
Second Year Largemouth Bass Growth Performance on a High Soy Inclusion Feed

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INTRODUCTION

A feeding trial was conducted cooperatively by the American Soybean Association International Marketing (ASA-IM) program and the Shanxi Provincial Fishery Extension Center to test feed-based production of advanced fingerling to market largemouth bass in ponds with a high soy-inclusion marine fish feed developed by ASA-IM. The trial was conducted at the Taiyuan Municipal Fish Stock Farm in Taiyuan, Shanxi Province, China.

FEEDING TRIAL PROTOCOLS

The trial was conducted using the ASA-IM 80:20 pond technology model, with largemouth bass as the fed species and silver carp as the service species. Three, 2.0-mu (0.13-ha) ponds were used for the feeding trial. Largemouth bass advanced fingerlings produced at the Taiyuan Municipal Fish Stock Farm were stocked in the trial ponds on 4 May 2007 at a density of 1,000 fish per mu (15,000/ha), together with 100 silver carp per mu (1,500/ha). Mean weight of the largemouth bass at stocking was 155 g. Mean weight of the silver carp at stocking was 100 g. Target size for largemouth bass for the trial was 400 g.

Largemouth bass were fed the ASA-IM 43/12¹ marine fish growout feed in extruded, floating pellet form (Tables 1, 2 and 3). Feed pellet size was increased appropriately as the fish grew, with pellet size maintained at approximately one-half the full open mouth size of the fish. Largemouth bass were fed to satiation twice daily, with fish in the three trial ponds receiving the same amount of feed at each feeding. The feed was least-cost formulated by ASA-IM, and produced for ASA-IM by Fenghua Feed Mill in Shunde, Guangdong Province.

Data on fish survival, gross and net production, average fish weight, and feed conversion efficiency were obtained at harvest for fish in each pond. All fish from each pond were

¹The numerical component of the feed description refers to the percentage of protein and fat, respectively, in the ration, i.e. 43/12 indicates 43% crude protein and 12% crude fat.

weighed at harvest and sub-samples from each pond counted to get the average fish weight for each species in each pond population. Data on production input costs was recorded throughout the trial to determine the economic return with the ASA-IM feed and technology.

FEEDING TRIAL RESULTS

Largemouth bass grew from 155 g to an average weight of 354 g per fish during 159 days of feeding between May and October (Table 4). Largemouth bass production averaged 349.8 kg/mu (5,247 kg/ha). The ponds yielded an additional 82.9 kg/mu (1,244 kg/ha) of silver carp at harvest. The average survival rate for largemouth bass and silver carp in the three trial ponds was 98.8% and 199%, respectively. The average feed conversion ratio (FCR) for largemouth bass with the 43/12 feed was 1.43:1.

The trial yielded an average net economic return of RMB 1,149 per mu (\$2,298/ha) at a market value of RMB 24/kg (\$3.20/kg) for largemouth bass and RMB 4/kg (\$0.53/kg) (Table 4). Return on investment (ROI) for the three trial ponds averaged 15.2%.

SUMMARY AND CONCLUSIONS

Largemouth bass did not reach the target harvest size of 400 g in this trial. Overall fish growth was slow, with an average daily weight gain of 1.26 g during the 159 days of feeding. Feeding response was reported by the cooperator to have slowed as the fish grew, but sampling data indicates growth was steady until the later stages of the trial. Bass growth slowed somewhat in the next to last month of the trial, and substantially in the last month. The reduction in bass growth in the later stages of the trial was at least partially attributed to sexual maturity, as significant gonad development was noted in female bass at harvest.

Although the bass grew slowly, they exhibited acceptable feed conversion efficiency with the 43/12 diet, yielding an average FCR of 1.43:1 for the 200 g of growth attained. Water quality remained good throughout the trial as a result of the high quality of the extruded feeds. No drugs or chemicals were used in the trial, allowing the harvested fish to conform to high quality “green” product standards.

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Table 1. Formula for the ASA-IM 43/12 marine fish growout feed fed to largemouth bass in the 2007 feeding trial conducted in Taiyuan, Shanxi Province, China. The feed was produced as a least-cost formulation by Fenghua Feed Mill, Guangdong Province, under supervision of ASA-IM. The feed was produced in extruded, floating pellet form.

