
ORIGINAL ARTICLE

Effect of Vitamin C on Growth Performance of Caged Broilers

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ABSTRACT

The study was aimed at determining the effects of Vitamin C on growth performance of broilers. A total of 45 straight run day old Cobb 500 broilers were reared in cages up to 35 days of age and fed ad libitum on a starter diet up to 21 days and thereafter, on a grower diet. The broilers were divided into 5 treatment groups viz. T₀, T₁, T₂, T₃, and T₄ with 9 birds in each group. One group T₀ (9 broilers) without Vitamin C supplementation was considered as control. The other four groups were provided with Ascorbic acid 30mg/kg feed (T₁), 60mg/kg feed (T₂), 90mg/kg feed (T₃) and 120mg/kg feed (T₄) respectively as supplement in feed. The result of the study indicated significant increase in body weight, body weight gain and feed consumption in treatment group as compared to control birds indicating the beneficial effect of Supplementation of Vitamin C. The feed conversion ratio (FCR) remains at par among the treatment group. However, further experiment using several doses of Vitamin C with large number of broilers may be conducted to confirm the appropriate doses of supplementation.

Key words: Vitamin C, caged broilers, body weight, Feed intake

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INTRODUCTION

Poultry has a crucial place in India as the eggs and chicken meat are important and rich sources of protein, vitamins and minerals. Poultry provides rich organic manure and is an important source of income and employment to millions of farmers and other persons engaged in allied activities in the poultry industry. Chicken is the most widely accepted meat in India. Unlike beef or pork, it does not have a religious taboo. The prices of chicken meat are lower than those of mutton and chevon. Many Indian families, especially the educated people in urban areas, have begun to accept eggs as a regular supplemental part of their vegetarian diet. The forecast surveys indicate that as the present younger generation goes to the adulthood, the acceptability and demand for eggs and chicken meat in next 2-3 decades is likely to increase many-folds very rapidly.

Vitamin C or ascorbic acid, is a hexuronic acid, a hexose derivative, is easily oxidised to form dehydro ascorbic acid which is just as easily reduced back to its original form. Further, oxidation of dehydro ascorbic acid results in the formation of diketo glunic acid, and inactive compound, its formation is the result of an irreversible reaction. This reaction proceeds easily under condition of light. Poultry require vitamin C for the synthesis of steroid hormones, amino acid and mineral metabolism and to maintain immunity and to respond to physiological stress. The vitamins C have been identified as immune modulators. Vitamin C is required in much larger amounts when the immune system is challenged. Thus, fortification of the feed with the vitamins at the levels indicated would be helpful in conferring the desired immunity in the birds. In certain stress conditions, chickens are not able to synthesis optimum amounts and in such circumstance ascorbic acid supplementation of the diets may prove beneficial [1]. Keeping in view the importance of the vitamin C in the broiler production, the present research work was aimed with objectives to study the effect of different levels of Vitamin C supplementation in ration on the performance of broilers.

MATERIALS AND METHODS

The present experiment was carried out in small animal laboratory of department of Animal Husbandry & Dairying, SHUATS, Allahabad (U.P.). A total of 45 Day old Cobb 500 broiler chicks of same hatch were procured and randomly divided into five groups with three sub groups comprising of 3 chicks in each to serve as replicates. Broilers in treatment T₀ were fed diet (Table-1) as per NRC standard crude protein 22 % and metabolizable energy 2900 Kcal/ kg feed. The broilers in T₁, T₂, T₃ and T₄ were fed standard ration supplemented with 30 mg of vitamin C, 60 mg of vitamin C, 90 mg of Vitamin C and 120 mg of vitamin C respectively. A bulb of 25 watt was left on in each cage. Broilers were given floor space @ 0.75 sq ft. All broilers were offered water ad lib at all time. The birds were reared in battery type cages under standard and uniform management practices from day-old to five weeks of age. Broiler starter ration (Table-1) containing crude protein 22 % and metabolizable energy 2900 Kcal/ kg feed was fed upto three weeks and broiler finisher ration containing crude protein 19 % and metabolizable energy 3000 Kcal/ kg feed upto five weeks. Initial weight of each chick was recorded on arrival and then weekly weight was recorded to obtain the growth rate. The mortality rate was also recorded during the experimental period. The data for weekly body weight, body weight gain and weekly feed consumption was recorded, tabulated and analyzed statistically using Analysis of Variance Technique (ANOVA) as per the standard methods [9].

Table-1: Ingredient and nutrient composition of experimental diet (%DM)

Ingredients (%)	Broiler starter (0 - 21 day)	Broiler finisher (22 - 42 days)
Maize	60.00	63.00
Ground nut cake	23.35	18.00
Fish meal	13.00	15.00
Mineral mixture	3.00	3.00
Common salt	0.50	0.38
Vitamine premix (vit. A,B ₂ ,D ₃)	0.05	0.02
Amprosol	0.05	0.05
Nuvimin	0.05	0.55
Nutrient composition		
Moisture (%)	6.29	6.22
Crude protein (%)	22	19
Total ash (%)	8.02	9.34
Crude fibre	5.5	6.00
ME (Kcal/kg)	2900	3000

RESULT AND DISCUSSION

Mean values of weekly live body weight, body weight gain, feed intake and FCR used to determine the effect of different levels of Vitamin C on the growth performance of broilers are presented in the Table-2, 3, 4 and 5 respectively.

Table-2: Average weekly mean live body weight of broiler chicks (g) of different treatments.

