International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
www.chemijournal.com
IJCS 2020; 8(6): 260-262

Received: 18-08-2020
Accepted: 16-10-2020

Kartik Tomar
Department of Animal Husbandry, College of Agriculture, Sardar Vallabhbhai Patel University of Agriculture & Technology, Meerut, Uttar Pradesh, India

Raj Kumar
Department of Animal Husbandry, College of Agriculture, Sardar Vallabhbhai Patel University of Agriculture & Technology, Meerut, Uttar Pradesh, India

SP Yadav
Department of Animal Husbandry, College of Agriculture, Sardar Vallabhbhai Patel University of Agriculture & Technology, Meerut, Uttar Pradesh, India

DS Sahu
Department of Animal Husbandry, College of Agriculture, Sardar Vallabhbhai Patel University of Agriculture & Technology, Meerut, Uttar Pradesh, India

Debashis Roy
Department of Animal Nutrition, College of Veterinary and Animal Science, Sardar Vallabhbhai Patel University of Agriculture & Technology, Meerut, Uttar Pradesh, India

Shivanshu Tiwari
Department of Animal Husbandry, College of Agriculture, Sardar Vallabhbhai Patel University of Agriculture & Technology, Meerut, Uttar Pradesh, India

Corresponding Author:
Kartik Tomar
Department of Animal Husbandry, College of Agriculture, Sardar Vallabhbhai Patel University of Agriculture & Technology, Meerut, Uttar Pradesh, India

Effect of feeding organic acid on blood biochemical parameters in commercial broiler

Kartik Tomar, Raj Kumar, SP Yadav, DS Sahu, Debashis Roy and Shivanshu Tiwari

DOI: https://doi.org/10.22271/chemi.2020.v8.i6d.10779

Abstract
Present study was conducted for 6 weeks to evaluate the effect of feeding different levels of organic acid (Butyric acid) on the blood biochemical parameters in broiler chickens. One hundred and eighty day-old broiler chicks (Cobb 400) were randomly assigned to four dietary treatments and each treatment was replicated three times with 15 birds/replicate. The first treatment (T_1) served as control in which basal diet was offered without organic acid supplementation while in T_2, T_3 and T_4 groups, the basal diet was supplemented with butyric acid at the rate of 0.5%, 1.0% and 1.5%, respectively. The blood biochemical parameters e.g. total protein, uric acid, AST, ALP ALT and cholesterol were observed. Though blood biochemical parameters and liver enzyme activity varied from control, all the values in control and supplemented groups were in normal physiological range. The results indicated that supplementation of butyric acid up to the level of 1.5% of improves the blood biochemical parameters in commercial broiler.

Keywords: Broiler, blood biochemical parameters, butyric acid

Introduction
Broiler is an important part of commercial poultry enterprise. India is the fourth largest broiler producer in the world after China, US and Brazil. The Broiler chickens (*Gallus domesticus*) originate from the jungle fowl of the Indian Sub continent (Tom, 2002) [14]. The modern broiler chicken is fast growing, efficient and can rapidly fulfil the shortage of protein requirement for human consumption since it can be produced in least possible time as compared to other meat producing animals (Sarkar *et al.* 2008) [11]. The term organic acid refers to a broad class of compounds used in fundamental metabolic processes of the body. Organic acids are weak acids and are only partly dissociated. Most organic acids with antimicrobial activity have a pKa (the pH at which the acid is half dissociated) between 3 and 5. A wide range of organic acids with variable physical and chemical properties exists, of which many can be used as drinking water supplements or as feed additives (acidifiers). They are also less corrosive and may be more soluble in water (Huyghebaert *et al.* 2011) [5]. Organic acid treatments composed of individual acids or blends of several acids have been found to perform antimicrobial activities similar to those of antibiotics (Wang *et al.* 2009) [15]. Organic acids have strong bacteriostatic effects and have been used as *Salmonella* controlling agents in feed and water supplies for poultry. Organic acids helps to maintain an optimum pH in the stomach, allowing correct activation and function of proteolytic enzymes and in total protein digestion in the stomach, stimulate feed consumption, inhibits the growth of pathogenic bacteria, improve protein and energy digestibility by reducing microbial competition with host nutrients and endogenous nitrogen losses. It increases pancreatic secretion and tropic effects on gastrointestinal mucosa.
Butyric acid is available as Na, K, Mg and Ca salts which can used as feed additive. Butyric acid is thus known to have antimicrobial, anticatabolic and antioxidant effect together improving the lipid metabolism, mineral absorption and immune status of birds. It is also known to improve the carcass characteristics and overall performance of broiler birds. Present experiment was conducted to see the effect of feeding different levels of butyric acid on the blood biochemical parameters in broiler chickens.

