



Effects of Multivitamins and Enzymes on Growth Performance and Hematological Parameters of Broilers at Meherpur in Bangladesh



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Abstract

The experiment was conducted on broiler chicks to evaluate the effects of enzymes and multivitamin supplementation on body weight gain and hematological parameters (TEC, Hb content, PCV and ESR). A total of 200 day old broiler chicks were randomly selected and divided into four equal groups (50 × 4) as T₀, T₁, T₂ and T₃. Group T₀ was considered as control, (fed only with commercial ration) and other groups T₁, T₂ and T₃ were treated at a dose rate of 0.5g multivitamins per liter of drinking water, 1g enzymes per liter of drinking water and 0.5g multivitamins plus 1 g enzymes per liter of drinking water, respectively, from 0 to 28 days of experiment. It was observed that enzymes and vitamins supplementation significantly (p<0.01) increased body weight with better physical appearance. TEC, PCV and Hb content increased significantly (p<0.01) in the treated groups as compared to that of control group. ESR values decreased significantly (p<0.01) in the treated groups from that of the control groups. Therefore, it may be concluded that enzymes and vitamins may be used with water to get best result in terms of body weight gain and blood profiles without any detrimental effects on broilers.

Keywords: Multivitamin and enzyme; Growth performance; Hematological parameters; Galactosidases; Xylanases; pectinases; raffinose; hemicelluloses; amylase; protease; β-glucanase; livestock; polysaccharides; Hemoglobin

Introduction

In Bangladesh, livestock contributes 2.73% of total GDP (Bangladesh Bureau of Statistics). About 15% of her total population suffers from malnutrition due to deficiency of calorie and protein [1]. The availability of animal protein in the country is only 7.6g [2], against the FAO recommendation of 28g. Poultry sub-sector is an important avenue to reduce the gap between demand and supply of animal protein.

Enzyme and multivitamin protect deficiency diseases and stimulate growth rate. Beside this, enzyme supplement along with multivitamin reduces mortality, keep birds healthy, increase feed intake, improve digestion and feed conversion rate. Most of the feed ingredients contain some anti-nutritional factors and indigestible part, which hinders feed utilization and bird's performance.

In commercial poultry farming feed cost is a major contributor as it covers 65-70% of farm expenses. In feed formulation grains have major share which contain non-starch polysaccharides (NSPs). These NSPs are not digestible by the endogenous enzymes of poultry. In order to make them available for digestion, certain enzymes are supplemented. Legume seeds also contain

NSP-like hemicelluloses, mannan, and raffinose. Chickens are unable to produce some enzymes, such as galactosidases; thus, corn- soybean-based diets without supplemented enzymes such as xylanases and pectinases might result in gas accumulation in the gut and diarrhea [3].

Supplementation of poultry diets with exogenous enzymes is one approach to help animals in hydrolysis of these oligosaccharides [4,5]. Enzyme supplementation is considered to break the bond among NSPs and reduce their anti-nutritional effect and results in improved nutritional value of feed materials [6,7]. The effect of exogenous enzyme may be variable as it is dependent on different factors like bird age, feed type and quality [8,9].

Widely used enzymes in feed industry are - galactosidase, amylase, β-glucanase, cellulase, protease, pectinase and xylanase that cleave the non-starch polysaccharides in cereals and vegetable meals. Protease breaks down proteins by proteolysis of the peptide bonds that link amino acids together in the polypeptide chain forming the protein. Proteases work best in acidic conditions except alkaline proteases. Its optimal activity is shown in alkaline pH [10].

Based on the above mentioned perspective, the present research work was undertaken to fulfill the following research objectives:

- a. To evaluate the effect of enzymes and multivitamins supplementation on growth performance in broilers.
- b. To study the effect of enzymes and multivitamins supplementation on broiler in terms of hematological parameters (TEC, Hb, PCV and ESR).

Materials and Methods

The experiment was conducted under the department of physiology, Sylhet Agricultural University. The hematological test was performed at Upazila Veterinary Hospital, Gangni, Meherpur.

