Effect of Feeding Synthetic and Herbal Vitamin E on Performance of Broiler Chicks in Hot Arid Zone of Rajasthan

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ABSTRACT

One hundred thirty five (135) unsexed day-old, commercial broiler chicks were weighed individually and uniformly distributed as 45 chicks in three groups (T1, T2 and T3). Each group was divided into three replicates with 15 chicks in each. The chicks were fed with starter mash which contained crude protein 23% and metabolizable energy 2905 Kcal/kg up to three weeks of age and from 4 to 6 weeks of age the chicks were fed with finisher mash which contained crude protein 20% and metabolizable energy 3120 Kcal/kg. In group T1 herbal vitamin E was added @ 50 g/ton of feed and group T2 herbal vitamin E was added @ 100 g/ton of feed and T3 synthetic Vitamin E @ 100 g/ton was added. Growth and feed consumption of broilers in experimental group i.e. T1 (basal diet + herbal vitamin E @ 50 g/ton) but feed conversion ration of T3 (basal diet+ synthetic vitamin E @ 100 g/ton) was better than that recorded on control diet.

Keywords: Broiler, Feed conversion ratio, Herbal, Performance, Synthetic, Vitamin E

Poultry constitutes an important aspect of animal husbandry in India and broiler industry has emerged as the most dynamic and rapidly growing segment of poultry rearing because of its assured returns, short generation interval and limited land requirements. Broiler meat is good source of protein and free from any type of social taboos. The economics of broiler production is very important criteria for assessing profit and feed is the major factor affecting the productive performance and economics of broiler production as it constitutes 70-75% of the total cost of production. It is well documented that growth and immunocompetence of chickens and turkeys are influenced by dietary vitamin E (Sell et al., 1997). Vitamin E (α-tocopherol) is a crucial lipid-soluble antioxidant that protects unsaturated fatty acids by terminating chain reaction involving fatty acid peroxyl radicals (Machlin, 1991). Vitamin E deficiency in chicks may lead to the deficiency disorders like exudative diathesis, muscular dystrophy and encephalomalacia. Keeping in view the above facts, the present study was undertaken to study the Comparative effect of Herbal and Synthetic vitamin E on broiler performance.

MATERIALS AND METHODS

One hundred and Thirty five (135) unsexed day-old, commercial broiler chicks were weighed individually and uniformly distributed as 45 chicks in two groups. Each group was divided into three replicates with 15 chicks in each. The birds were offered feed and water ad libitum. The chicks were fed with starter mash which contained crude protein 23% and metabolizable energy 2905 Kcal/kg up to three weeks of age. For next 3 weeks i.e. from 4 to 6 weeks of age with finisher mash which contained crude protein 20% and metabolizable energy 3120 Kcal/kg. Group T1 herbal vitamin E was added @ 50 g/ton, group T2 herbal vitamin E was added @ 100 g/ton of feed and group T3 synthetic vitamin E was added @ 100 g/ton.
Adequate and identical floor, feeding and watering space were provided to chicks of both groups throughout the experiment. Earthen vessels were used to provide water. The detailed composition of the basal ration (both starter and finisher) used for feeding the chicks is presented in Table 1.

### Table 1: Composition of basal ration fed to the chicks

| Ingredient         | Starter Ration (Parts per 100) | Finisher Ration (Parts per 100) |
|--------------------|--------------------------------|---------------------------------|
| Maize              | 39                             | 48                              |
| Wheat bran         | 9                              | 8                               |
| Rice polish        | 8                              | 6                               |
| Ground nut cake    | 30                             | 26                              |
| Fish Meal          | 10                             | 6                               |
| Mineral Mixture    | 2                              | 2                               |
| Ground nut oil     | 2                              | 4                               |
| **Total**          | **100**                        | **100**                         |

Projected Composition C P

| Energy (Kcal/Kg) | 23.1046 | 20.1532 |

The different experimental feeding diet groups were formulated as mentioned in the Table 2.

### Table 2: Number of broiler chicks assigned randomly to various experimental groups

| Treatments | Replicates | Total Chicks |
|------------|------------|--------------|
| **T1**     | I: 15      | III: 15      | 45           |
| Basal diet + Herbal vitamin E (50 g/ton) |         |              |
| **T2**     | I: 15      | III: 15      | 45           |
| Basal diet + Herbal Vitamin E (100 g/ton) |         |              |
| **T3**     | I: 15      | III: 15      | 45           |
| Basal diet + Synthetic Vitamin E (100 g/ton) |         |              |

The data obtained in this experiment were analyzed using conventional statistical procedure as suggested by Snedecor and Cochran (1994) and significance of mean differences was tested by Duncan’s new multiple range test.

