Research in
AGRICULTURE, LIVESTOCK and FISHERIES
ISSN : P-2409-0603, E-2409-9325
An Open Access Peer Reviewed Journal

Open Access **Res. Agric. Livest. Fish.**
Research Article **Vol. 4, No. 3, December 2017: 173-179.**

EFFECT OF DIETARY SUPPLEMENTATION OF GINGER ON FEED CONVERSION RATIO, CARCASS PHYSIOGNOMIES AND HAEMATOLOGICAL PARAMETERS IN BROILER

Md Sadik Al Mahdy, Md. Faridul Islam, Md. Nakibul Hasan[1], Ashadul Habib and Mahmudul Hasan Sikder*

Department of Pharmacology, and [1]Department of Physiology, Faculty of Veterinary Science, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh

***Corresponding author:** Mahmudul Hasan Sikder; E-mail: drmsikder@bau.edu.bd

ARTICLE INFO

Received
09 August, 2017

Accepted
24 December, 2017

Online
31 December, 2017

Key words
Ginger
FCR
Growth promoter
Broiler

ABSTRACT

This study evaluated the effect of ginger on the growth performance, carcass quality of broiler chickens. A total of 40 broiler chickens were randomly selected into four groups identified as A (1% ginger extract), B (2% ginger extract), C (positive control) and D (negative control). All groups contain equal number of birds (n=10.) Birds were treated with aqueous ginger extract via drinking water. Significant variations ($p<0.05$) existed between the control and other treatments in mean final body weight, dressed weight, daily feed intake and feed conversion ratio. At the end of experiment (35th day) for 1% ginger extraction treatment the live body weight is 1745gm ($p<0.05$), dressing weight 1135.3 ($p<0.05$) and FCR is 1.66 ($p<0.05$). The usage of the test ingredients had a significant effect ($p<0.05$) on dressing percentage. Administration of ginger to broiler chickens increased their performance, FCR as well as blood parameters. It is, thus, recommended in broiler chicken production alternative to antibiotic and/or growth promoter.

To cite this article: Mahdy MSA, MF Islam, MN Hasan, A Habib and MH Sikder, 2017. Effect of dietary supplementation of ginger on feed conversion ratio, carcass physiognomies and haematological parameters in broiler. Res. Agric. Livest. Fish., 4 (3): 173-179.

INTRODUCTION

In Bangladesh, the effect of insufficient animal protein intake is felt more by a large proportion of the population especially in the rural areas. Poultry meat is a better source of animal protein and can contribute enormously in enhancing the consumption level of animal protein. The excessive increase in the cost of input especially that of feed is among the constraints in commercial broiler production (Madubuike & Ekenyem, 2001). Ensuring more net return and minimizing high expenditure for feed are the main challenges, for which many research strategies have been trying to address through the inclusion of feed supplements and feed additives in the diets of broiler chicken. Feed additives are a group of nutrient and non-nutrient compounds which helps in improving the efficiency of feed utilization and thus reducing the high cost of feed. In the past, antibiotics were the most routinely used feed additives (Ogle, 2013). However, nowadays use of antibiotics is not only limited but their use in livestock and poultry industry also have been banned in many countries due to the reasons like alteration of natural gut microbiota and drug resistance in bacteria and humans. As a result, to replace them without adversely affecting the performance of birds, natural growth promoters such as prebiotics, probiotics, synbiotics, enzymes, plant extracts etc. can be used to feed the broilers (Demir et. al., 2003). Incidentally, their use in animal feed has shown several side effects such as resistance towards the drug and evidence of resistant strains that become zoonotic (Wegener et al., 1999). Furthermore, the residue of antibiotics could be end up in human food chain if the withdrawal period is not maintained.

Natural medicinal products originating from herbs and spices have been used as feed additives for farm animals (Guo, 2003). The efficacy and importance of a particular feed ingredient in poultry production is evaluated from its effect on the production performance/traits of the birds. Furthermore, valuable information can be obtained from the study of the haematological parameters. This stems from the fact that the blood serves as an important index of physiological, pathological and nutritional status of an animal. Ginger, *Zingiber officinalis*, is a perennial herbaceous plant that is a part of the *Zingiberaceae* family. Ginger as a carminative, diuretic, tonic and disinfectant compound contains glucosinolate, sterols and triterpenes (Al-Yahya, 1986). Ginger as natural growth promoters can be potential alternatives for common artificial growth promoters like antibiotics (Karangiya et al., 2016). Different researchers have examined the effect of ginger on growth performance in broilers, and variable results were reported. For example, Taylor (2001) showed that the use of ginger and ginger powders significantly increased body weight and improved feed conversion compared to birds fed with control diet. In contrast, Zhang et al*.,* (2009) examined the effect of processed ginger with different size on growth performance and showed that the ginger additive had no significant effect on the feed efficiency, while body weight and daily weight gain of birds fed with ginger supplements were higher than control group. It is also reported that serum cholesterol levels in broilers can be decreased.