Average live body weight of broilers in different treatments					
Weeks	T0	T1	T2	T3	T4
1	75.00	127.00	128.60	118.60	134.60
2	190.00	273.60	270.00	256.60	306.00
3	323.33	498.67	500.00	508.33	583.33
4	623.33	806.67	813.33	801.67	900.00
5	953.30	1233.60	1211.00	1206.30	1289.00
Mean	432.93	587.90	584.58	578.30	642.58

From the perusal of data treatment-wise body weight of broilers, contained in Table 2, it was noted that highest weekly mean body weight of broilers was recorded in T₄ (642.58 g) followed by T₁, (587.90 g), T₂ (584.58 g) T₃ (578.30 g) and T₀ (432.99 g). The differences in these values of treatments were found significant, indicating a significant effect of treatments on body weight of broilers. Vathana *et al.* [10] reported that during the first three weeks, no difference in body weight among different treatment groups was detected ($p > 0.05$). A significant difference in body weight among groups was observed from the 3rd to the 6th weeks. Birds in Group which received 40mg/bird/day of Vitamin C were the heaviest ($p < 0.01$). The findings recorded in present study are in agreement with those recorded by Edrise *et al.*

[2]. Similarly Lohakare *et al* [3] have also evaluated the efficacy of supplemental ascorbic acid on the performance of broiler chickens and reported significantly higher body weight in the supplemental groups at higher levels as compared with control. Rajput *et al* [8] have also recorded increased live body weight in broiler birds supplemented with Vitamin C @ 500mg/kg of feed in comparison to control birds. The control (T₀) registered significantly less mean body weight of broilers than the treatments, indicating thereby a significant beneficial effect of using vitamin C in the diet of broilers. The differences in the mean body weight of broilers among T₁, T₂, and T₄ were non-significant, being at par. This indicates that all treatments irrespective of level of vitamin C in diet were more or less equally beneficial.

TABLE-3: Average weekly mean feed intake (g.) per Broiler of different treatments

Weekly feed intake of broilers in different treatments					
Weeks	T0	T1	T2	T3	T4
1	66.60	124.60	141.30	140.00	129.00
2	226.56	273.60	290.00	257.30	373.30
3	253.70	455.00	400.00	510.00	526.30
4	537.00	620.00	607.00	596.00	623.96
5	630.00	800.00	790.00	795.00	760.00
Mean	342.78	454.64	445.66	459.66	482.52

The data on weekly feed intake (Table-3) of broilers indicated that mean feed intake of broilers, irrespective of treatments at one, two, three, four and five weeks of age was 120.3g, 284.16g, 428.94g, 596.8g and 755g, respectively. The differences in these were significant, which indicate a significant effect of age on the feed intake of broilers in all treatments. These results were as expected because under normal conditions an increase in feed intake with the increase in age is a normal phenomenon. The result of the present investigation is in agreement with the earlier reports of Lohakare *et al* [3]. Though significantly higher feed intake per broiler was recorded during fifth week than in fourth week. The intake of feed per broiler in fourth week was at par with third week, but broilers during both third and fourth week registered significantly higher feed intake than control group. However, the effect of treatments on feed intake of broilers due to treatments of vitamin C was significant indicating a significant influence of treatments on feed intake of broilers.

Table-4: Average weekly body weight gain of broiler chicks (g) of different treatments.

Body weight gain in different treatments					
WEEKS	T0	T1	T2	T3	T4
1	33.00	82.30	86.60	74.30	90.60
2	114.30	146.66	141.33	137.66	171.66
3	133.33	225.00	252.00	252.00	277.00
4	300.00	308.00	313.33	393.33	316.66
5	330.00	427.00	397.66	404.66	389.00
Overall Mean	182.13	237.79	233.78	232.39	248.98

From the data on weekly average gain in weight per broiler contained in Table 4, it may be noted that mean average gain in weight per broiler of treatments T₀, T₁, T₂, T₃ and T₄ was 182.13, 273.79, 233.78, 232.39 and 248.98 g, respectively. The differences in these were significant, indicating a significant effect of treatment on the average gain in weight per broiler in groups supplement with vitamin C in comparison to control group. These results are in line with the observation of Vidacs [11]. However, these do not tally with the report of Njoku [7] and Men-kin *et al.* [5]. The higher weight gains have been reported by Mans and Larbier [4] by supplementation of diet with vitamin C with lower stocking density.

Table-5: Mean average feed conversion ratio (FCR) or feed efficiency per broiler

Weekly FCR in different treatments					
WEEKS	T0	T1	T2	T3	T4
1	2.03	1.51	1.71	1.91	1.46
2	1.98	1.61	2.03	1.86	1.88
3	1.93	2.00	1.83	1.97	1.87
4	1.90	2.00	1.90	2.00	1.90
5	1.92	1.88	1.98	1.96	1.83
Overall Mean	1.95	1.80	1.89	1.94	1.79

From the perusal of data on weekly average FCR per broiler, contained in Table 5, it may be noted that the mean average FCR per broiler in different treatments during I, II, III, IV and V week of age was 1.72, 1.87, 1.92, 1.94 and 1.91 kg, respectively. The differences in these were found to be non significant which indicated a non significant effect of age on the average FCR per broilers in all treatments. Since the differences between values of weekly FCR of broilers between the treatments were not significant this indicates vitamin C supplementation played no significant role on the FCR of broilers, because it was found to be at par with control. Therefore, it can be concluded that vitamin C is not essential for improvement of FCR or the performance of broilers. That the vitamin C supplementation had no influence on the FCR on the broilers has also been reported by Mohammed [6]. This is in line with the findings of present study.

CONCLUSION

Increased body weight, body weight gain and feed intake were observed in the supplemental groups as compared with control especially at higher levels of supplementation. It may be concluded that there was a beneficial effect of vitamin C supplementation in the diet of broilers on body weight, gain in weight and feed intake of broilers. The feed conversion ratio (FCR) remains at par among the treatment group. From economic point of view ration supplemented with vit C @ 120mg/kg feed was found the best compared to all the treatments.

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