**RESULTS AND DISCUSSION**

The parameters studied were average weekly live body weight, weekly gain in body weight, weekly feed consumption and feed conversion ratio.

**Body weight**

The analysis of variance and the means along with their respective standard errors of weekly body weight in different treatment groups are presented in table 3 and depicted in Fig. 1.

![Fig. 1: Effect of synthetic and herbal vitamin E on body weight at different weeks](image)

At first week of age, maximum mean body weight was observed in T2 group (119.93 ± 1.75 g). This was followed by T1 group (117.46 ± 1.8g) and T3 group (117.22 ± 1.74 g) respectively. The mean body weight of the T1 group, T2 group and T3 group did not differ significantly among themselves. At second week of age, the mean body weight of chicks was highest in T2 group (290.93 ± 4.54 g). This was followed by T1 group and T3 group. At the end of week III, the mean body weight of chicks of T1 group comprising Herbal vitamin E (50g/ton) was found to be highest (646.73 ± 10.03g) followed by T3 group and T1 group. The mean body weight of the T1, T2, and T3 group did not differ significantly among themselves. At fourth week of age, significantly highest mean body weight was attained by chicks of group T1 (1064.82 ± 16.56g). At five and sixth weeks of age, same trend as that of week fourth was observed, T3 group followed by T2 group, T1 group, that all the three groups did not differ significantly. These results were in agreement with Silva et al. (2011).

**Body weight gain**

The means with their respective standard errors of weekly body weight gain in different treatment groups are presented in table 3 and depicted in Fig. 2.
The means for body weight gain of broiler chicks at week II indicated that group T₁ (172.93 ± 2.97g) has significantly highest body weight gain. This was followed by T₂ group and T₃ group. Similarly, at week III, the mean body weight gain of chicks was highest in group T₁ (356.71 ± 5.30g) followed by T₃ group and T₂ group, these three groups had no significant difference among themselves. Likewise, at IV week of age significantly highest average body weight gain was attained by chicks of treatment T₂ group (426.55 ± 8.32g). There was no significant difference among these three groups. At week V, the significantly highest mean body weight gain was found in T₁ group (344.45 ± 7.43g) and group T₃ (327.87 ± 12.11g). Intermediate body weight was found in group T₂ group (325.55 ± 4.89g). Week VI followed the same pattern as that of groups II, III and IV. The weight gain at this week (VI) was lower the week V, it might be attributed to the highest temperature during week VI as compared to temperature during week V and period.

**Fig. 2**: Effect of synthetic and herbal vitamin E on body weight gain at different weeks

The means for body weight gain of broiler chicks at week I indicated that group T₁ chicks fed herbal vitamin E (100 g/ton) had highest body weight gain (75.66 ± 1.10g) this was followed by T₃ group and T₁ group.

**Table 3**: Means with respective standard errors for body weight (g), body weight gain, feed consumption and feed conversion ratio at different weeks

| Treatment | Body weight gain | Age in weeks |
|-----------|-----------------|--------------|
|           | I               | II            | III           | IV            | V             | VI            |
| T₁        | 72.37 ± 1.11    | 172.93 ± 2.97 | 356.33 ± 5.47 | 418.09 ± 6.68 | 344.45 ± 7.43 | 309.50 ± 6.06 |
| T₂        | 75.66 ± 1.10    | 171.00 ± 2.85 | 343.56 ± 6.01 | 426.55 ± 8.32 | 327.87 ± 12.11 | 319.01 ± 4.94 |
| T₃        | 73.27 ± 1.09    | 165.53 ± 2.72 | 356.71 ± 5.30 | 415.44 ± 6.22 | 325.55 ± 4.89 | 314.36 ± 4.79 |

| Treatment | Feed consumption | Age in weeks |
|-----------|------------------|--------------|
|           | I                | II            | III           | IV            | V             | VI            | I-VI           |
| T₁        | 192.65 ± 9.90    | 454.35 ± 4.26 | 982.78 ± 13.18 | 1174.78 ± 16.26 | 957.02 ± 15.78 | 851.55 ± 2.94 | 4613.15 ± 16.17 |
| T₂        | 195.75 ± 5.29    | 447.95 ± 9.44 | 903.35 ± 11.62 | 1142.60 ± 5.96 | 863.35 ± 29.38 | 842.00 ± 5.46 | 4395.03 ± 56.95 |
| T₃        | 191.50 ± 4.37    | 422.15 ± 9.50 | 941.61 ± 14.55 | 1135.20 ± 18.70 | 875.04 ± 8.51 | 858.74 ± 10.03 | 4424.26 ± 31.91 |

