Original Research

Effect of Supplementation of Enzymes (Enzymex) and Probiotic (Yeamark) on Biochemical Parameters in Ven Cobb^{400} Broilers

S. Kaushal[1], R. K. Sharma[1], D. V. Singh[1], S. K. Shukla[2], S. Kumar[1], J. Palod[1] and M. K. Singh[3*]

G.B.P.U.A & T, Pantnagar-263145, Uttarakhand, INDIA

[1]Department of Livestock Production Management
[2]Department of Veterinary Medicine
[3]Department of PSC, DUVASU, Mathura-281001, Uttar Pradesh, INDIA

***Corresponding author:** drmksingh_1@rediffmail.com

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Abstract

This experiment was conducted to examine the effect of enzymes (Enzymex) and probiotic (Yeamark) and their combination on biochemical parameters in Ven Cobb broilers. Three hundred and sixty chicks were divided into eight groups viz. control (T_1) in which no supplement was added to the feed, while in treatments T_2, T_3 and T_4 cocktail of enzymes was provided as 0.25, 0.50 and 0.75 g per kg of feed, respectively, in treatment T_5 probiotic was added as 0.25 g per kg and in treatment T_6, T_7 and T_8 cocktail of enzymes as in T_2, T_3 and T_4 with probiotic as 0.25 g per kg in the basal diet from 1st to 6th weeks of age respectively. Biochemical estimations showed significant increase in TSP, albumin, globulin and ALT and significant decrease in AST in supplemented groups.

Key words: Biochemical Parameters, Enzymes (Enzymex) and Probiotic (Yeamark), Ven Cobb^{400} Broilers

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Introduction

Poultry production has garnered significant landmark in animal production. From a backyard venture five decades ago, the Indian poultry industry has evolved as the most vibrant fast growing and dynamic sub-sector of agriculture with 7.3 % growth in poultry population, has witnessed one of the fastest annual growth of about 6 % in egg and 10 % in meat production over the last decade amongst all animal based sectors (CARI VISION, 2050). The industry has not only grown in size but also in productivity. With rapidly changing lifestyles, affluent culture, and a conscious need for general wellness, Indian consumers are now

opting for a more protein-rich diet. The changing trends are definitely a boon for the poultry sector in India. Feed additives or growth promoters have been used to improve growth rate, feed efficiency, and product quality and to reduce the production cost in poultry. Various antibiotics, anthelmintics, anti-coccidials and hepato-protectants are used for increasing production. They not only increase the cost of production but have adverse effects on long term usage. Due to prohibition of most of the antimicrobial feed additives in animal feed and their residual effects in animals, enzymes (Ravindran, 2013) and probiotic are becoming more popular. Therefore, present investigation is carried out using enzymes (Enzymex) and probiotic (Yeamark) and their combinations. Though incorporation of enzymes and probiotic and their combination in the poultry diet had been tried by various workers but consistent results with respect to biochemical aspects is lacking. Therefore, the present investigation was undertaken to study the biochemical parameters in broilers.

Materials and Methods

The study was conducted on 360 day-old straight run Ven Cobb^{400} broiler chicks for a period of 6 weeks using enzymes (Enzymex) and probiotic (Yeamark) and their combinations. The first treatment was considered as control T_0 in which no supplement was added to the feed, while in treatments T_2, T_3 and T_4 cocktail of enzymes was provided as 0.25, 0.50 and 0.75 g per kg of feed, respectively, in treatment T_5 probiotic was added as 0.25 g per kg and in treatment T_6, T_7 and T_8 cocktail of enzymes as in T_2, T_3 and T_4 with probiotic as 0.25 g per kg in the basal diet. At the 21st day and end of feeding trial on 42th day, two birds from each replicate were randomly selected and 2.0 ml blood samples were collected in plane tubes for biochemical parameters. Serum was obtained by centrifugation of blood at 3000 rpm for 10 min, and then it was frozen at -20 °C for future analysis. The total protein, albumin, globulin, AST and ALT was estimated spectrophotometrically (Span Diagnostics Ltd(R), Surat, India).

