The Effect of Different Levels of Vitamin Premix in the Diet of African Catfish (*Clarias gariepinus*) Fingerlings

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Abstract

The present study was conducted to determine the growth and survival of African catfish (*Clarias gariepinus*) fingerlings fed diets with various levels of vitamin premix. The fingerlings (mean weight, 1.55 to 2.12 g) were stocked in circular concrete tanks measuring 1.5 m x 17 cm at a density of 50 fish/tank. Fish were fed 42% protein diets containing of 0, 1,2 and 3% vitamin premix (commercially blended). The fingerlings were fed at a rate of 10 % of the total body weight. Feeding was done three times daily at 0800, 1200, and 1600h. Feeding rates were adjusted based on the average weight of the fish every after sampling period. The fish were given the experimental diets for a period of 8 weeks. Results showed no significant differences in the weight gain and survival rate of the catfish. Water quality parameters such as dissolved oxygen, pH and temperature were not affected by the addition of vitamin premix at the level of up to 3 percent in the diet of African catfish fingerlings.

Introduction

African catfish (*Clarias gariepinus*) has become a popular aquaculture species in some parts of the country and has generated great interest among fish farmers and consumers. The African catfish is hardy and resistant to parasites and diseases, can be stocked at high density, and has high growth rates (Huisman 1989; Vivien *et al.* 1985). These qualities have contributed to the rapid development of the catfish industry. However, the major constraint is high mortality.

The increasing importance of this species in aquaculture requires research on nutritional requirements. Addition of vitamins in the diet has been found necessary for carps (Suhenda and Djajadiredja 1985) channel catfish (Dupree 1966. The present experiment was designed to determine the effect of different levels of vitamin premix on growth and survival of African catfish fingerlings.

Materials and Methods

Facilities and experimental fish

Twelve circular concrete tanks (1.5m diameter; 17 cm height) located at the Wet Laboratory of the Freshwater Aquaculture Center, Central Luzon State University, Muñoz, Nueva Ecija, Philippines were used in the feeding experiment. Each tank was filled with 50 liters of tap water and had a drain pipe to control the water level. About two-thirds of the water in each tank was changed daily (morning and afternoon) by siphoning to remove wastes. Total draining of water and cleaning of tanks were done bi-weekly when fish were removed for weighing.

African catfish fingerlings weighing 1.55 to 2.12 g were acclimatized one week prior to stocking. Fish were randomly stocked at 50 fish per tank.

Experimental diets and feeding

All four diets had 42% crude protein (Table 1). A commercial poultry vitamin premix (Table 2) was added to each of the four diets at of 0, 1, 2, and 3%. The dry ingredients were mixed thoroughly for 30 minutes to assure homogeneity. The diets were prepared as dry mash and stored in separate plastic containers.

Table 1. Ingredient composition (%) of the four experimental diets containing different levels of vitamin premix.

Ingredient	Diet			
	1	2	3	4
Fish meal (Peruvian)	61.0	62.5	63.9	64.0
Rice bran	20.0	20.5	18.2	17.0
Corn meal	10.0	10.0	10.0	10.0
Blood meal	8.0	5.0	5.0	5.0
Mineral premix	1.0	1.0	1.0	1.0
Vitamin premix[1]	0.0	1.0	2.0	3.0
Total	100.0	100.0	100.0	100.0
Calculated protein (%)	42	42	42	42

[1]Composition of vitamin premix is given in Table 2.

Table 2. Components of vitamin and mineral premix added in the diet of African catfish fingerlings[1]

Component	Amount per 1 kg premix
Vitamin	
Vitamin A	12,000,000 IU
Vitamin D_3	2,000,000 IU
Vitamin E	12,000 mg
Vitamin B_1	2,000 mg
Vitamin B_2	8,000 mg
Vitamin B_6	4,000 mg
Vitamin B_{12}	20,000 mg
Nicotinic acid	25,000 mg
Calcium panthothenat	15,000 mg
Choline chloride	200,000 mg
Folic acid	198 mg
Biotin	110 mg
BHT	40,000 mg
Minerals	
Iron	50,000 mg
Copper	8,000 mg
Manganese	70,000 mg
Iodine	1,500 mg
Zinc	60,000 mg
Cobalt	500 mg
Selenium	154 mg

[1]Vitamin premix was blended by Bayer, Phil. The premix also contained some minerals. (The use of the trade name does not imply endorsement of the product.)

The experimental fish were fed at a daily rate of 10% of the body weight. Feeding was done three times daily at 0800, 1200, and 1600h. The fish in all tanks were weighed and counted every 2 weeks to estimate weight gain and survival rate. Adjustment of daily ration was based on the average weight of the fish in all treatments for the first two weeks. Thereafter, feeding rates were adjusted based on the average weight of the fish in each treatment and number of fish in each tank. The fish were fed for a period of 8 weeks.