For this study a total of 200 day old chicks were purchased from C.P Company Ltd and randomly divided into four (4) equal groups (50×4) and numbered them as group T₀, T₁, T₂ and T₃. Group T₀ was considered as control. Birds were housed into a well ventilated, proper atmosphere and hygienic condition. The broilers were feed with standard broiler starter and broiler finisher ration throughout the experimental period. Group T₁ was treated with supplementation of 1gm enzymes/liter drinking water. Group T₂ was treated with supplementation of 0.5gm vitamins/liter drinking water and Group T₃ was treated with supplementation of 1gm enzymes plus 0.5gm vitamins/liter drinking water. Initial body weight of each bird was recorded just prior to segregation and kept them into pens. Fresh, clean and normal drinking water was made available for all times to the birds. Feeder and waterier were provided to the birds according to the recommendation of Panda et al. Each pen was 2.5ft×2ft and was allotted for 200 birds. Therefore, floor space provided for each bird was 1ft². Fresh and dry rice husk was used as litter at a depth of about 4cm. As per head the old litter material was changed using new rice husk to prevent birds from fungal or coccidian attack. The birds were exposed to a continuous lighting of 12 hours a day. During night electric birds were used to provide necessary light. In order to maintain required temperature and humidity inside the pen all the windows of the farm were kept open during day and at night electric bulb were provided as a source of heat. Body weight was recorded at 7 days interval up to the end of the 28 days of experimental period and collection of blood sample for hematological study (TEC, Hb, PCV and ESR) by acid hematin method. For hematological test 5ml of blood was collected with anticoagulant in the sterile glass test tubes.

Table 1: Effect of vitamins and enzymes on body weight of broilers

Group	No of Birds	Body Weight Gain (gm)				
		0 day	7 th day	14 th day	21 st day	28 th day
T ₀	50	125.24±2.04	530.56±3.54 ^d	901.24±13.45 ^d	1646.25±32.64 ^d	2120.74±46.37 ^d
T ₁	50	128.32±2.55	550.43±7.91 ^b	955.54±16.58 ^b	1710.34±43.01 ^b	2250.34±35.36 ^b
T ₂	50	130.35±3.53	535.34±5.00 ^c	949.37±8.43 ^c	1670.64±46.36 ^c	2140.64±43.01 ^c
T ₃	50	132.25±3.39	563.21±8.60 ^a	1059.65±22.49 ^a	1865.54±26.93 ^a	2520.47±98.23 ^a

*Values followed by different superscript in the same column differ significantly p<0.01.

After collection of data from the farm, verified to eliminate errors and inconsistencies. Then the data were tabulated into computer. The data generated from this study was entered in Microsoft excel worksheet, organized and processed for further analysis. All data were analyzed by One-way ANOVA using Minitab 17 Statistical Software. Finished test was further done for comparison of means.

Results

Body weight on 7 days of age (day 0 of experiment) was more or less similar. Highest body weight was recorded in group T₃ and lowest in group T₀. The recorded body weight was 125.24±2.04gm in group T₀, 128.32gm in group T₁, 130.35 in group T₂ and 132.25±3.39gm in group T₃.

On 14 days of age (7th day of experiment) it was observed that the body weight in control group T₀ was 530.56±3.53 gm, in group T₁ was 550.43±5gm, in group T₂ was 535.34±7.91gm and in group T₃ was 563.21±8.60gm. All the data were statistically significant (p<0.01). The highest and lowest body weight was observed as 563.21±8.60gm and 530.56±3.53gm, respectively.

On 21 days of age (14th day of experiment) the body weight in control group T₀ was 901.24±13.45gm and in the treated groups were 955.54±8.43gm in group T₁, 949.37±16.58gm in group T₂ and 1059.65±22.49gm in group T₃. The increased rates were statistically significant (p<0.01). The highest body weight was recorded in treated group T₃ and lowest in control group T₀. But among the treated groups the lowest body weight was recorded in group T₀. But among the treated groups the lowest body weight was recorded in group T₂.

On 28 days of age (21th day of experiment) the body weight in control group T₀ was recorded 1646.25±32.64gm and in the treated groups were 1710.34±46.36gm in group T₁, 1670.64±43.01gm in group T₂ and 1865.54±26.93gm in group T₃. The average body weight of all treated groups were statistically significant (p<0.01) than the control group. The highest body weight was recorded in treated group T₃ and lowest in control group T₀.

On 35 days of age (28th day of experiment) the body weight in control group T₀ was recorded 2120.74±46.37gm and in the treated groups were 2250.34±43.01gm in group T₁, 2140.64±35.36gm in group T₂ and 2520.47±98.23gm in group T₃. The highest body weight was recorded in group T₃ (2520.47±98.23gm).