Statistical Analysis

All data pertaining to various parameters were analysed statistically by running ANOVAs using SPSS 19 software. Significant mean differences between the treatments were determined at a 5% significance level ($P<0.05$) using Duncan's Multiple Range Test (DMRT) as modified by Kramer (1957).

Results and Discussion

Mean serum protein profiles of broilers in different experimental groups at 21 and 42 day are given in Table 1 and Table 2.

Serum Proteins Profiles (21days)

Serum Total Protein

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Enzymes and probiotic supplementation and their combinations had marked effect on serum total protein levels. Serum total protein values in T_2, T_3, T_4, T_5, T_6, T_7 and T_8 groups were significantly ($P<0.05$) higher than T_1 group, however, there were no significant differences in the serum total protein values between T_2 and T_5, T_3 and T_4, T_7 and T_8 groups of broilers. Maximum and significantly higher serum total protein compared to the control was found in broilers of group T_8 which was statistically similar to the serum total protein of group T_7. Minimum and significantly lower serum total protein was observed in the broilers of control group.

Table 1: Serum protein profile of broilers (Mean±SE) in different treatment group at 21 and 42 days

Treatments (days)		Serum Protein Profile g/dl			
		Total Protein	Albumin (A)	Globulin (G)	A/G ratio
T_1	21	$3.03^{e} \pm 0.03$	$0.98^{d} \pm 0.02$	$2.05^{d} \pm 0.01$	0.48 ± 0.01
	42	$3.11^{f} \pm 0.04$	$1.01^{e} \pm 0.01$	$2.10^{d} \pm 0.03$	0.48 ± 0.00
T_2	21	$3.17^{d} \pm 0.01$	$1.03^{cd} \pm 0.04$	$2.14^{cd} \pm 0.03$	0.48 ± 0.03
T_3	21	$3.33^{c} \pm 0.04$	$1.09^{c} \pm 0.03$	$2.24^{bc} \pm 0.03$	0.49 ± 0.01
T_4	21	$3.35^{c} \pm 0.04$	$1.10^{bc} \pm 0.03$	$2.25^{bc} \pm 0.07$	0.49 ± 0.03
T_5	21	$3.20^{d} \pm 0.03$	$1.04^{cd} \pm 0.02$	$2.16^{cd} \pm 0.04$	0.48 ± 0.02
	42	$3.34^{d} \pm 0.03$	$1.09^{cd} \pm 0.02$	$2.25^{c} \pm 0.04$	0.49 ± 0.02
T_6	21	$3.49^{b} \pm 0.05$	$1.16^{ab} \pm 0.01$	$2.33^{ab} \pm 0.05$	0.50 ± 0.01
	42	$3.78^{b} \pm 0.04$	$1.21^{b} \pm 0.02$	$2.57^{a} \pm 0.06$	0.47 ± 0.02
T_7	21	$3.65^{a} \pm 0.03$	$1.22^{a} \pm 0.02$	$2.43^{a} \pm 0.05$	0.50 ± 0.02
	42	$3.96^{a} \pm 0.04$	$1.30^{a} \pm 0.03$	$2.66^{a} \pm 0.04$	0.49 ± 0.01
T_8	21	$3.67^{a} \pm 0.04$	$1.23^{a} \pm 0.02$	$2.44^{a} \pm 0.05$	0.50 ± 0.02
	42	$3.99^{a} \pm 0.04$	$1.32^{a} \pm 0.03$	$2.67^{a} \pm 0.04$	0.50 ± 0.01

Means bearing different superscripts in a column differ significantly ($P<0.05$)

The results of the present experiment are in accordance with the finding of Shareef and Al-Dabbagh (2009) as they found significant increase in serum total protein levels of broilers supplemented with probiotics. Similarly, Hassen and Chauhan (2003) also found significant increase in serum total protein levels of broilers supplemented with enzymes. In contrast to the findings of present experiment, Chuka (2014) noted non-significant increase in serum total protein of broilers supplemented with enzymes and probiotics compared to the control. Similarly, Alkhalf *et al.* (2010) also found non-significant increase in serum total protein levels of broilers fed with probiotic.

