ASSESSMENT STUDY ABOUT EFFECT OF VITAMIN E ON GROWTH OF JAPANESE ORNAMENTAL CARP

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Abstract

This study was conducted to determine the effect of dietary level of vitamin E on growth performance of ornamental Japanese carp Cyprinus carpio. The experiment was carried out with four experimental variants carp in duplicate aquaria for 102 days. In V_1 variant was used a comercial diet with 240 mg vit E/kg . In other variants, basal diet was supplemented with 100, 200 and 300 mg vitamin E / kg (variant 2 - V2, 3 – V3 and 4 – V4). Within the experimental period, the fishes were fed 3 times a day manually at initially rate of 10% of their body weight and then progressively decreasing. All fish from each replicate were weighed at the beginning and every two weeks until the end of the experiment. The effects of feeding through E vitamin in different proportions on the parameters such as growth in view of live weight, survival rate, feed conversion, specific growth rate, protein efficacy for the ornamental carp were studied. The best results regarding growth were obtain in V1 and V2 variants in which was used 240 and 340 mg / kg diet respectively of vitamin E.

Key words: ornamental carp, vitamin E, weight gain, feed conversion ratio, specific growth rate

INTRODUCTION

Vitamin E (a-tocopherol) function as biological antioxidants to protect cellular macromolecules (DNA, protein and lipids) and other antioxidant molecules from uncontrolled oxidation by free radicals during normal metabolism or under the conditions of oxidative challenge such as infection, stress and pollution [5]. Vitamin E occurs in several naturally occurring forms, with a-tocopherol having the highest vitamin E activity [6]. Vitamin E functions as a lipid soluble antioxidant and protects biological membranes, lipoproteins and lipid stores against oxidation. Its main function is to protect unsaturated fatty acids against free radical-mediated oxidation [1]. The tocopheryl acetates do not act as antioxidants, but are hydrolyzed by digestive enzymes prior to absorption into the body [3].

MATERIAL AND METODS

In this study, 240 of juvenile ornamental carp with initial average weight of 0.2 g were randomly stocked into each aquarium with two replications per treatment. The biological material was brought from Malina farm of Galati where hatched in April 2012 and were transferred to the place of experiment and acclimated for 3 weeks. In trial period fish were fed to satiation twice per day. The feeding trials were conducted in 8 (80×30×40 cm) glass aquaria. Gentle aeration was provided by air stones. During the experiment, the water quality parameters were monitored during the trial and the value for temperature, dissolved oxygen and hydrogen ion concentration (pH) and were maintained in tolerable limits for ornamental carp.

We used a commercial diet with 240mg/kg in V1 which was supplemented with 100, 200 and 300 mg vitamin E/kg in other variants (variant 2, 3 and 4 respectively). For this purpose, vitamin E was dissolved in alcohol prior to addition of mixed feed for all treatments added to the feed and was homogenously mixed for 5 min. The diet was freshly prepared every 10 days, sealed in bottles and stored in a refrigerator until needed.

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In all variants the fish were fed with Nutra 4 pellets (Italy). The pellets contain fish meal, oils, cereal and cereal by-products, antioxidants (BHT). Nutrient compositions of experimental diet are given in Table 1.

Table 1 Biochemical composition of pellets

Biochemical composition	UM	V1 (Nutra 4)
Rough protein	%	58
Rough fat	%	12
Rough cellulose	%	0,9
Cinders	%	9,8
Phosphorus	%	1,5
A vitamin	U.I./kg	14000
D3 vitamin	U.I./kg	2200
E vitamin	mg	240
C vitamin	mg	1000
Cu ($CuSO_4$)	mg	8,5

The experiment was conducted for 102 days with ornamental Japanese carp. All fish from each replicate were weighed at the beginning and every two weeks until the end of the experiment. At the end of the experiment following parameters were calculated:

Weight Gain (W) = Final Weight (W_t) – Initial Weight (W_0) (g)

Feed Conversion Ratio (FCR) = Total feed (F) / Total weight gain (W) (g/g)

Specific Growth Rate (SGR) = 100 x (ln W_t – ln W_o) /t (%BW/d)

Protein Efficacy Rate (PER) = W / F * Pb, where:

Pb = rough protein of feed (%).