The means for body weight gain of broiler chicks at week II indicated that group T₁ (172.93 ± 2.97g) has significantly highest body weight gain. This was followed by T₂ group and T₃ group. Similarly, at week III, the mean body weight gain of chicks was highest in group T₁ (356.71 ± 5.30g) followed by T₁ group and T₂ group, these three groups had no significant difference among themselves. Likewise, at IV week of age significantly highest average body weight gain was attained by chicks of treatment T₂ group (426.55 ± 8.32g). There was no significant difference among these three groups. At week V, the significantly highest mean body weight gain was found in T₁ group (344.45 ± 7.43g) and group T₃ (327.87 ± 12.11g). Intermediate body weight was found in group T₂ group (325.55 ± 4.89g). Week VI followed the same pattern as that of groups II, III and IV. The weight gain at this week (VI) was lower the week V, it might be attributed to the highest temperature during week VI as compared to temperature during week V and period.
prior to it. Significantly highest overall mean body weight gain (week I-VI) was observed in $T_1$ group (1673.70 ± 26.06g), $T_2$ (1652.67 ± 24.35g) and group $T_3$ (1643.90 ± 26.06g). There was no significant difference among these three groups.

The result observed in the study are in agreement with the reports of Singh et al. (2005), Chae et al. (2005) and Shaiks et al. (2006).

Feed conversion ration

Feed conversion ratio (FCR) or feed conversion efficiency (FCE) i.e. output in terms of body weight gain in relation to feed consumption is one of the most important parameter to be given due consideration presented in Table 3 and Fig. 3.

![Fig. 3: Effect of synthetic and herbal vitamin E on feed consumption at different weeks](image)

The means feed conversion ratio at the starter phase (I-III weeks) was significantly best in $T_3$ group (2.60 ± 0.04) followed by $T_2$ group (2.61 ± 0.05) and $T_1$ group (2.68 ± 0.04), but there was no significant difference among them. The feed conversion efficiency at this stage revealed that Herbal vitamin E helped in efficient utilization of feed which resulted in significantly lower feed conversion ratio over control. At finisher phase (week IV-VI) the mean feed conversion ratio was significantly best in $T_3$ group (2.65 ± 0.01). Which was followed by group $T_1$ (2.78 ± 0.01) and $T_2$ (2.71 ± 0.01). The overall feed conversion efficiency (week I-VI) best feed conversion efficiency was observed in group $T_2$ (2.63 ± 0.02), but there was no significant difference among the means of these three groups. The best FCR of herbal vitamin E i.e. group $T_2$ might be due to less feed intake and moderately higher weight gain, as compare to other groups. The results of significantly better feed conversion ratio due to incorporation of herbal vitamin E are similar to those of Panda et al. (2004), Shaik et al. (2005), Baruah et al. (2006) and Liu et al. (2009), all of whom observed significant effect on feed conversion ratio by supplementing control diet with vitamin E.

Feed consumption

The most important factor affecting the profitability in broiler farming is feed cost which accounts for 70-75% of the total cost of broiler rearing. Hence, it is necessary to study the effect of various treatments on feed intake of broiler chicks. While the means with their standard errors are shown in table 3 and depicted in Fig. 4.

![Fig. 4: Effect of synthetic and herbal vitamin E on feed conversion ratio](image)