Serum Albumin

Serum albumin values in T_3, T_4, T_6, T_7 and T_8 groups were significantly ($P<0.05$) higher than T_1 (control) group, however, there were no significant differences in the serum albumin values between T_1, T_2 and T_5, T_2, T_3, T_4 and T_5, T_4 and T_6, T_6, T_7 and T_8 groups of broilers. Maximum and significantly ($P<0.05$) higher serum albumin compared to the control was found in broilers of group T_8 (1.23 ± 0.02 g/ dl) which was

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statistically similar to the serum albumin of groups T_6 and T_7. Minimum and significantly ($P<0.05$) lower serum albumin was observed in the broilers of control (0.98 ± 0.02 g/ dl) group which was statistically similar to the serum albumin of groups T_2 and T_5. Findings of the present investigation regarding enzymes and probiotic supplementation are in accordance with the finding of Shareef and Al-Dabbagh (2009) as they found significant increase in serum albumin levels of broilers supplemented with probiotics. Similarly, Hassen and Chauhan (2003) also found significant increase in serum albumin levels of broilers supplemented with enzymes. However, Chuka (2014) found non-significant increase in serum albumin of broilers supplemented with enzymes and probiotics compared to the control.

Serum Globulin

Serum globulin values in T_3, T_4, T_6, T_7 and T_8 groups were significantly ($P<0.05$) higher than T_1 (control) group. The concentration of serum globulin was significantly ($P<0.05$) minimum in the birds of control group (2.05 ± 0.01 g/ dl) compared to T_3, T_4, T_6, T_7 and T_8 groups. Maximum (2.44 ± 0.05 g/ dl) and significantly ($P<0.05$) higher concentration of serum globulin as compared to T_1, T_2, T_3, T_4 and T_5 groups were observed in T_8 group broilers. There were no significant differences in the serum globulin values between T_1, T_2 and T_5, T_2, T_3, T_4 and T_5, T_3, T_4 and T_6, T_6, T_7 and T_8 groups of broilers. The results of the present experiment are in accordance with the findings of Hassen and Chauhan (2003) who found significant increase in serum globulin levels of broilers supplemented with enzymes. Similarly, Shareef and Al-Dabbagh (2009) found significant increase in serum globulin levels of broilers supplemented with probiotics. However, Chuka (2014) noted non-significant increase in serum globulin of broilers supplemented with enzymes and probiotics compared to the control. Similarly, Alkhalf *et al.* (2010) also found non-significant increase in serum globulin levels of broilers fed with probiotic.

Albumin-Globulin Ratio (A/ G Ratio)

There were no significant differences in the serum albumin-globulin ratio among different treatment groups. The albumin-globulin ratio were maximum in groups T_6 (0.50 ± 0.01), T_7 (0.50 ± 0.02) and T_8 (0.50 ± 0.02) and minimum in T_1 (0.48 ± 0.01), T_2 (0.48 ± 0.03) and T_5 (0.48 ± 0.02) groups of broilers. The results of the present experiment are in accordance with the findings of Chuka (2014) who found non-significant difference in the serum albumin-globulin ratio of broilers supplemented with enzymes and probiotics compared to the control.

Enzymatic Profile (21 days)

Serum Aspertate Aminotransaminase (AST)

The AST values in the present investigation showed a significant ($P<0.05$) effect of enzymes and probiotic supplementation in broilers as shown in Table 2. The AST concentration in broilers of T_1 group (186.32 ±

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1.63 IU/ L) was significantly (P<0.05) higher than the supplemented groups. However, the AST concentrations in broilers of T_2 and T_5, T_3 and T_4, T_7 and T_8 groups were statistically similar. Minimum (161.14 ± 0.09 IU/ L) concentration of AST was noted in the broilers of T_8 group.

