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Production of Songpu Carp (*Cyprinus Carpio var. Songpu*) with the USSEC Soy-based Feed and Zero Water Discharge Technology

Results of USSEC/China 2013 Freshwater Aquaculture Feeding Demonstration

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INTRODUCTION

A pond feeding demonstration was jointly conducted by U.S. Soybean Export Council (USSEC) and the Shenyang Municipal Fishery Research Institute. The objective of the demonstration was to evaluate the production performance and economic value of the 32/6¹ soy-based feed for Songpu carp growout production with the USSEC zero water discharge technology to fish farmers in the northeastern region of China.

DEMONSTRATION PROTOCOLS

Three ponds of average size 2.4-mu (0.16-ha) at the Demonstration Farm of the Shenyang Municipal Fishery Extension Center, Liaoning Province, China were used for

¹The 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.

the Songpu carp growout feeding demonstration. Pond water depth averaged 1.5 m. All ponds were equipped with water exchange and stand-by aeration.

Fish were Songpu carp fingerlings produced at the Demonstration Farm of the Shenyang Municipal Fishery Extension Center in 2012. Songpu carp were stocked in the three trial ponds on 9 May 2012 at an average fish size of 60 g and at a density of 700 fish per mu (10,500/ha), 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 Songpu carp was >1,000 g per fish.

Feeding of the Songpu carp was initiated on 10 May 2013 and was continued for 138 days. Songpu carp were fed the USSEC 32/6 all-plant protein feed in extruded, floating pellet form (Table 1, 2, 3). The feed contained over 50% soybean products. The feed was formulated by USSEC and produced by the Ningbo Techbank Feed Company, Zhejiang Province. Fish were fed to 90% satiation twice daily, with fish in all three ponds fed identically at each feeding.

Trial management was based on the USSEC 80:20 pond production protocols. 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 carp 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.

DEMONSTRATION RESULTS

Songpu carp were fed a total of 138 days from 10 May and 24 September 2013. Songpu carp grew from an average size of 60 g to an average weight of 1,385 g during the 138-day trial period (Table 4). The gross production averaged 921 kg/mu (13,815 kg/ha) for Songpu carp and 62.5 kg/mu (938 kg/ha) for silver carp (Table 2). The average survival rates of Songpu carp and silver carp were 95% and 100%, respectively. The average FCR for Songpu carp was 1.37:1.

The net economic return for the 138-day production cycle averaged a net income of RMB 1,295 per mu (\$3,184/ha) at a market price of RMB 10/kg (\$1.6/kg) for Songpu carp and RMB 4.0/kg (\$0.66/kg) for silver carp (Table 4). The average ROI was 16% for the three trial ponds (Table 4).

SUMMARY AND CONCLUSIONS

The Songpu carp feeding demonstration with the USSEC soymeal-based 32/6 feed yielded a higher survival rate and better feed conversion efficiency as compared to local sinking feeds typically used in the north of China. Use of the USSEC zero water

discharge and eco-friendly aquaculture technology allowed for maintenance of excellent water quality and no diseases during the feeding demonstration season. No drugs or chemicals were used because no disease was observed, allowing the producer to harvest and market high quality, uncontaminated fish that met the standard for a “green” product. However, the lower market price significantly impacted the ROI of the Songpu carp feeding demonstration.

It is reported that more extruded feed has been used by local fish farmers because of availability of the extruded feed in the north region.

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Chinese Currency and Production Unit Conversions:

RMB 6.10 = US\$1.00

15 mu = 1.0 hectare (ha)

kg/mu x 15 = kg/ha

1.0 kg = 2.2 lb

6 mu = 1.0 acre (ac)

kg/mu x 13.2 = lb/ac

Table 1. Formula for the USSEC 32/6 soy-based feed used in the 2013 Songpu carp growout feeding demonstration at the Demonstration Farm of the Shenyang Municipal Fishery Extension Center, Liaoning Province, China. The demonstration feed was produced by Ningbo Techbank Feed Company, Zhejiang Province.

Ingredient	Percent of total
Soybean Meal	40.50
Wheat Flour	9.00
Wheat Midds	33.00
Corn Gluten Meal	3.00
Blood Meal, spray dried	6.00
Calcium phosphate mono - 21%P	2.06
Fish, Anchovy	0.00
Fish Oil	1.00
Soy Oil	2.25
Soy Lecithin	1.50
Vitamin Premix-F2	0.50
Mineral Premix F-1	0.25
DL-Methionine(99%)	0.16
L-Lysine HCL (98.5%)	0.02
Choline Chloride 50%	0.11
Stay C - 35%	0.03
Ethoxyquin - Antioxidant	0.02
Solis MOS - Mycotoxin Binder	0.50
Mold Inhibitor	0.10
Total	100.00

Table 2. Calculated nutritional profile of the USSEC 32/6 soy-based growout diet tested in the 2013 Songpu carp pond feeding demonstration at the Demonstration Farm of the Shenyang Municipal Fishery Extension Center, Liaoning Province, China. The demonstration feed was produced by Ningbo Techbank Feed Company, Zhejiang Province.

Nutrient	Amount	Unit
DE Fish (extr)	2529.2	kcal/kg
	3	
NFE	39.01	%
Starch	18.71	%
*Protein	32.06	%
Protein, dig.	29.13	%
Soy Protein	18.63	%
Soy NFE	12.60	%
*Fat	6.00	%
W 3	0.52	%
W 6	2.13	%
Fiber	4.99	%
*Ash	6.03	%
Calcium	0.53	%
Phos Avail	0.60	%
Iron	584.26	ppm
Copper	28.69	ppm
Zinc	142.31	ppm
Selenium	1.01	ppm
Moisture	9.84	%
Vitamin C	105.00	mg/kg
Choline	2497.4	mg/kg
	0	
Ethoxyquin	134.50	mg/kg
Arginine	1.84	%
Lysine	1.83	%
Methionine	0.60	%
Meth+Cyst	1.14	%
Threonine	1.24	%
Tryptophan	0.37	%

Table 3. Vitamin and mineral premix formulations for the 2013 USSEC Songpu carp feeding demonstration at the Shenyang Municipal Fishery Extension Center Demonstration Farm, Shenyang City, China. Quantities of vitamins and minerals are per kilogram of premix. Both premixes were produced by Chengdu Phoenix Feed Company, Sichuan Province.

Ingredient	Unit	Amount
<u><i>Vitamin Premix F-2</i></u>		
<i>Vitamin A</i>	<i>IU/kg</i>	<i>1,200,000</i>
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 2013 USSEC aquaculture feeding demonstration in Shenyang that demonstrated fingerling to market growth performance of Songpu carp in ponds using the USSEC zero water discharge technology and a 32/6 soy-based feed fed in extruded, floating pellet form.

Pond No.	CrC ¹ stocking size (g)	Stocking rate (fish/mu)	No. days fed	Harvest wt. (g)		P _G ³ (kg/mu)		Survival (%)		FCR	Net income (RMB/mu)	ROI (%)
				SoC	SiC ²	SoC	SiC	SoC	SiC			
1	60	700	138	1,340	1,250	891	62.5	95	100	1.42	995	12
2	60	700	138	1,420	1,200	954	60.0	96	100	1.32	1,615	20
3	60	700	138	1,395	1,300	918	65.0	94	100	1.37	1,275	16
Mean	60	700	138	1,385	1,250	921	62.5	95	100	1.37	1,295	16

¹SoC = Songpu Carp

²SiC = Silver Carp

³P_G = Gross Production