Materials and Methods

This experiment was conducted at Poultry Research and Training Center, Sardar Vallabhbhai Patel University of Agriculture & Technology, Modipuram, Meerut-250110 (U.P.) on Effect of feeding organic acid on blood biochemical parameters in commercial broiler. Geographically Meerut is situated between $29^0$01" latitude in the north and $77^0$45" longitudes in the East. One hundred and eighty day-old broiler chicks (Cobb 400) strain were procured and were randomly distributed into 4 treatments with 3 replications. Each replicate contained 15 chicks. Chicks were reared in electric brooder until 7 days of age. Chicks had free access to feed and water throughout and were maintained on a constant 24 hours light schedule. Experimental house and brooding pens were thoroughly cleaned, disinfected, fumigated and remain closed for a period of 15 days before the arrival of chicks. All the feeders, drinkers and other utensils were thoroughly washed and disinfected. In treatment group, the measured amount of butyric acid was supplemented at different levels in the basal diets as 0.5, 1.0 and 1.5%. Butyric acid was purchased from local market. The birds were given *ad libitum* pelleted diets and water throughout the period of the study. The feeding trials of broiler chicks were conducted for forty two days during summer season with given feeding schedule for experimental groups. Standard broiler feeds for the starter (0-3 weeks) and finisher (4-6 weeks) periods as per BIS specifications (1992) [3] were procured from market. On the last week of the feeding trial, blood samples were collected randomly from one bird from each replicate. Blood samples were collected in gel and clot activator vials and were centrifuged at 3000 rpm for 10 min for plasma separation. Separated plasma samples were stored in the freezer and were used for serum biochemical analysis *viz* cholesterol, total protein, uric acid, ALP (Alkaline phosphatase), AST (Aspartate aminotransferase) and ALT (Alanine aminotransferase) after 2 days. The data obtained was subjected to analysis completely randomized design with the simple an alysis of variance technique (Snedecor and Cochran, 1994) [12] using Statistical Package for the Social Sciences (SPSS, 2011) [13]. Differences among treatments were considered to be significant when $P \leq 0.05$. The experiment will be conducted in complete randomized design (CRD).

Results and Discussion

The experiments were performed with supplementation of basal diet with different levels of butyric acid to find out whether Butyric acid will have any effect or any change on the blood biochemical parameters in broiler chickens. The observations on blood biochemical parameters are presented as below.

Blood Biochemical Parameters

Effect of supplementing basal diet with different levels of Butyric acid on certain blood biochemical parameters *viz* cholesterol (mg/dl), total protein (g/dl), uric acid (mg/dl), AST (IU/L), ALT (IU/L) and ALP (IU/L) were measured at 6^{th} weeks of age in experimental Cobb 400 birds. The results obtained is presented in Table 1. The Total protein (g/dl), Uric acid (mg/dl) and ALT (IU/L) were found similar to control but the Cholesterol (IU/L) was recorded as higher in T_4 supplemented group than control. AST (IU/L) level was found higher in T_4 group than control whereas ALT (IU/L) and ALP (IU/L) was found to be higher in T_1 control group than other supplemented groups. The cholesterol (mg/dl) and AST (IU/L) were represented to highest in T_4 supplemented group than other groups. The cholesterol (mg/dl) and AST (IU/L) were represented to highest in T_4 supplemented group than control but ALT (IU/L) and ALP (IU/L) were recorded to highest in T_1 control group than supplemented groups. The total protein (g/dl) and uric acid (mg/dl) was found to be highest in T_3 supplemented group than control. Faramarzzadeh *et al.* (2017) [4] did not found any significant effect on serum biochemical parameters due to dietary treatments of different levels of chicory root and stem powder (CRSP) and butyric acid (BA) combination on in broiler chickens. Yesilbag and Colpan (2006) [16] found significant increase in total protein and AST activity in laying hens with organic acid supplementation (0.5, 1.0, and 1.5 %). Whereas, ALT activity and cholesterol were found unaffected. Unlike the above results, butyric acid supplementation at 0.3 (Mahdavi and Torki, 2009) [9] and BA at 3.0 % (Kamal and Ragaa, 2014) [7] did not influence serum total protein, but in the latter study, serum globulin level was significantly higher. Addition of 0.6 (Panda *et al.* 2009) [10], 0.3 % BA (Lakshmi and Sunder, 2015) [8] in broiler chicken reduced the abdominal fat. While, it was not influenced by inclusion of 0.04 % microencapsulated SB (Zhang *et al.* 2011b) [17], 0.3 % protected BA (Mahdavi and Torki, 2009) [9], 0.25 (Aghazadeh and Yazdi, 2012) [2] and 0.2 % BAG (Jang, 2011) [6]. Elevated levels of serum ALT and AST indicates the deleterious effects of liver functions. BA supplementation at 3.0 % (Kamal and Ragaa, 2014; Adil *et al.* 2010) [7, 1] did not influence the serum Alanine Transaminase (ALT) and Aspartate Transaminase (AST) levels in broilers.

