

EFFECT OF ENZYME AND VITAMIN SUPPLEMENTATION ON PHYSIO-BIOCHEMICAL PARAMETERS IN BROILER CHICKENS

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ABSTRACT

The present research was carried out on broilers to study the effect of oral administration of enzymes and vitamins on growth, haematological parameters and biochemical parameters in the Department of Physiology, Bangladesh Agricultural University for the period of 21 days from 15th January to 5th February 2007. A total of 20 broiler birds of 20 day old were divided into four equal groups as A, B, C and D. Group A was maintained as control and was fed only with commercial broiler ration through out the experimental period. Group B was treated with enzymes @ 1 gm per litre of drinking water, group C was treated with vitamins @ 0.5 gm per litre of drinking water and group D was treated with enzymes and vitamins combinedly at the rate of above mentioned dose. Body weight was recorded at 7 days interval up to the end of the 21 days of experimental period and the birds were sacrificed on the final day of experiment to collect blood sample for haematological (TEC, Hb, PCV and ESR) and biochemical study (SGOT and SGPT). Body weight was increased significantly ($p < 0.01$) in all the treated groups compared with the control group and highest was recorded in group D. TEC, PCV and Hb content increased significantly ($p < 0.01$) in the treated groups as compared to that of control group but ESR, SGOT and SGPT values decreased significantly ($p < 0.01$) in all the treated groups as compared to that of control group. The result reveals that use of enzymes and vitamins is an effective way of getting best result in terms of body weight gain and haemato-biochemical profiles in broiler birds.

Key words: Broiler, enzyme, vitamin, body weight, haemato-biochemical parameters

INTRODUCTION

Broiler diet is predominantly composed of plant materials, mainly cereals and vegetable proteins plus little amount of animal protein. Many cereals and their by products contain non-starch polysaccharides (NPS) such as cellulose, xylose, arabinose, galactonic acid which are not easily digested by poultry. Most of the feed ingredients contain some anti-nutritional factors and non-digested part, which inhibit feed utilization and bird's performance. The anti-nutritive effect is manifested by depressed nutrient utilization accompanied by poor growth. This adverse effect can be overcome by supplementation of exogenous carbohydrase (xylanase) enzymes which have been shown to lower viscosity of intestinal contents and to improve digestibility of starch, protein, fat and apparent metabolisable energy (AME) in broilers fed on diets containing wheat (Annison and Choct, 1991; Bedford, 1995). The nutritive value of available feed stuffs such as wheat, maize, rice polish, til oil cake, soybean meal etc in Bangladesh contain more undigested part. So, the feed utilization and digestibility is also poor. Exogenous enzymes should have the ability to break down plant cell wall materials and nutrients such as protein and starch. Thereby, feed utilization and digestibility is expected to get enhanced. As a result, the nutritive value of feedstuffs may be increased. On the other hand, deficiency diseases are the major one which causes mortality at the growing stage, reduced body growth and resistance etc (Singsen, 1947). Deficiency diseases are mainly concerned with vitamin, which occur in ordinary ration. The optimum vitamin supplementation are required for poultry and formulating premixes are to be necessary (Mc Dowel, 1989). Vitamin plays an important role in both nutrition and production. Deficiency of vitamin causes various diseases and disease condition in poultry such as cessation of growth, weakness, incoordination, ruffled plumage, ataxia, blindness, xerophthalmia due to deficiency of vitamin A (Hill *et al.*, 1961), encephalomalacia, exudative diathesis for vitamin E, polyneuritis, curled toe paralysis, perosis, impairment of food utilization for vitamin B

complex (Briggs *et al.*, 1942) and anaemia for vitamin B₁₂ and folic acid deficiency (Robertson *et al.*, 1941). Therefore, the present study has been undertaken to investigate the effect of vitamins and enzymes on body weight gain and haemato-biochemical parameters in broiler chicks.

