform size and age at stocking. Target market size for the black carp was 60 g per fish.

Black carp were fed the ASA 41/11 soymeal-based fry feed in crumble form from fish size 0.06 g to fish size 3 g (Table 1). At 3 g, the fish were weaned to the ASA 36/7 soy-maximized fingerling feed (Table 2). This feed was fed in extruded, floating pellet form. Black carp were weaned to the extruded 36/7 feed over a five-day period. Feed pellet size was increased as the fish grew, with pellet size maintained at approximately one-half the full open mouth size of the fish. Fish were fed to satiation twice daily, with fish in the three replicate ponds receiving an identical amount of feed at each feeding. The feeds were formulated by ASA and produced by the Fwusow feed mill in Xiamen, Fujian Province.

Trial management was based on the ASA 80:20 pond production model, together with zero water exchange due to the water shortage situation in northeastern China. 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 black carp and silver carp in each pond were 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.

---

<sup>1</sup> 15 mu = 1.0 hectare (ha)

## **RESULTS**

Black carp were fed a total of 99 days between 19 June and 25 September 2004. Black carp grew from 0.06 g to an average weight of 37.4 g during this feeding period (Table 3). Gross production averaged 141 kg/mu (2,115 kg/ha)<sup>2</sup> for black carp and 25.4 kg/mu (381 kg/ha) for silver carp (Table 3). Average black carp and silver carp survival rates were 94.3% and 67.5%, respectively. Average FCR for black carp with the soy-maximized fry and fingerling feeds was 0.95:1 (Table 3).

Net economic return averaged RMB 975 per mu (\$1,770/ha) at a market price of RMB 16/kg (\$1.94/kg)<sup>3</sup> for black carp fingerlings and RMB 4/kg (\$0.48/kg) for silver carp fingerlings (Table 3). ROI averaged 70.5% for the three trial ponds (Table 3).

## **SUMMARY AND CONCLUSIONS**

Black carp fed aggressively on the extruded, floating fingerling feed and exhibited rapid growth with the soy-maximized feeds. Black carp easily weaned from crumble to extruded feed within five days. Results indicate that stocking density in black carp fingerling ponds can be significantly increased over the demonstrated 4,000/mu rate. Black carp production of 141 kg/mu in this trial should be able to be increased 2 to 2.5 times without a decline in fish performance. Increasing stocking density should further improve economic return, while optimizing pond space utilization. Black carp fingerlings yielded a higher economic return in 2004 than either common or crucian carp in the Harbin region, and are a good species for feed-based production in this region.

## **ACKNOWLEDGEMENTS**

ASA gratefully acknowledges the Heilongjiang Provincial Fisheries Extension Center and the China National Fisheries Extension Center (NEC) for their assistance and support for this aquaculture trial.

---

<sup>2</sup> Kg/mu x 15 = kg/ha

<sup>3</sup> RMB 8.26 = \$1.00

**ASA FY04 Harbin Black Carp Demonstration Trial**

Table 1. Formula for the ASA 41/11<sup>1</sup>, soymeal-based fry feed used in the 2004 black carp fry to fingerling feeding trial in Harbin, Heilongjiang Province, China. Fwusow/Xiamen feed mill produced the feed in crumble form.

Ingredient	Percent of total
Soybean Meal 47.5	46.3
Wheat, SWW	13.0
Corn Gluten Meal 60%	15.0
Fishmeal, Anchovy 65/10	13.5
Fish Oil, Unspec.	3.93
Soy Oil	4.0
Soy lecithin	1.5
Ca Phosphate Mono	1.7
Vit PMX F-2	0.75
Min PMX F-1	0.25
Stay C-35%	0.05
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. 41/11 indicates 41% crude protein and 11% crude lipid.

**ASA FY04 Harbin Black Carp Demonstration Trial**

Table 2. Formula for the ASA 36/7<sup>1</sup>, soymeal-based fingerling feed used in the 2004 black carp fry to fingerling feeding trial in Harbin, Heilongjiang Province, China. Fwusow/Xiamen feed mill produced the feed in extruded, floating pellet form.

---

Ingredient	Percent of total
Soybean Meal 47.5	46.0
Wheat, SWW	19.0
Corn Gluten Meal 60%	10.0
Wheat middlings	8.0
Fishmeal, Anchovy 65/10	8.0
Fish Oil, Unspec.	4.0
Ca Phosphate Mono	2.2
Soy lecithin	1.75
Vit PMX-F2	0.75
Min PMX F-1	0.25
Stay C-35%	0.03
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. 36/7 indicates 36% crude protein and 7% crude lipid.

**ASA FY04 Harbin Black Carp Demonstration Trial**

Table 2. Results of the 2004 ASA aquaculture feeding demonstration in Heilongjiang Province that demonstrated fry to fingerling pond growth performance of black carp using the ASA 80:20 production model and soymeal-based feeds.

Pond No.	BkC <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 income (RMB/mu)	ROI (%)
				BkC	SiC <sup>2</sup>	BkC	SiC	BkC	SiC			
1	0.06	4,000	99	36.4	41.2	141.5	26.2	97.2	63.6	0.94	986	71.3
2	0.06	4,000	99	40.0	37.6	144.4	25.5	90.3	67.8	0.93	1,030	74.5
3	0.06	4,000	99	35.9	34.5	137.1	24.5	95.4	71.0	0.98	909	65.7
Mean	0.06	4,000	99	37.4	37.7	141.0	25.4	94.3	67.5	0.95	975	70.5

<sup>1</sup>BkC = Black Carp

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

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