Table 2: Serum enzymatic profile of broilers (Mean±SE) in different treatment group at 21 and 42 days

Treatment	Serum Enzymatic Profile (IU/L)			
	21 day		42 day	
	AST	ALT	AST	ALT
T_1	$186.32^{a} \pm 1.63$	21.01 ± 0.88	$179.48^{b} \pm 0.96$	21.03 ± 1.55
T_2	$181.85^{b} \pm 0.09$	21.25 ± 0.91	$170.21^{c} \pm 1.17$	22.21 ± 0.98
T_3	$174.95^{c} \pm 1.48$	22.62 ± 1.09	$168.37^{c} \pm 1.01$	22.50 ± 0.84
T_4	$173.14^{c} \pm 0.64$	22.95 ± 1.11	$177.22^{b} \pm 0.81$	21.33 ± 0.88
T_5	$180.32^{b} \pm 0.56$	21.96 ± 1.12	$161.48^{d} \pm 0.60$	22.91 ± 0.79
T_6	$167.85^{d} \pm 1.47$	23.61 ± 0.68	$156.33^{e} \pm 0.54$	23.70 ± 1.26
T_7	$161.95^{e} \pm 0.38$	23.98 ± 1.20	$155.55^{e} \pm 0.88$	23.34 ± 1.07
T_8	$161.14^{e} \pm 0.09$	23.84 ± 1.29	$188.21^{a} \pm 0.41$	20.63 ± 1.17

Means bearing different superscripts in a column differ significantly (P<0.05)

Findings of the present investigation regarding effect of enzymes and probiotic supplementation on serum aspertate aminotransaminase of broiler chickens are in accordance with Rahman *et al.* (2013) who found significant decrease in AST of broilers supplemented with enzymes and probiotic. However, Chuka (2014) found significant increase in AST of broilers supplemented with enzymes and probiotics. Saleh (2014) observed significant reduction in serum aspertate aminotransaminase in broilers supplemented with probiotics. Similarly, Ahmed *et al.* (2007) noted significant reduction in the serum aspertate aminotransaminase level of broilers supplemented with enzymes.

Serum Alanine Aminotransaminase (ALT)

There was no significant effect of enzymes and probiotic supplementation on ALT values in broilers of different treatment groups. The ALT values was maximum in group T_7 (23.98 ± 1.20) and minimum in T_1 (21.01 ± 0.88) group of broilers. The results of the present experiment on serum alanine aminotransaminase are supported by Chuka (2014) who found non-significant effect of enzymes and probiotics supplementation on ALT levels in broilers. However, Rahman *et al.* (2013) found significant decrease in ALT of broilers supplemented with enzymes and probiotics. Shareef and Al-Dabbagh (2009) found no significant effect of probiotics supplementation on ALT values in broilers. Similarly, Shehab *et al.* (2012) noted no significant effect on ALT of broilers supplemented with enzymes.

Serum Protein Profiles (42 days)

Serum Total Protein

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Enzyme and probiotic supplementation had marked effect on serum total protein levels. Serum total protein values in T_5, T_6, T_7 and T_8 groups were significantly ($P<0.05$) higher than T_1 group, however, there were no significant differences in the serum total protein values between T_7 and T_8 groups of broilers. Maximum and significantly ($P<0.05$) higher serum total protein compared to the control was found in broilers of group T_8 (3.99 ± 0.04 g/ dl) which was statistically similar to the serum total protein of group T_7. Minimum and significantly lower serum total protein was observed in the broilers of control group.

Findings of the present investigation regarding the effect of enzymes and probiotic supplementation on serum total protein level are in accordance with the report Shareef and Al-Dabbagh (2009) who found significant increase in serum total protein levels of broilers supplemented with probiotics. However, Chuka (2014) noted non-significant increase in serum total protein of broilers supplemented with enzymes and probiotics compared to the control. Similarly, Alkhalf *et al.* (2010) found non-significant increase in serum total protein levels of broilers fed with probiotic. Increased total protein levels in enzymes and probiotic supplemented groups of broilers in the present experiment may be attributed to the stimulating effect of enzymes and probiotic on the synthesis of protein in the body. The findings of present experiment showed that better protein retention and mobilization may be induced by the enzymes and probiotic supplementation.

Serum Albumin

Serum albumin values in T_5, T_6, T_7 and T_8 groups were significantly ($P<0.05$) higher than T_1 (control) group, however, there were no significant differences in the serum albumin value between T_7 and T_8 groups of broilers. Maximum and significantly ($P<0.05$) higher serum albumin compared to the control was found in broilers of group T_8 (1.32 ± 0.03 g/ dl) which was statistically similar to the serum albumin of group T_7. The results of the present experiment are in accordance with the finding of Shareef and Al-Dabbagh (2009) who found significant increase in serum albumin levels of broilers supplemented with probiotics. However, Chuka (2014) found non-significant increase in serum albumin of broilers supplemented with enzymes and probiotics compared to the control.