MATERIALS AND METHODS

A total of twenty, 20 day old broiler chicks of Star Boro strain were purchased from Begum Rokeya Prashickha Kendra, Maskanda, Mymensingh and brought to the Laboratory of the Departmental Physiology into a well ventilated bamboo boxes to avoid the danger of suffocation. The birds were reared throughout the entire period of study in the well ventilated, well adapted room during the period from January to February 2007. The birds were then randomly divided into four equal groups, each consisting of 5 and numbered them as group A, B, C and D. Group A was maintained as control and was fed only with commercial broiler ration through out the experimental period. Group B was treated with enzymes (Alquerzim[®], ACI Limited) @ 1 g per litre of drinking water, group C was treated with vitamins @ 0.5 g (Rena-WS[®], Renata Limited) per litre of drinking water and group D was treated with combination of enzymes and vitamins at the rate of above mentioned dose from 0 to 21 days of experiment.

Initial body weight of each bird was recorded just prior to segregation and kept them into cages. Body weight was recorded at 7 days interval up to the end of the 21 days of experimental period and the birds were sacrificed to collect blood sample for haematological (TEC, Hb, PCV and ESR) and biochemical study (SGOT and SGPT).

Adequate feeders and waterers were provided to the birds. Proper humidity, temperature, hygiene and sanitary measures were also taken during the experimental period. Vaccination schedule was maintained properly. A number of sterile test tubes containing anticoagulant (4% sodium citrate) at a ratio of 1:10 was taken. Blood was collected from each group containing five birds through slaughtering at the end of the experiment. For preparation of serum samples, about 5 ml of blood was collected without anticoagulant in the sterile glass test tubes. The tubes containing blood were placed in a slanting position at room temperature for clotting. The tubes were then placed in the refrigerator at 4°C over night. Serum was then collected and was centrifuged at 1000 rpm for 15 minutes to get rid of unwanted substances. The serum was then stored in the screw capped serum vial and preserved at -20°C until use.

The haematological studies were performed within two hours after the blood collection as per technique described by Shastry (1983). The SGOT and SGPT values were estimated by using "Reflotron[®]". Analysis of variance was done with the obtained data according to the standard procedures (Snedecor and Cochran, 1980).

RESULTS AND DISCUSSION

Effect on body weight

Broiler treated with different treatment of enzymes, vitamins, and both enzymes and vitamins supplement showed an increased body weight gain than control group. The data showed that the body weight on 1st day of experiment was more or less similar but on 7th, 14th and 21st day of experiment increased significantly ($p < 0.01$) in all the treated groups in comparison to control and it was always significantly ($p < 0.01$) higher in group D that was treated with combined enzyme and vitamin (Table 1). The increased body weight in group B (enzyme supplemented group) is in agreement with the earlier reports of Meng *et al.* (2005), Saleh *et al.* (2005), Wang *et al.* (2005) and Silva and Smithard (2002). 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. The increased body weight in group C (vitamin supplemented group) is also in agreement with the earlier reports of Villar *et al.* (2000) who reported that weight gain and feed efficiency increased statistically with vitamin supplementation. The highest weight was recorded always in group D. It indicated synergistic effect of combine treatment of enzyme and vitamin. This finding is supported by the above mentioned researchers. The better performance might be due to the synergistic action of both of them on the physiological system of the birds.

Effect on haematological parameters

All the haematological values are presented in Table 2. The mean values of TEC (Total Erythrocyte Count) in all treated groups were increased significantly ($p < 0.01$) than control group. The highest TEC value was recorded in group D (3.29 ± 0.21) and lowest in group A (2.71 ± 0.04) millions/mm³. The mean values of haemoglobin increased significantly ($p < 0.01$) in all the treated groups and the highest was recorded in group D (9.08 ± 0.40 g/dl) and lowest in control group A (7.64 ± 0.15 g/dl). The mean value of PCV (Packed Cell Volume) also increased significantly ($p < 0.01$) in all the treated groups.

