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EFFECT OF VITAMIN E (α-TOCOPHEROL) ON PROTEIN CONTENT OF *LABEO ROHITA* (HAM.) FRY

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ABSTRACT

Increase in body protein concentration was noted in the fry of rohu fed vitamin E @ 0.0mg, 25mg, 50mg, 75mg, 100mg, 150mg, 200mg, 300mg, and 400mg/kg of formulated diet. The protein content of fry was found to be significantly different between the different levels of vitamin E. It was found to be maximum (18.7%) in the case of vitamin E @ 75mg/kg diet followed by vitamin-E @100mg/kg diet. On increasing of vitamin E above 100 mg per kilogram diet there was further decline in the protein content of the fry. The protein increase, from the initial value (12.5%), were recorded to be 14.4%, control; 21.6%, 25mg level; 31.2%, 50mg level; 49.6%, 75mg level; 45.6%, 100 mg level; 14.4%, 150mg level; 28%, 200 mg level; 29.6%, 300 mg level and 13.6% for 400 mg level in different experimental groups.

Vitamin E is essential for optimum nutrition, normal muscle metabolism, maintenance of the integrity of the vascular system and of the central nervous system (CNS) and for physiological functions. The vitamin E deficiency syndromes in fish showed reduced survival, poor growth, anemia, immature erythrocytes, variable sized erythrocytes, erythrocytes fragility and fragmentation, nutritional muscular dystrophy, elevated body water, poor feed conversion etc. Vitamin E is also needed for normal growth, reproduction and as an anti-oxidant to prevent fraction of phospholipids in biomembranes.

Not much work have been done on the use of vitamin E and its effect on the biochemical composition in fish tissue. Hence the present attempt has been made to study the influence of vitamin E on the change of protein percentage in the body tissue.

Fry of *Labeo rohita* were collected from the Government Fish Seed Farm, Aarey, Bombay. These were reared for six weeks and each group was regularly fed with one of the nine semi-purified diets containing eight graded levels of vitamin E (α - Tocopherol), ranging from 25 to 400 mg/kg including control group.

Table 1 : *Composition of semi-purified diet.*

Sr.No.	Ingredients	Percentage
1.	Casein (vitamin-free)	38
2.	Gelatin	12
3.	Cod liver oil	3
4.	Corn oil	6
5.	White Dextrin	28
6.	α-cellulose	8
7.	Vitamin mixture	1
8.	Mineral mixture	4

** Vitamin mix : Thiamine - HCl, 5 mg; Roboflavin, 20 mg; Pyridoxine - HCl, 5 mg; Choline - HCl, 500 mg; Nicotinic acid, 75 mg; Calcium pantothenate, 50 mg;Inositol, 200 mg; Biotin, 0.5 mg; Folic acid, 1.5mg; L-Ascorbic acid, 100 mg; Vitamin - E (α - Tocopherol) as per graded levels (25 to 400 mg/kg) and nil in the control diet.*

Mineral mixture : Aluminum chloride, 15 mg; Zinc sulphate, 300 mg; Copper chloride, 10 mg; Manganese sulphate, 80 mg; Potassium iodide, 15 mg; Cobalt chloride, 100 mg; Calcium biphosphate, 13.58 g; Calcium lactate, 32.70 g; Magnesium sulphate, 13.20g; Potassium phosphate, 23.98g; Sodium biphosphate, 23.98g; Sodium biphosphate, 8.72g; and Sodium chloride, 4.35g.

Experimental groups, in triplicate, were held each in circular plastic tubs (capacity 40 l). Every third day half of the water was replaced by fresh borewell water. Fifteen fishes were stocked (length : 27 to 30 mm and weight : 245 to 280 mg) in each tub. After six weeks fishes were analyzed for protein contents in the carcass following Lowry *et al.* (1951).

Highest value of protein (18.70%) was recorded in fry fed with D-4 (vitamin E @ 75mg/kg diet) followed by D-5 (vitamin E @ 100 mg/kg), whereas the lowest protein content (14.2%) was recorded in those fed with D-9 (Vitamin E @ 400 mg/kg). The present findings indicate that protein content increase in tissue depends on the amount of vitamin E supplemented through diet (Table 2).

Vitamin requirement for the growth of fishes have been reported by various workers (Dupree, 1968; Wilson *et al.*, 1984 in channel cat fish; Halver, 1976 in finfish; Cowey *et al.* 1983; Hung and Slinger, 1982 in rainbow trouts; Lall *et al.*, 1988 in atlantic salmon; Roem *et al.*, 1990

Table 2 : *Protein content in Labeo rohita carcass fed semi-purified basal diets containing graded levels of vitamin E (0.0 to 400 mg/kg).*

Diet	Vitamin E (mg/kg.)	Protein (%)	Percentage increase over initial	Percentage increase/ or nil/or loss over control
Initial	-	12.5	-	-
D-1	0.0	14.3	14.4	-
D-2	25.0	15.2	21.3	6.3
D-3	50.0	16.4	31.2	14.7
D-4	75.0	18.7	49.6	30.8
D-5	100.0	18.2	45.6	27.3
D-6	150.0	14.3	14.4	0.0
D-7	200.0	16.0	28.0	11.9
D-8	300.0	16.2	29.6	13.3
D-9	400.0	14.2	13.6	-0.7

in Tilapia; and Dube and Trung, 1993 in gold fish. Datta (1993) has studied the effect of vitamin E on growth and survival in carps.

Woodall *et al.* (1964) found that the requirement of vitamin E for salmonids is less than 30 mg/kg diet. Halver (1978) found 80 to 100 mg vitamin E/kg diet to be the optimum requirement of carps, 30 mg for trout, salmon and channel catfish.

Low levels of serum vitamin E causes nutritional anemias (macrocytic). It is believed that vitamin E maintain the integrity of the membranes of the erythrocytes and prevents hemolysis by preventing the oxidation of unsaturated fatty acids.

Recent studies have revealed a close functional relationships between vitamin E and selenium. It has been shown that glutathione peroxidase is a selenium containing enzyme. In facts, it has been shown that vitamin E deficiency is coincident with low glutathione peroxidase levels. This glutathione peroxidase has direct relation in amino acid metabolism (Murthy, 1989).

During avitaminosis the creatine content of the striated muscles is greatly reduced in rabbits and rats and the urinary excretion of creatine is considerably increased. A marked reduction of the creatine content in the urine is observed following the

administration of vitamin E. These effects could be explained from the point of view of the poor absorbability of amino acids from the intestinal cell membranes during vitamin E deficiency (Murthy, 1989).

Lall (1991), working on formulation and preparation of a complete fish diet found that the vitamin E requirement for growth and survival of channel catfish was 50-100 mg/kg diet while it was 80 to 300 mg/kg diet for common carp and 30-50 mg/kg diet for rainbow trout. Lovell *et al.* (1984) observed vitamin E deficiency signs such as reduced growth, depigmentation, anaemia etc. in channel catfish.

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