Ingredient	Percent of total
Soybean Meal 48	30.00
Fish Meal, Anchovy 67/8	30.00
Wheat Flour 15.4	21.00
Fish Oil, Anchovy w/ eq 200	6.00
Corn Gluten Meal 63.2	5.00
Blood Meal spr 90/0.5	2.30
Soy Oil	2.30
Soy Lecithin/Corn Blend	2.00
Calcium Phos. Mono 21%	0.50
Vit PMX F-2	0.50
Min PMX F-1	0.25
Stay C – 35%	0.06
Mold Inhibitor	0.05
Antioxidant	0.04
TOTAL	100.00

Table 2. Calculated nutritional profile of the ASA-IM 43/12 marine fish growout feed used in the 2007 largemouth bass pond feeding trial in Taiyuan, Shanxi Province, China. The feed was produced in extruded, floating pellet form.

Nutrient	Value, As Fed
DE Fish (extruded)	3364
NFE	24.22
Starch	12.74
Protein, crude	43.06
Protein, digestible	40.54
DE:DP Ratio	8.3:1
Fish Protein	20.10
Soy Protein	14.40
Fat	12.07
W-3 (omega 3 fatty acid)	2.57
W-6 (omega 6 fatty acid)	1.94
Fiber	2.12
Ash	7.64
Calcium	1.30
Phosphorus, available	0.70
Choline	2564
Vitamin C	210
Ethoxyquin	44.50
Arginine	2.59
Lysine	2.80
Methionine	0.98
Methionine + Cystine	1.52
Threonine	1.75
Tryptophan	0.50

Table 3. Vitamin and mineral premix formulations used in the ASA-IM 43/12 marine fish feed used in the 2007 largemouth bass feeding trial in Taiyuan, Shanxi Province. Quantities of vitamins and minerals are per kilogram of premix. Premixes were produced by the Phoenix Feed Mill premix plant in Chengdu, Sichuan Province, under supervision of ASA-IM.

Ingredient	Unit	Amount
<u>Vitamin Premix F-2</u>		
Vitamin A	IU/kg	1,200,000
Vitamin D3	IU/kg	200,000
Vitamin E	IU/kg	20,000
Vitamin K	mg/kg	0
Vitamin C	mg/kg	0
Biotin	mg/kg	40
Choline	mg/kg	0
Folic Acid	mg/kg	1,800
Inositol	mg/kg	0
Niacin	mg/kg	40,000
Pantothenate	mg/kg	20,000
Pyridoxine (B6)	mg/kg	5,000
Riboflavin (B2)	mg/kg	8,000
Thiamin (B1)	mg/kg	8,000
Vitamin B12	mcg/kg	2,000
Ethoxyquin	mg/kg	500
<u>Mineral Premix F-1</u>		
Iron	ppm	40,000
Manganese	ppm	10,000
Copper	ppm	4,000
Zinc	ppm	40,000
Iodine	ppm	1,800
Cobalt	ppm	20
Selenium	ppm	200

Table 4. Results of the 2007 ASA-IM aquaculture trial in Taiyuna, Shanxi Province that evaluated growth performance of largemouth bass in ponds using the ASA 80:20 production model and 43/12 ASA-IM marine fish feed fed in extruded, floating pellet form.

Pond No.	LMB ¹ stocking size (g)	Stocking rate		No. days fed	Harvest wt. (g)		P _G ³ (kg/mu)		Survival (%)		FCR	Net income (RMB/mu) ⁴	ROI (%)
		LMB	SiC ²		LMB	SiC	LMB	SiC	LMB	SiC			
1	155	1,000	100	159	351.4	755	345.6	75.9	98.4	100	1.46	1020	13.5
2	155	1,000	100	159	369.0	827	366.7	82.7	99.4	100	1.31	1554	20.5
3	155	1,00	100	159	341.5	911	337.1	90.1	98.7	100	1.52	873	11.5
Mean	155	1,000	100	159	354.0	831	349.8	82.9	98.8	100	1.43	1149	15.2

¹LMB = Largemouth Bass

²SiC = Silver Carp

³P_G = Gross Production

⁴RMB exchange rate: RMB 7.5 = \$1.00