A study was conducted in broilers from day 0 to 7 weeks of age to evaluate the effect of different levels of selenium and vitamin E supplementation in corn-soya based diet on immune status. Feeding of selenium and vitamin E at higher levels than the recommended dose increased the antibody titre against sheep red blood cell antigen (SRBC). The haemagglutination titre showed significant (P< 0.01) increase on day 7 after primary injection of SRBC. The titre also increased significantly on day 7 (P < 0.05) and 14 (P < 0.05) after booster dose in all the treatment groups.

Poultry industry is a fast growing segment of Indian economy and contributes to about 8 per cent of the Gross National Income. The growth rate of poultry industry in the last 15 years has been estimated to be 12 to 15 per cent in broiler sector. A successful poultry production requires the inputs of proper genetic make up, nutritional and health care management. In intensive poultry husbandry practice diseases have been a potential threat to the economics of the poultry industry and caused severe losses. The chicks from day old stage are exposed to variety of stresses such as intensive production methods, high density as well as other nutritional and pharmacological factors. Theses stresses adversely affect the immune status of the birds. Selenium as an essential trace mineral functions as an integral component of glutathione peroxidase (Rotruck et al., 1973). Vitamin E is a primary biological antioxidant preferentially retained in cellular membrane and provides the first line of defence against oxidative damage. A combination of selenium and vitamin E has been shown to play a major role in the development and maintenance of defence systems (Marsh et al., 1981).

One hundred and twenty eight day old Vencobb broiler chicks were randomly allotted to eight groups with two replicates of eight chicks each. The birds were reared in cages under standard managemental practices from day old to seven weeks of age. The experimental diet was formulated according to the standards prescribed by B.I.S. (1992).

Feeding trail

<table>
<thead>
<tr>
<th>Treatment(s)</th>
<th>Experimental diet</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1 (Control)</td>
<td>Standard broiler ration</td>
</tr>
<tr>
<td>T2</td>
<td>Standard diet + 0.1 mg selenium + 10 IU vitamin E</td>
</tr>
<tr>
<td>T3</td>
<td>Standard diet + 0.3 mg selenium + 10 IU vitamin E</td>
</tr>
<tr>
<td>T4</td>
<td>Standard diet + 0.5 mg selenium + 10 IU vitamin E</td>
</tr>
<tr>
<td>T5</td>
<td>Standard diet + 0.1 mg selenium + 20 IU vitamin E</td>
</tr>
</tbody>
</table>

1. Part of M.V.Sc., Thesis submitted by the first author to the Tamil Nadu Veterinary and Animal Sciences University, Chennai - 600 051.

2. Professor and Head, Department of Veterinary Physiology, Madras Veterinary College, Chennai - 6007.
T6 Standard diet + 0.1 mg selenium + 
30 IU vitamin E

T7 Standard diet + 0.3 mg selenium + 
20 IU vitamin E

T8 Standard diet + 0.5 mg selenium + 
30 IU vitamin E

The broiler starter and finisher diets were provided ad libitum to the birds from 1 to 21 and 22 to 49 days of age respectively.

Whole sheep blood collected in Alsever's solution (Dextrose 5.125g, sodium citrate 2g, sodium chloride 1.05g in 250 ml distilled water) was washed three times in phosphate buffered saline (PBS, pH7.4) and diluted in PBS to 25 per cent (v/v).

The chicks were immunized with 1 ml of 25 per cent SRBC (Kundu et al., 1999) in thigh and breast muscles. Booster dose of SRBC antigen was given on 14th day of immunization. Blood samples were collected at weekly intervals from 4th week onwards till 7th week of age for assessing haemagglutination (HA) titre (Abdel - Ati and Latshaw, 1984) against SRBC by using freshly prepared one per cent SRBC.

The test serum (25μl) was serially diluted to two fold with PBS in microtiter plates. After dilution, 25 μl of one percent SRBC was added to each well and mixed. The plate was incubated at 370C for 1 hour and haemagglutination titre was expressed as the log2 of the reciprocal of the highest dilution showing 100 percent agglutination.

The HA titre against SRBC in broilers fed different levels of selenium and vitamin E is presented in the table.
Mean of 16 observations

Means bearing different alphabets in lower case (P < 0.05) and upper case (P< 0.05) letters in a column differ significantly

There was a significant difference (P < 0.01) in the mean HA titre among treatment groups on day 7 after primary immunization and day 7 (P < 0.05) and 14 (P < 0.05) after booster injection.

On day 7 after booster injection the mean HA titre was maximum in T6 (5.40) compared to the control (3.00), whereas, T3 (5.00) and T7 (5.00) recorded higher titre on day 14 compared to the control (3.20).

The result of the present study is similar to the earlier reports of Marsh el al. (1981), Gore and Qureshi (1997), Larsen el al. (1997), Leshchinsky and Klasing (2001) and Nageswara et al. (2003). They found an increased antibody titre against SRBC when selenium and vitamin E were included at higher levels in the diet. On the contrary, Friedman el al. (1998) observed depression in antibody production against E.coli and New Castle disease virus vaccination in both chicken and turkey when vitamin E supplementation in the diet was increased from 10 to 150mg/Kg.

The increase in the antibody titre in broiler might be associated with relative increase in CD4+ and CD8-T cells by vitamin E supplementation (Erf el al., 1998). Vitamin E regulates prostaglandin (PG) production by antagonizing the peroxidation of arachidonic acid and limiting the entry of precursors into the PG cascade.

Vitamin E supplementation was resulted in an increased lympho proliferative responsiveness (Gore and Qureshi, 1997), phagocytic function due to decrease in endogenous level of PG (Likoff el al., 1981) and T cell hyper activity (Marsh el al., 1981). The effect of vitamin E on any one of these parameters would be expected to influence antibody formation. These functions of vitamin E may be manifested via its antioxidant activity in the lymphoid tissues.

Selenium supplementation might have influenced intracellular transmission of signals necessary to initiate proliferation of lymphocytes (Schumacher el al., 1990).

REFERENCES