Body weight recorded on 14, 21, 28 and 35 days of age shows increased body weight and Increase body weight was gradual in group T₀ but increase in other groups was rapid in comparison to control group. Total Erythrocyte count is presented in Table 1. On the final day of experiment (35 days of age) the values of TEC in control group T₀ was 2.71±0.04million/mm³ and in

the treated group T₁ was 3.00±0.02million/mm³, Group T₂ was 3.26±0.20million/mm³ and group T₃ was 3.29±0.21million/mm³. The highest values of TEC was in the group T₃ (3.29±0.21million/mm³) and lowest in control group T₀ (2.71±0.04million/mm³). All the values of treated groups were significantly higher than the control group T₀.

Table 2: Effect of vitamins and enzymes on hematology of broilers.

Group	No of Birds	TEC (millions/mm ³)	Hb (gm/dl)	PCV (%)	ESR
T0	50	2.71±0.04 ^c	7.64±0.15 ^c	27.99±0.18 ^c	2.40±0.12 ^a
T1	50	3.00±0.02 ^{ab}	8.38±0.14 ^b	30.24±0.31 ^b	2.00±0.29 ^b
T2	50	3.26±0.20 ^a	8.70±0.21 ^b	30.80±0.21 ^b	1.98±0.16 ^b
T3	50	3.29±0.21 ^a	9.08±0.40 ^a	31.08±0.35 ^a	1.50±0.16 ^c

*Values followed by different superscript in the same column differ significantly p<0.01.

Hemoglobin content in different groups of bird is presented in Table 2. On the final day of experiment (35 days of age) the values of Hb content in control group T₀ was 7.64±0.15gm/dl and the treated group T₁ was 8.38±0.14gm/dl, group T₂ was 8.70±0.21gm/dl and group T₃ was 9.08±0.40gm/dl. The highest value of Hb content was recorded in group T₃ (9.08±0.40 gm/dl) and lowest value of Hb content was recorded in group T₀ (7.64±0.15gm/dl). All the values of packed cell volume (PCV) is presented in Table 2. On the final day of experiment PCV value of groups T₀, T₁, T₂ and T₃ were 27.99±0.18%, 30.24±0.31%, 30.80±0.21% and 31.08±0.35% respectively. The highest value was recorded in group T₃ (31.08±0.35%) and lowest value was recorded in group T₀ (27.99±0.18%). All the values of treated groups were significantly higher than the control group T₀.

Erythrocyte sedimentation rate (ESR) is presented in table 2. On the final day of experiment ESR value of groups T₀, T₁, T₂ and T₃ were 2.40±0.12, 2.00±0.29, 1.98±0.16 and 1.50±0.16mm in 1st hour respectively. The lowest value was found in group T₃ (1.50±0.16 mm in first hour) and highest was in control group T₀ (2.40±0.12mm in first hour). All the value of treated groups were significantly (p<0.01) decreased than the control group T₀.

Discussion

The increased rate of body weight gain in the treated groups might be due to an increased feed intake, feed consumption, utilization, digestion, absorption and metabolism of supplied feed nutrient specially protein essential for their health and body weight gain. Increased live weight for addition of enzymes was similar to previous findings [11-15]. They concluded that improved feed utilization by exogenous enzyme is responsible for an increased live weight in broilers. This finding contradicts with the report of Preston. who found that enzyme inclusion did not improve performance. This work also deferred earlier report of who reported that live weight did not increase with enzyme supplementation in barley and triticale based diets.

The increased weight in present finding resembles Villar who reported that weight gain and feed efficiency increased statistically with vitamin supplementation. This present work is also in agreement with the earlier reports of Khatun, Gavrilona [16-18].

The increased level of total erythrocyte count, hemoglobin content and packed cell volume might be due to the initiative effects on hemopoietic organs. There are some vitamins such as vitamin B₁₂, pantothenic acid, folic acid and biotin which are essential for normal growth of the hemopoietic organs and erythropoiesis. The concentration of erythrocytes may be influenced by certain vitamins and drugs. The hematological parameters of present finding resembles to that of Dukes [19] who reported that the number of erythrocytes and other components of blood varied due to the influence of age, sex, environment, exercise, nutritional status and climate.

But the result of hematological parameters are contrary to Cengiz [20], who observed that there were not any significant effects on blood parameters (RBC, HB, PCV and TLC) after given vitamin. In group T₁ and T₂ multivitamins and enzymes were used respectively and the results of these two groups are in agreement with previous different studies. But in group T₃ multivitamins and enzymes together were used and better results than that of group T₁ and T₂ were found [21-26].

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