Table 1. Body weight (Mean \pm SE) gain in broilers on different days after being treated with enzymes and vitamins

Group	No of birds	Pre-treatment Post-treatment			
		Body weight (g) on day 0 of experiment	Body weight (g) on 7 th day of experiment	Body weight (g) on 14 th day of experiment	Body weight (g) on 21 st day of experiment
A	5	550 \pm 3.54	993 \pm 1.14 ^d	1444 \pm 1.41 ^d	1588 \pm 0.71 ^d
B	5	555 \pm 2.38	1012 \pm 4.24 ^c	1506 \pm 2.12 ^c	1640 \pm 0.87 ^c
C	5	550 \pm 3.55	1033 \pm 1.22 ^b	1518 \pm 0.71 ^b	1769 \pm 3.22 ^b
D	5	556 \pm 1.58	1065 \pm 3.22 ^a	1563 \pm 3.30 ^a	1855 \pm 3.53 ^a

Values with different superscripts in the same column differ significantly at $p < 0.01$.

Table 2. Haemato-biochemical parameters (Mean \pm SE) in broilers after being treated with enzymes and vitamins

Groups (n = 5)	TEC (million/mm ³)	Hemoglobin content (g/dl)	Packed cell volume (%)	ESR (mm in 1 st hour)	SGOT (U/L)	SGPT (U/L)
A	2.71 \pm 0.04 ^c	7.64 \pm 0.15 ^c	27.99 \pm 0.18 ^c	2.40 \pm 0.12 ^a	341 \pm 3.18 ^a	6.36 \pm 0.32 ^a
B	3.00 \pm 0.02 ^{ab}	8.38 \pm 0.14 ^b	30.24 \pm 0.31 ^b	2.00 \pm 0.29 ^b	330 \pm 3.30 ^a	4.59 \pm 0.10 ^b
C	3.26 \pm 0.20 ^a	8.70 \pm 0.21 ^b	30.80 \pm 0.21 ^b	1.98 \pm 0.16 ^b	288 \pm 3.22 ^b	4.57 \pm 0.85 ^b
D	3.29 \pm 0.21 ^a	9.08 \pm 0.40 ^a	31.08 \pm 0.35 ^a	1.50 \pm 0.16 ^c	253 \pm 3.30 ^b	4.42 \pm 0.09 ^b

n = No. of blood/sera samples tested, Values with different superscripts in the same column differ significantly ($p < 0.01$).

The highest value was recorded in group D (31.08 ± 0.35 %) and lowest in control group A (27.99 ± 0.18 %). The mean value of ESR (Erythrocyte Sedimentation Rate) decreased significantly ($p < 0.01$) in all the treated groups and greatly decreased in treated group D (1.50 ± 0.16 mm in 1st hour). The increased level of total erythrocyte count, haemoglobin content and packed cell volume might be due to the effects on haemopoietic organs. There are some vitamins such as vitamin B₁₂, pantothenic acid, folic acid and biotin etc which are essential for normal growth of the haemopoietic organs and erythropoiesis. The haematological parameters of present finding resembles to that of Dukes (1955), who reported that the number of erythrocytes and other components of blood varied due to the influence of age, environment, exercise, nutritional status and climate.

Effect on biochemical parameters

The serum SGOT (Serum Glutamic Oxaloacetate transaminase) and SGPT (Serum Glutamic Pyruvic transaminase) levels are also presented in Table 2. SGOT concentration was decreased in treated groups comparison to control group but the values of treated group B was not significantly ($p > 0.05$) decreased than the control group A. All the values of SGOT in groups C and D were decreased significantly ($p < 0.01$) than the control group A. The decreased SGOT level in present finding is in close agreement with the report suggested by Swain and Johri (2000) and Kumar and Rawat (1976).

SGPT concentration was decreased in all the treated groups in comparison to control group. All the values of treated groups were significantly ($p < 0.01$) decreased than the control group A. This present finding is strongly supported by the work of Sahin *et al.* (2001), Kumar and Rawat (1976) and Pravbhakaran *et al.* (1996).

Therefore, it may be concluded that enzymes and vitamins may be used with water to get best result in terms of body weight gain, physical appearance and blood profiles without any detrimental effects on broilers.

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