Table 1: Blood biochemical parameters of broiler birds at 6 weeks of age fed with different levels of butyric acid

Treatment	Cholesterol (mg/dl)	Total protein (g/dl)	Uric acid (mg/dl)	AST (IU/L)	ALT (IU/L)	ALP (IU/L)
T_1	136.10^a	3.32^a	4.44^a	113.69^a	10.39^a	271.15^a
T_2	138.22^{ab}	3.30^a	4.56^b	119.25^a	10.29^b	264.81^b
T_3	141.75^b	3.52^b	4.60^b	127.05^b	10.05^c	262.34^b
T_4	142.69^b	3.44^b	4.36^c	139.25^c	10.17^d	264.77^b
SEM	1.34	0.03	0.02	1.59	0.02	1.33
P value	0.02	<0.01	<0.01	<0.01	<0.01	<0.01

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

Conclusion

It can be concluded that supplementation of butyric acid addition at the level of 1.5% in broiler diet improve the blood biochemical parameters and liver enzyme activity without adverse effect of Butyric acid supplementation.

Acknowledgement

The authors are thankful to Dean, Director and Vice Chancellor SVPUAT, Meerut for providing necessary facilities to conduct the research work.

References

1. Adil S, Tufail B, Gulam AB, Masood S, Manzoor R. Effect of dietary supplementation of organic acids on performance, intestinal histomorphology and serum biochemistry of broiler chicken. Veterinary Medicine International Journal 2010;12:1-7.
2. Aghazadeh AM, Yazdi MT. Effect of butyric acid supplementation and whole wheat inclusion on the performance and carcass traits of broilers. South African of Animal Science 2012;42:241-248.
3. BIS. Indian Standard, Poultry Feeds Specifications. Bureau of Indian Standards, 4th Review, Manak Bhawan, 9, Bahadur Shah Zafar Marg, New Delhi, India 1992.
4. Faramarzzadeh M, Behroozlak M, Samadian F, Vahedi V. Effects of chicory powder and butyric acid combination on performance, carcass traits and some blood parameters in broiler chickens. Iranian Journal of Applied Animal Science 2017;7:139-145.
5. Huyghebaert G, Richard D, Van Immerseel F. An update on alternatives to antimicrobial growth promoters for broilers. Veterinary Journal 2011;187:182-188.
6. Jang JP. Comparative effect of achillea and butyric acid on performance, carcass traits and serum composition of broiler chickens. Annals of Biological Research 2011;2:469-473.
7. Kamal AM, Ragaa NM. Effect of dietary supplementation of organic acids on performance and serum biochemistry of broiler chicken. Natural Science 2014;12:38-45.
8. Lakshmi KV, Sunder GS. Supplementation of Propionic Acid (PA), Butyric Acid (BA) or Antibiotic (AB) in diets and their influence on broiler performance, carcass parameters and immune response. International Journal of Science and Research 2015;4:1002-1006.
9. Mahdavi R, Torki M. Study on usage period of dietary protected butyric acid on performance, carcass characteristics, serum metabolite levels and humoral immune response of broiler chickens. Journal of Animal and Veterinary Advances 2009;8:1702-1709.
10. Panda AK, Rao SR, Raju MVLN, Sunder GS. Effect of butyric acid on performance, gastrointestinal tract health and carcass characteristics in broiler chickens. Asian-Australasian Journal of Animal Science 2009;22:1026-1031.
11. Sarkar PK, Chowdhury SD, Kabir MH. Comparative study on the productivity and profitability of commercial broiler, cockerel of a layer strain and cross bred chicks. Bangladesh Journal of Animal Science 2008;37:89-98.
12. Snedecor GW, Cochran WG. Statistical methods 9th edition, The Iowa, state university press, Ames, Iowa 1994.
13. SPSS. Statistics version 20.0. IBM SPSS Inc, USA 2011.
14. Tom K.U.S. Broiler Industry Structure. National Agricultural Statistics Service (NASS), Agricultural Statistics Board, U.S. Department of agriculture, Retrieved 2002, 2012.
15. Wang JP, Yoo JS, Lee JH, Zhou TX, Jang HD, Kim HJ, *et al*. Effects of phenyl lactic acid on production performance, egg quality parameters, and blood characteristics in laying hens. Journal of Applied Poultry Research 2009;18:203-209.
16. Yesilbag D, Colpan I. Effects of organic acid supplemented diets on growth performance, egg production and quality and on serum parameters in laying hens. Revue Medicine Veterinaire 2006;157:280-284.
17. Zhang WH, Gao F, Zhu QF, Li C, Jiang Y, Dai SF *et al*. Dietary sodium butyrate alleviates the oxidative stress induced by corticosterone exposure and improves meat quality in broiler chickens. Poultry Science 2011b;90:2592-2599.