During week I, average feed consumption by the broiler chicks was significantly highest in $T_2$ group (195.75 ± 5.29g) followed by $T_1$ group (192.65 ± 0.90g) and lowest in group $T_3$ (191.50 ± 4.37 g), which differ non-significantly among them. During week II, highest feed intake was observed in control group $T_1$ (454.35 ± 4.26 g), followed by $T_2$ group (447.95 ± 9.44 g) and $T_3$ group (422.15 ± 9.50 g). The mean feed consumption during week III of the experiment was recorded to be significantly highest in group $T_1$ (982.78 ± 13.18g). Lowest in group $T_3$ (903.35 ± 11.62 g). The mean feed intake during week IV, the average feed consumption was in group $T_1$ (1174.78 ± 16.26g), succeeded by group $T_2$ (1142.60 ± 5.96). Mean feed intake during week V revealed significantly highest
feed consumption in group $T_1$ (957.02 ± 15.78 g), this was followed by group $T_2$ (957.02 ± 15.78) and lowest in group $T_3$ (863.35 ± 29.38g). The mean feed consumption during week VI of the experiment recorded highest in group $T_1$ (851.51 ± 2.94g), followed by group $T_2$ and $T_3$. The results of the present study of supplementing herbal vitamin E are akin to those of Chatterjee and Agarwal (2005), Shaik et al. (2005), Kumar and Singh (2005), Oliveros (2006) and Liu et al. (2009), who observed significant improvement in feed consumption.

CONCLUSION

The results of the present study revealed that body weight, weight gain and feed consumption were on higher side by inclusion of herbal vitamin E @ 50g/ton, during starter phase (week I-III) and finisher phase (week IV-VI). The feed conversion ratio was significantly better in herbal $T_2$ group as compared to $T_1$ and $T_3$ group, at starter phase (week I-III), finisher phase (week IV-VI) and overall (week I-VI). The current level of herbal vitamin E present in the feed improved the performance of broilers up to marketable age reared in a high temperature environment.

REFERENCES

Chae, B.J., Lohakare, J.D. and Choi, J.Y. 2006. Effect of incremental levels of α-tocopherol acetate on performance, nutrient digestibility and meat quality of commercial broilers. Asian-Aust. J. Anim. Sci., 19(2): 203 – 208.

Chatterjee, S. and Agrawal, S.K. 2005. Comparative Antioxidant efficacy of herbal vitamin E and synthetic vitamin E. Proceeding of XXIII IPSACON on Nutrition for growth and reproduction; feedsstuffs. Hyderabad. Andhra Pradesh. (Abs.)

Liu, F.J., Niu, Z.Y., Yan, Q.L. and Li, W.C. 2009. Effects of different levels of vitamin E on growth performance and immune responses of broilers under heat stress. Poult. Sci., 88: 2101-2107.

Kumar, M. and Singh, K.C.P. 2005. Efficacy of dl α-tocopherol on immune response and growth parameters of broiler chicken. Proceeding of XXIII IPSACON on Nutrition for growth and reproduction; feedsstuffs. Hyderabad. Andhra Pradesh. (Abs.)

MacLain, L.J. 1991. Vitamin E Page 100-144 in Effect of α-tocopherol on antioxidants, lipid peroxidation and the incidence of pulmonary hypertension syndrome (Ascites) in broilers. Poult. Sci., 1356 – 1369.

Oliveros, M.C.R., Batungbacal, M.R., Roxas, N.P., Sevilla, C.C. and Acda, S.P. 2006. Performance of broiler chickens fed diets supplemented with either Alpha-Tocopherol Acetate or oregano (Origanum vulgare) Extract. Philippine J. Vet. Anim. Sci., 32(1).

Panda, B.K., Sahoo, S.K. and Pandhi, M.K. 2004. Comparative studies on immunostimulating effect of Immuplus, Levamisole and vitamin (E and C) against Ranikhet disease in broilers. Indian. J. Poult. Sci., 39(3): 252 – 255.

Sell, J.L., Soto-Salanova, M.F., Palo, P. and Jeffrey, M. 1997. Influence of supplementing corn-soyabean meal diets with vitamin E on performance and selected physiological traits of male turkeys. Poult. Sci., 76: 1405-1417.

Shaik, A.K.K., Reddy, E.V.R., Rao, N.R. and Raju, M.V.L.N. 2005. Effect of supplementation of vitamin E and selenium on the growth and immune response in broilers. Indian J. Poult. Sci., 40(3): 235 – 240.

Silva Ia, Abreu Mlt, Leal Abg, Souza Iot, Lima Dcp And Teixeira Mpf. 2011. Vitamina E para frangos de corte estressados por calor. Reunião Anual da Sociedade Brasileira de Zootecnia, 48ª, 2011, Belém. Proceedings... Belém: RBZ.

Singh, H., Kaur, R., Sodhi, S. and Singh, B. 2005. Effect of supplementation of different combination of vitamin E and selenium on biochemical indices in broiler. Proc. of XXIII IPSACON on nutrition for growth and reproduction; feedsstuffs. Hyderabad. Andhra Pradesh. (Abs.)
