GROWTH, FEED CONVERSION AND DEFICIENCY SYMPTOMS IN FINGERLINGS OF CATLA CATLA FED WITH VITAMIN E DIETS

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ABSTRACT
In the present investigation, dietary requirement of vitamin E for the fingerlings of C. catla was evaluated considering various parameters. Significant absolute growth, SGR and FCE for the fingerlings were observed to range 20-40 mg vitamin E/kg of diet. The relative efficiency of various levels of dietary vitamin E on growth, SGR and FCE for the fingerlings was estimated as 20 < 40 < 80 < 10 < 100 < 000 (Control) mg/kg diet. The vitamin E deficiency symptoms observed in the fingerlings were poor growth and low conversion efficiency, low PPV and ECE, anaemia, ascites and muscular dystrophy.

The requirement of vitamin E in the diet of terrestrial animals has been well documented. However, the demand for this micronutrient has been demonstrated in relatively few fish species. Vitamins E has been identified as an essential dietary component for channel catfish, Chinook salmon, carp and rainbow trout (Watanable et al., 1970a, b; Cowey et al., 1981; 1984; Wilson et al., 1984). The present study has been designed to evaluate the vitamin E requirement of the fingerlings of Catla catla in relation to growth, feed conversion and deficiency symptoms.

The modified isocaloric test diet of Yone (1975), supplemented with graded levels of vitamin E as alpha-tocopherol (10, 20, 40, 80, 100 mg/kg) was used for the present study. In each prepared diet, 7-10% of water was added to prepare a thick paste. Vermicelli of diameter 1mm size from the thick paste were prepared, air-dried and refrigerated. Sixty days feeding trials were conducted in cemented pools of 185t capacity. For each treatment, three sets of experiment were run. In each replicate, ten healthy fingerlings of approximately similar size and length were used. Controls with vitamin E deficient diet were also run simultaneously. The diets supplemented with graded levels of vitamin E were fed to the fingerlings in the morning between 9.00 to 9.30 A.M. @ 2% body weight per day. The faecal deposits were removed daily by siphoning. Response parameters such as absolute growth, specific growth rate (SGR), food conversion efficiency (FCE), protein productive value (PPV), per cent digestibility and energy conversion efficiency (ECE) were determined for the fingerlings using standard methods. Gross deficiency symptoms in the fingerlings were also examined and recorded during the feeding trials.

RESULTS AND DISCUSSION
The relative efficiency of various levels of dietary vitamin E as alpha-tocopherol on growth parameters for the fingerlings of Catla catla was estimated as 20 < 40 < 80 < 10 < 100 < 000 (Control) mg/kg of diet (Table 1). According to Woodall et al., (1964) and Watanable et al., (1970a, b), the exact requirement of alpha-tocopherol for any fish species may depend upon the form of vitamin E and amount and type of unsaturated fatty acids in the oil components of the ration. The present study reveals that at a range of 20-40 mg vitamin E/kg diet which contained 10% corn oil, displayed a significant role for maintaining maximum growth, SGR, FCE, PPV and ECE in catla fingerlings (Table 1). Whereas
some authors have recommended optimum vitamin E requirement as 5-30, 100 and 20-50 mg/kg of diet for chinook salmon, common carp and rainbow trout, respectively.

**Table 1.** Average absolute growth, specific growth rate (SGR), food conservation efficiency (FCE), protein productive value (PPV), digestibility and energy conversion efficiency (ECE) of the *Catla* fingerlings fed with vitamin E supplemented diets for a period of 60 days.

<table>
<thead>
<tr>
<th>Vit. E (mg/kg diet)</th>
<th>Absolute growth (g)</th>
<th>SGR</th>
<th>FCE (%)</th>
<th>PPV- muscles (%)</th>
<th>PPV- liver (%)</th>
<th>Digestibility (%)</th>
<th>ECE (kcal/g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>4*</td>
<td>0.067*</td>
<td>0.123</td>
<td>3.007</td>
<td>1.79</td>
<td>105.08</td>
<td>95.15</td>
</tr>
<tr>
<td>10</td>
<td>17</td>
<td>0.283</td>
<td>0.472</td>
<td>21.86</td>
<td>25.70</td>
<td>94.80</td>
<td>94.41</td>
</tr>
<tr>
<td>20</td>
<td>31</td>
<td>0.517</td>
<td>0.599</td>
<td>27.94</td>
<td>28.90</td>
<td>96.30</td>
<td>96.34</td>
</tr>
<tr>
<td>40</td>
<td>28</td>
<td>0.467</td>
<td>0.848</td>
<td>58.28</td>
<td>43.20</td>
<td>93.40</td>
<td>93.59</td>
</tr>
<tr>
<td>80</td>
<td>24</td>
<td>0.400</td>
<td>0.730</td>
<td>35.96</td>
<td>33.40</td>
<td>93.20</td>
<td>93.49</td>
</tr>
<tr>
<td>100</td>
<td>4</td>
<td>0.067</td>
<td>0.124</td>
<td>21.81</td>
<td>28.80</td>
<td>92.70</td>
<td>92.72</td>
</tr>
</tbody>
</table>

* 20% mortality in fingerlings was observed.

in order to maintain maximal growth rate and feed efficiency (Woodall et al., 1964; Watanable et al., 1970b; Cowey et al., 1981; Watanable et al., 1981). The *Catla* fingerlings in the present investigation have only shown 20% mortality besides poor growth, low FCE and certain deficiency symptoms, viz. low PPV and ECE, anemia, ascites and muscular dystrophy with vitamin E deficient diets. Woodall et al., (1964) have observed deficiency symptoms, viz. poor growth, exophthalmia, ascites, anemia, clubbed gills, epicarditis and ceroid deposition in the spleen of chinook salmon. However, Dupree (1969) and Murai and Andrews (1974) have noticed vitamin E deficiency symptoms of poor growth, exudative diathesis, muscular dystrophy, depigmentation, fatty livers, anemia and atrophy of pancreatic tissue in channel catfish. Poston et al., (1976) fed vitamin E deficient diet to Atlantic salmon displayed deficiency symptoms of anemia, pale gills, anisocytes, poikilocytosis, exudative diathesis and muscular dystrophy.

**REFERENCES**