

Use of a Soy-Maximized Feed for the Production of Pacu *Piractus branchyomum*

Results of ASA/China 2004 Feeding Trial 35-04-86

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 trial was conducted in Nanjing, Jiangsu Province, China to demonstrate advanced fingerling to market growth performance of pacu *Piractus branchyomum* using a soy-maximized, all-plant protein feed. Fish were stocked in three, 4-mu (0.27-ha) ponds at a density of 800 pacu and 100 silver carp per mu (12,000 pacu and 1,500 silver carp per ha). Pacu grew from 149 g to an average weight of 628 g per fish in 54 days of feeding. Gross production averaged 496 kg/mu (7,440 kg/ha) for pacu and 108 kg/mu (1,620 kg/ha) for silver carp. Average survival rates for pacu and silver carp were 98.7% and 100%, respectively. The soy-maximized feed, formulated to have 32% crude protein and 6% crude fat with soybean meal as the primary protein source, yielded a FCR with pacu of 1.12:1. Non feed-taking silver carp served as a service species and provided additional fish production for added economic return. Average net economic return was RMB 1,809 per mu (\$3,285/ha). Average return on investment was 59.9%. Pacu demonstrated excellent growth performance and feed conversion efficiency with the ASA soy-maximized feed and 80:20 production technology in this trial. Pacu produced were uniform in size with good body color and conformation. The demonstrated short culture cycle allows for the production of two crops of pacu per pond during a single growing season in the temperate climate of China.

INTRODUCTION

The American Soybean Association (ASA), in cooperation with Jiangpu County Fishery Extension Station, the Jiangpu County Fish Stock and Breeding Farm in Nanjing, the Jiangsu Provincial Fisheries Extension Center, and the China National Fisheries Extension Center (NEC), conducted a two-month pond feeding trial with pacu *Piractus branchyomum*. The objective of the trial was to demonstrate pacu growth and economic performance from advanced fingerling to market stages with the ASA 32/6 soy-maximized growout feed and the ASA 80:20 pond production model.

MATERIALS AND METHODS

Three ponds of average size 4.0-mu (0.27-ha) at the Jiangpu County Fish Stock and Breeding Farm in Nanjing, Jiangsu 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. All ponds had clean bottoms with no organic accumulation.

Fish were 149-g pacu produced at the Jiangpu County Fish Stock and Breeding Farm in Nanjing. Pacu were stocked in the three trial ponds in early June at a density of 800 fish per mu (12,000/ha)¹, together with 100 silver carp fingerlings per mu (1,500/ha). Fish in all three trial ponds were of uniform size and age at stocking. Target market size for pacu was 500 g per fish.

Pacu were fed the ASA 32/6 all-plant protein growout feed in extruded, floating pellet form (Table 1). The feed was formulated by ASA to maximize dehulled soybean meal use. The feed was produced by Fwusow feed mill in Xiamen, Fujian 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 pacu 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 return on investment (ROI) were calculated at the end of the trial.

RESULTS

Pacu were fed a total of 54 days between 3 June and 26 July 2004. Pacu grew from 149 g to an average weight of 628 g during this feeding period (Table 2). Gross production averaged 496 kg/mu (7,440 kg/ha)² for pacu and 108 kg/mu (1,620 kg/ha) for silver carp

¹ 15 mu = 1 ha

² Kg/mu x 15 = kg/ha

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(Table 2). Average pacu and silver carp survival rates were 98.7% and 100%, respectively. Average FCR for pacu with the 32/6 soy-maximized feed was 1.12:1. Harvested pacu were uniform in size and had good body coloration and conformation.

Average feed cost per kilogram of fish growth was RMB 4.59 (\$0.56/kg)³. Net economic return for the 54-day production cycle averaged RMB 1,809 per mu (\$3,285/ha) at a market price of RMB 8.8/kg (\$1.07/kg) for pacu and RMB 4.3/kg (\$0.52) for silver carp (Table 2). ROI averaged 59.9% for the three trial ponds (Table 2).

SUMMARY AND CONCLUSIONS

Pacu exhibited excellent growth and feed conversion efficiency with the 32/6 soy-maximized feed and the ASA 80:20 pond production model. Pacu attained an average weight of 628 g in just 54 days of culture from a stocking size of 149 g. This surpassed the target market size of 500 g by 25%, and demonstrated the excellent production potential of this species with a soy feed.

The demonstrated short culture cycle allows for the production of two crops of pacu per pond during a single growing season in the temperate climate of China. Stocking of 150-g advanced fingerlings, which can be produced in year one of a two-year production cycle, would permit two fish harvests at 55 days per production cycle, with 10 days between crops for harvesting the first crop and preparing ponds for the second crop. This can be accomplished within the constraints of a 01 June to 30 September production season in central China.

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³ RMB 8.26 = \$1.00

Table 1. Formula for the ASA 32/6¹, soymeal-based growout feed used in the 2004 pacu demonstration feeding trial in Nanjing, Jiangsu Province, China. Fwusow/Xiamin feed mill in Fujian Province produced the feed in extruded, floating pellet form.

Ingredient	Percent of total
Soybean meal 47.5	52.8
Wheat, SWW	23.2
Wheat middlings	10.0
Corn gluten meal 60%	6.0
Fish oil	3.5
Soy lecithin	1.00
Ca phosphate mono	2.70
Vit PMX F-2	0.50
Min PMX F-1	0.25
Stay C-35%	0.03
Ethoxyquin	0.02
Total	100.00

¹The 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.

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Table 2. Results of the 2004 ASA aquaculture trial in Nanjing that demonstrated advanced fingerling to market pond growth performance of pacu using a soy-maximized 32/6 feed and the ASA 80:20 production model.

Pond No.	Pacu stocking size (g)	Stocking rate (fish/mu)	No. days fed	Harvest wt. (g)		P_G^2 (kg/mu)		Survival (%)		FCR	Net (RMB/mu)	ROI (%)
				Pacu	SiC ¹	Pacu	SiC	Pacu	SiC			
1	149	800	54	645	1,055	516.0	125.5	100	100	1.05	2060	68.2
2	149	800	54	620	835	491.0	106.0	99	100	1.14	1757	58.2
3	149	800	54	620	725	481.1	92.5	97	100	1.17	1610	53.3
Mean	149	800	54	628	872	496.0	108.0	98.7	100	1.12	1809	59.9

¹SiC = Silver carp

²P_G = Gross Production