The use of ginger as substitute for antibiotic growth promoters is desirable for greater productivity of poultry, increased palatability of feed, nutrient utilization, appetite stimulation, increase in the flow of gastric juice and piquancy to tasteless food (Owen and Amakiri, 2012). Therefore, the present study was performed to assess the growth performance, carcass quality and haematological parameters of broiler chicks for aqueous extract of ginger.

MATERIALS AND METHODS

Test elements

The fresh ginger was bought from local market. The ginger was peeled, cut into small pieces and dried. The dried ginger was crumpled by grinder (Jaipan-CM/L-7360065) and aqueous extract was prepared by extraction as described by (Dieumou et al*.,* 2012). After receiving the extraction 1% and 2% solution of ginger was freshly prepared for daily basis.

Experimental bird's management

A total of 40 day-old Cobb 500 broiler chicks were purchased from Nourish Poultry & Hatchery Limited, Gazipur, Bangladesh. The chicks were kept for nine days for adaptation and were fed commercial broiler starter feed (Nourish poultry Feed, Nourish poultry feed limited, Gazipur, Bangladesh) only and given plain drinking water. The brooding temperature was maintained at 35°C during 1st week. It was then gradually lowered by 3°C every week until it reached to room temperature (i.e. 25±1°C). Mean initial weight of the chicks was 36.52 gm. at the start of experiment. Chicks were vaccinated with Newcastle disease vaccine (Baby Chick Ranikhet Disease Vaccine-BCRDV, Livestock Research Institute, Mohakhali, Dhaka, Bangladesh) Intraocularly on 4^{th} day and 21^{th}day.

On day 7^{th}, 40 chicks weighing average body weight of 89.55±1.24 gm. were randomly allotted to two treatments and a positive and negative control group in a completely randomly design (CRD). The birds were reared in litter system. Four experimental groups were identified as A (1% ginger), B (2% ginger), C (positive control: antibiotic (Renamycin® 20 w/w Oxytetracycline Hydrochloride USP) Renata Animal Health, Dhaka, Bangladesh) supplied as pharmaceuticals recommended dose) and D (negative control: only feed and water).

Collection of data

Daily body weights of all birds were recorded. At the end of treatment blood sample was collected from the wing vein of each bird using disposable plastic syringe and needle with an EDTA. After sacrificed dressing percentage were taken and offal's weight such as the liver, heart, pancreas, gizzard and spleen were recorded.

Haematological assay

The Packed Cell Volume (PCV), Total Erythrocyte Count (TEC) and Haemoglobin concentrations were done as described by Lamberg SL and Rothstein R (1977).

Statistics and data analysis

The data were analyzed using general linear model procedure of Statistical Package For Social Science(SPSS) IBM 20 and comparison of means tested using Duncan's multiple range test and significance was considered at $p<0.05$ (Dieumou et al*.,* 2012).

RESULTS AND DISCUSSION

The effects of feeding different concentration of dietary ginger on daily body weight gain are shown in Table 1. All groups had initial body weight 89.55±1.24 gm. No mortality was detected in all treatment groups throughout the study period. Feed Conversion Ratio (FCR) is shown in Table 2, where significant variation was evident in group A. Dressed weights of birds are shown in Table 3. No significance variation was found in offal's weight (Table 4). Significant increases of PCV, Hb and TEC are shown in Table 5.

Growth performance

Daily body weight gain was collected in record log book. In Table 1, average weight gain from day 7 to day 35 is shown with 7 days interval. Best weight gained was observed in A group at day 35 followed by C, B and lowest in D.

Ginger extract given in broiler diets have significant ($p<0.05$) influence on body weight gains especially after 14 to 35 days of age. It was observed that 1% ginger was better than 2% as a supplementation to increase body weight. Farinu et al. (2004) reported slight improvement in the growth performance of broilers value (27.50%) with ginger supplementation. On the other hand, Al-Homidan (2005) reported reduced least mean value (5.98 g/dl), while those on diet growth rate of broiler starters fed ginger at the rate of 20 containing 1.00% garlic and 0.50% ginger mixture had higher growth rate. Javed et al. (2009) reported that broiler chicks given aqueous extract of ginger showed an improved body weight gain. Dieumou et al (2009) found that there were no differences among the ginger oil diets and the control in terms of feed intake, body weight gain and feed conversion ratio who fed ginger essential oils to broilers.

