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## **Demonstration of the ASA-IM 80:20 Technology for Producing Channel Catfish at the Extension Center Fish Farm in Anhui Province**

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### **INTRODUCTION**

A feeding trial was conducted cooperatively by the American Soybean Association International Marketing (ASA-IM) program and the Anhui Provincial Fishery Extension Center to demonstrate feed-based production of channel catfish using the ASA-IM 80:20 pond technology and soy-based feed. The demonstration trial was conducted at the Extension Center Demonstration Fish Farm in Feixi, near Hefei, Anhui Province.

### **FEEDING TRIAL PROTOCOLS**

Three, 5.0-mu (0.33-ha) ponds were used in the feeding trial to demonstrate feed-based production of channel catfish. Channel catfish were stocked in the trial ponds at a density of 800 fish per mu (12,000/ha), together with 100 silver carp per mu (1,500/ha). Mean weights of the channel catfish and silver carp at stocking were 32.5 g and 50 g, respectively. Fish were stocked in the ponds on 1 May 2006, and fed for 152 days with the ASA-IM 32/6<sup>1</sup> feed. The ASA-IM feed is a least-cost formulated, all or primarily plant protein ration that has soybean meal as the primary source of protein. Channel catfish were fed the 32/6 feed to satiation twice daily, with fish in the three trial ponds receiving the same amount of feed at each feeding. All feed was fed in extruded, floating pellet form. Target market size and harvest biomass for channel catfish were 600 g per fish and 480 kg/mu (7,200 kg/ha), respectively.

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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 6% crude fat.

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 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**

Channel grew from 32.5 g to an average weight of 624 g per fish in 152 days of feeding (Table 4). Fish production at harvest averaged 482 kg/mu (7,230 kg/ha) for channel catfish and 69.4 kg/mu (1,041 kg/ha) for silver carp. Channel catfish and silver carp represented 87% and 13%, respectively, of the total harvested fish biomass of 551.4 kg/mu (8,271 kg/ha). Average weight of silver carp from the three trial ponds at harvest was 743 g. The average survival rates for channel catfish and silver carp were 96.5% and 93.3%, respectively.

Channel catfish were fed a total of 515.8 kg of feed per mu (7,737 kg/ha) over the 152-day trial. The feed yielded net catfish growth of 456 kg per mu (6,840 kg/ha) at an average feed conversion ratio (FCR) with the soy-based 32/6 feed of 1.14:1 for the 15 mu of trial ponds.

The trial yielded an average net economic return of RMB 1,698 per mu (\$3,224/ha) at market prices of RMB 10/kg (\$1.27/kg) for channel catfish and RMB 3.4/kg (\$0.43/kg) for silver carp (Table 4). Return on investment (ROI) for the three demonstration ponds averaged 50.6%.

## **SUMMARY AND CONCLUSIONS**

Channel catfish grew well on the soy-based feed and reached the target market size of 600 g in approximately 150 days of feeding. The low FCR of 1.14:1 indicated excellent feed utilization efficiency. Average channel catfish production of 482 kg/mu (7,250 kg/ha) was at a sustainable level, particularly given the low FCR.

Water quality remained good throughout the trial, although some surfacing of fish was noted by the cooperator in August and September. The cooperator reported using a bleaching powder in July to control suspected disease organisms, which is strongly discouraged by ASA-IM. ASA-IM has a policy of no drugs or chemicals in its feeding trials in order to produce an uncontaminated, consumer safe product. This policy was not adhered to by the cooperator in this trial.

The cooperator reported that the soy-based ASA-IM feed and 80:20 technology generated a much better economic return compared to the traditional sinking feed used on the farm.

## **ACKNOWLEDGEMENTS**

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Table 1. Formula for the ASA-IM 32/6 soy-based feed used in the 2006 channel catfish pond feeding trial in Feixi, Anhui Province, China. The feed was produced as a least-cost formulation by Techbank Feed Mill, Shanghai, under supervision of ASA-IM. The feed was fed in extruded, floating pellet form. Feed batch formulations varied slightly during the trial period depending on specific ingredient nutrient profiles and ingredient availability.

Ingredient	Percent of total
Soybean Meal 46%	51.00
Wheat Middlings 14%	14.00
Wheat Flour 11%	12.00
DDGS, 27/10	11.50
Fish Meal, 65/8	3.00
Ca Phosphate Mono 21%	2.00
Soy Oil	1.50
Soy Lecithin	1.50
Corn Gluten Meal 60%	1.50
Fish Oil	1.20
Vit PMX F-2	0.50
Min PMX F-1	0.25
Stay C – 35%	0.03
Ethoxyquin, SQ mixture 6	0.02
TOTAL	100.00

Table 2. Calculated nutritional profile of the ASA-IM 32/6 soy-based feed used in the 2006 channel catfish pond feeding trial in Feixi, Anhui Province, China. The feed was produced in extruded, floating pellet form.

Nutrient	Value, As Fed
DE Fish (extruded)	2369.68
NFE	39.83
Starch	17.89
Protein, crude	32.74
Protein, digestible	29.82
Fish Protein	1.95
Soy Protein	23.46
Fat	6.07
W-3 (omega 3 fatty acid)	0.57
W-6 (omega 6 fatty acid)	2.08
Ash	6.06
Calcium	0.60
Phosphorus, available	0.61
Choline	2469.93
Vitamin C	105.00
Ethoxyquin	134.50
Arginine	2.06
Isoleucine	1.63
Lysine	1.85
Methionine	0.50
Methionine + Cystine	1.00

Table 3. Vitamin and mineral premix formulations used in the ASA-IM 32/6 soy-based feed. Quantities of vitamins and minerals are per kilogram of premix.

Ingredient	Unit	Amount
<b><u>Vitamin Premix F-2</u></b>		
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
<b><u>Mineral Premix F-1</u></b>		
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 2006 ASA-IM aquaculture trial in Feixi, Anhui Province that demonstrated growth performance of channel catfish in ponds using the ASA 80:20 production model and a 32/6 soy-based feed fed in extruded, floating pellet form.

Pond No.	ChC <sup>1</sup> stocking size (g)	Stocking rate (fish/mu)	No. days fed	Harvest wt. (g) ChC SiC <sup>2</sup>	P <sub>G</sub> <sup>3</sup> (kg/mu) ChC SiC	Survival (%) ChC SiC	FCR	Net income (RMB/mu) <sup>4</sup>	ROI (%)
1	32.5	800	152	583 746	445.0 68.6	95.5 92	1.23	1,326	39.5
2	32.5	800	152	635 744	487.8 71.4	96.0 96	1.12	1,764	52.5
3	32.5	800	152	654 741	513.0 68.2	98.0 92	1.06	2,005	59.7
Mean	32.5	800	152	624 743	481.9 69.4	96.5 93	1.14	1,698	50.6

<sup>1</sup>CoC = Channel catfish

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

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

<sup>4</sup>RMB exchange rate: RMB 7.9 = \$1.00