Serum Globulin

Serum globulin values in T_5, T_6, T_7 and T_8 groups were significantly ($P<0.05$) higher than T_1 group. The concentration of serum globulin was maximum (2.67 ± 0.04 g/ dl) in the T_8 group and minimum in control group (2.10 ± 0.03 g/ dl) broilers. There were no significant differences in the serum globulin value between T_7 and T_8 groups of broilers. Similarly, Shareef and Al-Dabbagh (2009) also found significant increase in serum globulin levels of broilers supplemented with probiotics. However, Chuka (2014) noted non-

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significant increase in serum globulin of broilers supplemented with enzymes and probiotics compared to the control.

Albumin-Globulin Ratio (A/ G Ratio)

There were no significant differences in the serum albumin-globulin ratio among different treatment groups. The albumin-globulin ratio was maximum in group T_8 (0.50 ± 0.01) and minimum in T_6 (0.47 ± 0.02) group of broilers. The results of the present experiment were in accordance with the findings of Chuka (2014) who found non-significant difference in the serum albumin-globulin ratio of broilers supplemented with enzymes and probiotics compared to the control. The results obtained on albumin-globulin ratio in the serum may be due to inhibition of proteolytic activity.

Enzymatic Profile (42 Day)

Serum Aspertate Aminotransaminase (AST)

The AST values in the present investigation showed a significant ($P<0.05$) effect of enzymes and probiotic supplementation in broilers. The AST concentration in broilers of T_1 group (188.21 ± 0.41 IU/ L) was significantly ($P<0.05$) higher than the supplemented groups. However, the AST concentrations in broilers of T_7 and T_8 groups were statistically similar. Minimum (155.55 ± 0.88 IU/ L) concentration of AST was noted in the broilers of T_8 group. Similar to the findings of the present studies, Rahman *et al.* (2013) found significant decrease in AST of broilers supplemented with enzymes and probiotics. However, Chuka (2014) found significant increase in AST of broilers supplemented with enzymes and probiotics. Similarly, Saleh (2014) observed significant reduction in serum aspertate aminotransaminase in broilers supplemented with probiotics. The significant decrease in AST values of supplemented groups indicates that there is no adverse effect of enzymes and probiotics supplementation on hepatic function of broilers.

Serum Alanine Aminotransaminase (ALT)

There was no significant effect of enzymes and probiotic supplementation on ALT values in broilers of different treatment groups as shown in Table 2. The ALT values was maximum in group T_7 (23.70 ± 1.26 IU/ L) and minimum in T_1 (20.63 ± 1.17 IU/ L) group of broilers.

The results of the present experiment are in accordance with the findings of Chuka (2014) who found non-significant effect of enzymes and probiotics supplementation on serum alanine aminotransaminase values in broilers. However, Rahman *et al.* (2013) found significant decrease in ALT of broilers supplemented with enzymes and probiotics. Shareef and Al-Dabbagh (2009) found no significant effect of probiotics supplementation on ALT values in broilers. Serum aspertate aminotransaminase (AST) and serum alanine

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aminotransaminase (ALT) enzymes are a relatively specific indicator of acute liver cell damage and pathological manifestation of liver dysfunction. When such damage occurs, AST and ALT are released from the liver cells into the blood stream, thus any abnormal increase in their concentrations could imply liver malfunction (Toghyani *et al.*, 2011). The activity of enzymes in the present study due to dietary incorporation of enzymes and probiotics with significantly lower AST and no significant effect on ALT indicated normal functioning of liver.

Conclusion

Present study was designed to determine the effect of dietary supplementation of enzymes and probiotic and their combinations on biochemical profile of broilers from 1st to 6th week. Increased concentration of total serum protein was observed in treated birds which may be because of increased amount of globulins as enhanced humoral immune response. The concentration of AST decreased significantly in the serum samples of treated groups which is indicative of stronger musculature (cardiac and skeletal tissues). The ALT concentration in the serum samples was slightly increased in treated groups which may be attributed to better alanine synthesis and protective microsomal enzymes.

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