

# **Grass Carp Production with Soy-Maximized Feed**

## **Results of ASA/China 2004 Feeding Trial 35-04-97**

Michael C. Cremer, Zhou Enhua and Zhang Jian  
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 Shenyang, Liaoning Province, to demonstrate fingerling to market growth performance of grass carp using the ASA 80:20 pond production model and ASA soy-maximized grass carp feed. Fish were stocked in three, 2.4-mu (0.16-ha) ponds at a density of 500 grass carp and 100 silver carp per mu (7,500 grass carp and 1,500 silver carp per ha). Grass carp grew from 87 g to an average weight of 1,126 g per fish in 108 days of feeding. Gross production averaged 535 kg/mu (8,025 kg/ha) for grass carp and 136 kg/mu (2,036 kg/ha) for silver carp. Average survival rates for grass carp and silver carp were 95% and 100%, respectively. Grass carp FCR with the all-plant protein, soy-maximized feed averaged 1.13:1. Average net economic return was RMB 1,674 per mu (\$3,040/ha) at market prices of RMB 8.4/kg (\$1.02/kg) for grass carp and RMB 3.2/kg (\$0.39/kg) for silver carp. Return on investment (ROI) for the three demonstration ponds averaged 51.4%. Grass carp exhibited rapid growth, aggressive feeding behavior and efficient FCR with a soy-maximized feed formulated with standard soybean meal (44% crude protein) and soy hulls as the primary feed ingredients.

## **INTRODUCTION**

The American Soybean Association (ASA), in cooperation with the Shenyang Municipal Fishery Research Institute (SMFRI), conducted a four-month pond feeding trial with grass carp. The objective of the trial was to demonstrate grass carp growth and economic performance from fingerling to market stages with a soy-maximized feed and the ASA 80:20 pond production model.

## **MATERIALS AND METHODS**

Three earthen ponds of size 2.4-mu (0.16-ha) each at the SMFRI Experimental Fish Farm in Shenyang, Liaoning Province, were used for the feeding trial. Pond water depth averaged approximately 1.5 m. All ponds were equipped with water exchange and stand-by aeration.

Fish were 87-g grass carp produced at the SMFRI Experimental Fish Farm. Grass carp were stocked in the three trial ponds at a density of 500 fish per mu (7,500/ha), together with 100 silver carp per mu (1,500/ha). Fish in all three trial ponds were of uniform size and age at stocking. Target market size for the grass carp was 800 g per fish.

Grass carp were fed an all-plant protein, soy-based feed containing 32% crude protein and 3% crude lipid (32/3) (Table 1). The feed was formulated to maximize soy product use, and contained 50% standard soybean meal (44% crude protein) and 16% soy hulls as percentages of total feed ingredients. The feed was fed in extruded, floating pellet form. 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 Fwusow in Fujian Province.

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 grass 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 ROI were calculated at the end of the trial.

## **RESULTS**

Grass carp were fed a total of 108 days between 7 May and 22 August 2004. Grass carp grew from 87 g to an average weight of 1,126 g during this feeding period (Table 2). Gross production averaged 535 kg/mu (8,025 kg/ha) for grass carp and 135.7 kg/mu (2,036 kg/ha) for silver carp (Table 2). Average grass carp and silver carp survival rates

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were 95.1% and 100%, respectively. Average FCR for grass with the soy-maximized feed was 1.13:1 (Table 2).

Net economic return for the three demonstration ponds averaged RMB 1,674 per mu (\$3,040/ha) at a market price of RMB 8.4/kg (\$1.02/kg) for grass carp and RMB 3.2/kg (\$0.39/kg) for silver carp (Table 2). ROI averaged 51.4% for the three trial ponds (Table 2).

## **SUMMARY AND CONCLUSIONS**

Grass carp exhibited rapid growth and efficient feed conversion with the ASA 32/3 diet, exceeding the target market size of 800 g by 41% in only 108 days. The 1.13:1 FCR indicated excellent feed conversion efficiency with the all-plant protein, soymeal based feed that was formulated to maximize soy product use. Grass carp in this trial exhibited growth and FCR rates similar to previous ASA grass carp trials using the 32/3 soy-maximized feed. Grass carp remained healthy, without incidence of disease, and water quality remained good, with no water exchange required, throughout the trial.

Grass carp fingerling to market production using the 32/3 soy-maximized feed and ASA 80:20 pond technology has been demonstrated to be profitable throughout China, through testing at locations in Heilongjiang, Liaoning, Beijing, Anhui and Guangdong Provinces.

## **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

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Table 1. Formula for the ASA 32/3<sup>1</sup>, all-plant protein, soy-maximized feed used in the 2004 grass carp pond feeding trial in Shenyang, Liaoning Province, China. The feed is a reduced energy, high fiber feed fed in extruded, floating pellet form.

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Ingredient	Percent of total
Soybean Meal 44	50.0
Wheat, SWW	20.6
Soy Hulls	16.0
Corn Gluten Meal 60%	8.9
Ca Phosphate Mono	2.43
Fish Oil, Unspec.	1.30
Vit PMX F-2	0.50
Min PMX F-1	0.25
Ethoxyquin	0.02
TOTAL	100.00

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<sup>1</sup>The numerical component of the feed description refers to the percentage of protein and fat, respectively, in the ration, i.e. 32/6 indicates 32% crude protein and 3% crude fat.

**ASA FY04 Shenyang Grass Carp Demonstration Trial**

Table 2. Results of the 2004 ASA aquaculture trial in Shenyang that demonstrated fingerling to market pond growth performance of grass carp using the ASA 80:20 production model and a 32/3 soy-maximized feed fed in extruded, floating pellet form.

Pond No.	GrC <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 (%)
				GrC	SiC <sup>2</sup>	GrC	SiC	GrC	SiC			
1	87	500	108	1,193	1,405	560.7	140.5	94.0	100	1.07	1,905	58.5
2	87	500	108	1,044	1,450	500.1	145.0	95.8	100	1.21	1,410	43.3
3	87	500	108	1,141	1,215	544.3	121.5	95.4	100	1.10	1,706	52.4
Mean	87	500	108	1,126	1,357	535.0	135.7	95.1	100	1.13	1,674	51.4

<sup>1</sup>GrC = Grass Carp

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

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