RESULTS AND DISCUSSION

Technological performance plays an important role for increasing operating system of fish; it depends on many factors including meeting the nutritional requirements of cultured species and maximizing feeding efficiency, the optimization of feed conversion ratio. Vitamin E is a potent antioxidant that prolongs the life of erythrocytes and plays an essential role in cellular respiration [4].

A dietary requirement of vitamin E has been demonstrated in a number of fish, which includes 120 mg/kg diet [2] for Atlantic salmon, 30 to 50 mg/kg diet for channel catfish [7, 9] and 200 to 300 mg/kg diet for common carp [8].

For our experiment, the growth of the experimental fish is summarized in Table 2.

Growth Performance: Out of growth performance parameters for trial groups of ornamental carp, the best weight growth as of the completion of the experimental period was attained in V1 and V2 variants, where the level of vitamin E was 240 and 340 mg/kg diet respectively. These variants were followed by V4 and V3 variants, respectively (Table 2).

Feed Conversion Rate: When the rates of feed assessment calculated through the amount of feed consumed and live weight, the best feed assessment rates are observed in V1 variant and V2 variant, where the level of vitamin E was 240 and 340 mg/kg diet respectively (Table 2).

Specific growth rate: The highest specific growth rate was recorded V1, the percentage rise in the daily growth rate compared with the increase in the 4.6% / day, whereas for the other values V1 was 4.31% / day (V2), 4.16% / day (V3) and 3.95% / day (V4).

Protein Efficacy Rate: When the protein efficacy rate is examined in general terms as of the date of completion of the tests, the highest protein efficacy was observed in V1 variant, where the concentration of vitamin E was 240 mg/kg diet. This is variant was followed by V2, V4 and V2 variant (Table 2).

To calculate food rations is necessary to know the relationship between the nutritional requirements of fish and environmental conditions. In this experiment, the amount of feed distributed was limited by the absence of an efficient water filtration system. Entering daily water volume replacement 5-10% of the total system provided water renewal and maintaining other chemical parameters of water in the spread tolerable without material culture to be stressed.

Table 2 Technological indicators of growth

Parameter/Variant	V1(1)	V1(2)	V2(1)	V2(2)	V3(1)	V3(2)	V4(1)	V4(2)
Initial total biomass (g)	6	6	6	6	6	6	6	6
Final total biomass (g)	664	454	488	478	340	444	424	416
Initial no. exp.	30	30	30	30	30	30	30	30
Final no. exp.	30	24	22	26	24	25	26	24
Initial mean body weight (g)	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2
Final mean body weight (g)	22,13	18,92	22,18	18,38	14,17	17,76	16,31	17,33
Total increase growth (g)	658	448	482	472	334	438	418	410
Individual spore growth (g)	21,93	18,72	21,98	18,18	13,97	17,56	16,11	17,13
The amount of feed distributed (g)	797,13	517,03	590,03	663,28	559,8	547,85	548,2	549,48
FCR	1,21	1,15	1,22	1,4	1,67	1,25	1,31	1,34
SGR (%/zi)	4,6	4,23	4,31	4,28	3,95	4,21	4,16	4,15
Protein Efficacy Rate	1,42	1,49	1,4	1,22	1,02	1,37	1,31	1,28

CONCLUSIONS

1. The best results regarding growth, in term of growth rate, specific growth rate, feed conversion ratio and protein efficacy rate were obtain in V1 and V2 variants in which was used 240 and 340 mg / kg diet respectively.

2. We recommend checking the assimilation of vitamin E in feed by High-performance liquid chromatography (HPLC).

3. It was obtained modest growth values because the amount of feed distributed was limited by the absence of an efficient water filtration system.

4. The growth of numerous varieties of color may be a profitable activity when its ecobiological requirements are properly known.

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