Experimental design and statistical analyses

There were four treatments with three replicates in a completely randomized design. Data on weight gain and percent survival were analyzed using one way analysis of variance. Means were compared using least significant difference test (Gomez and Gomez 1984). Differences were considered significant at $P < 0.05$.

Results and Discussion

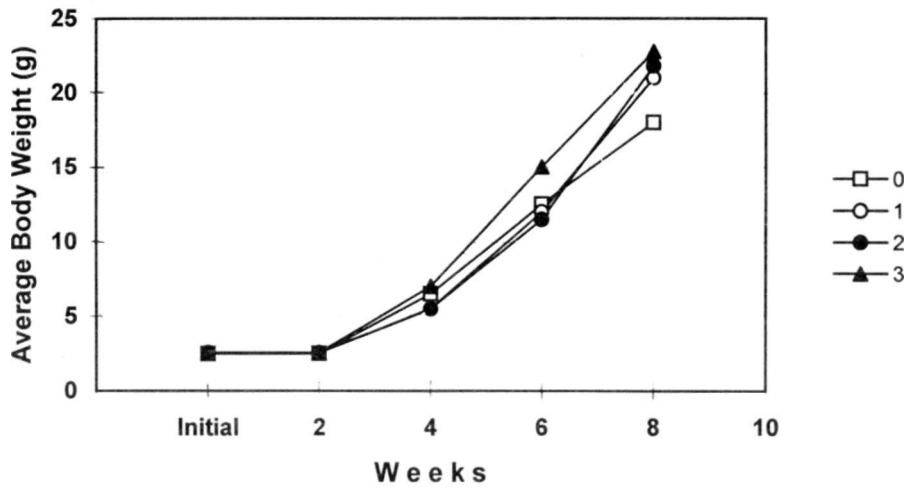
Fish that received the diet without vitamin premix had the least weight gain. Highest gain in weight of 20.8 g was obtained by fingerlings given 3% vitamin premix followed by those given 2 and 1% (Table 3). However, differences in weight gain were not significantly different (P > 0.05).

Table 3. Mean weight gain and survival rate of African catfish fingerlings fed diets containing various levels of vitamin premix.

Treatment (Level of vitamin premix, %)	Weight gain (g)*	Survival (%)
0	17.13 ± 2.55	46.0 ± 17.8
1	18.02 ± 10.92	60.0 ±20.3
2	19.77 ± 1.09	61.3 ± 9.9
3	20.80 ± 8.00	41.3 ±22.7

* No significant difference was observed among treatments (P > 0.05).

The growth curves (Fig. 1) showed that fingerlings fed diet with 3% vitamin premix had the highest final weight of 22.78 g and those fed diet without vitamin premix had the lowest (18.69 g). Suhenda and Djajadiredja (1985) found that common carps which received no vitamin premix in the diet had significantly lower



weight gain, feed efficiency and slightly lower protein retention. Butthep *et al.* (1985) reported that vitamin deficiency in catfish (*Clarias batrachus* Linn) fingerlings inhibited normal growth and caused fading of body color. Other fish had poor growth and dark skin. Stickney (1979) indicated that vitamins are essential for the growth of fish, although the quantity required is very small.

The highest survival rate (61.3%) was noted in those fed diet with 2% vitamin supplement while the lowest survival (41.3%) was observed in those fed diet with 3% vitamin supplement. However, analysis of variance revealed no significant difference among the treatments. The mortalities could be attributed to stress and cannibalism which were also observed in catfish by Fermin and Bolivar (1991), Hecht and Appelbaum (1987), and Butthep *et al.* (1985).

Although growth and survival did not differ among treatments, fish fed diet without vitamin supplementation consistently had the lowest. Both growth and survival were high in fish fed diets with 1% and 2% vitamin premix. The vitamin premix was designed for poultry and was lacking in vitamin C. Further study on the use of complete vitamin premix for fish in African catfish diets is recommended.

Good water quality is a requirement for a successful feeding management. Dissolved oxygen (DO) and pH were monitored weekly, while water temperature was monitored twice a day at 0700 and 1600h. The mean DO, pH, and temperature of the rearing water (Table 4) were within the range favorable for fish culture (Boyd 1979; Huet 1972). Water quality was not affected by the addition of vitamin premix in the diet of the African catfish. Regular changing of water must have helped maintain good water quality.

The summary data for water quality parameters are shown in Table 4. The twateer emperature monitored ranged from 22.4°C to 29.5°C. The values of dissolved oxygen (D.O.) which ranged from 4.53 ppm to 4.93 ppm were within the range favorable for fish culture. Likewise, pH of 8.3 to 8.4 is still considered best for fish cultivation (Huet 1972); Boyd (1979).

Table 4. Mean dissolved oxygen (DO), pH, and temperature of rearing water.

Treatment (Level of vitamin premix, %)	DO (ppm)	pH	Temperature (°C)	
			0700h	1600h
0	4.9	8.4	22.8	29.5
1	4.8	8.4	22.4	28.9
2	4.9	8.3	22.5	28.9
3	4.5	8.3	22.6	29.2

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