Table 1. Live body weight of birds

Groups	Body weight gain (gm.)				
	Day 7	Day 14	Day 21	Day 28	Day 35
A	88.4±4.92 [a]	310.5±21.18[a]	755.3±55.12[ab]	1353.2±73.14[b]	1745.2±135.17[a]
B	89.6±4.83 [a]	333.8±24.18[a]	703.2±57.19[ab]	1225.5±85.47[ab]	1597.4±155.25[a]
C	88.0±5.02 [a]	312.1±22.81[a]	705.6±56.27[ab]	1351.8±82.14[b]	1701.3±119.72[a]
D	90.0±4.78 [a]	310.8±23.28[a]	623.5±60.71[a]	1120.5±84.53[a]	1523.4±157.43[a]

Table 2. Feed Conversion Ratio (FCR) of birds

Groups	Feed Conversion Ratio (FCR)				
	Day 7	Day 14	Day 21	Day 28	Day 35
A	1.16	1.90	1.56	1.51	1.66
B	1.14	1.92	1.68	1.65	1.82
C	1.14	1.71	1.75	1.57	1.69
D	1.13	1.72	1.98	1.92	1.89

FCR of birds

FCR was calculated in every 7 days interval where best FCR was found in group A at 35th day, followed by C, B and lees feed conversion was observed in D group.

Significant ($P<0.05$) difference were revealed for FCR in all the treatments from 7 days to 35 days of age. Poor FCR was observed in negative control group (group D) and better FCR was observed in 1% ginger group (group A). According to Moorthy *et al* (2009) and Onimisi *et al* (2005) the FCR of broiler with ginger supplementation has better effect on FCR.

Dressed weight

After dressing of each bird at day 35, they were individually weighted. Among the groups; A obtained highest dressed weight followed by C, B and lowest dressed weight was in D group (Table 3).

Table 3. Dressed weight of birds after dressing at day 35

Group	Weight of dressed birds (g)
A	1135.3±121.23 [ab]
B	982.47±117.27 [a]
C	1123.1±102.71 [ab]
D	977.3±122.31[ab]

*Different letters denotes significant variation among the groups

Offal's weight of birds

Individual bird's liver, gizzard, hear, spleen and pancreas weight was taken and no statistical significance was observed (P<0.05).

Table 4. Offal's weight of birds after dressing at day 35

Groups	Offal's weight of birds (gm.)				
	Liver	Gizzard	Heart	Spleen	Pancreas
A	47.96±0.64 [a]	9.11±1.03[a]	21.05±2.51[a]	3.53±0.27 [ab]	2.56±0.34[a]
B	57.16±0.61 [c]	9.06±1.00[a]	22.02±2.07[ab]	3.37±0.26 [ab]	2.53±0.35[a]
C	51.62±0.65 [a]	9.91±1.01[a]	20.68±2.91[a]	3.12±0.27[a]	2.43±0.34[a]
D	46.53±0.71 [b]	10.02±1.04[a]	19.17±2.94[a]	3.42±0.25 [ab]	2.31±0.34[a]

*Different letters denotes significant variation among the groups

The results indicated no significant differences (P<0.05) between all treatment groups in offal's (liver, gizzard, heart, spleen and pancreas) weight of bird.

Haematological assay

After collection of blood with anticoagulant (EDTA), TEC, Hb and PCV were performed at department of Physiology, Bangladesh Agricultural University, Mymensingh. No significance variation was found but significance increase was found among the groups but 2% ginger treated birds show relatively high PCV with least standard deviation and other hematological parameters are almost similar as positive control.

Table 5. Haematological data

Group	Mean ± SD		
	TEC (million/cm^3)	Hb (g)	PCV (%)
A	2.61±0.13	7.01±0.21	23.32±0.57
B	2.85±0.06	7.32±0.12	27.02±1.72
C	2.34±0.15	7.26±0.30	23.17±3.77
D	2.31±0.16	7.01±0.32	21.02±3.76

Saeid et al. (2010) observed that aqeous extract of ginger significantly reduced the level of cholesterol in the blood of broilers. Bhandari et al. (1998) and Akhani et al. (2004) also reported that ginger treatment significantly decreased serum cholesterol. The present experiment didn't check cholesterol level in the blood of broiler.

CONCLUSIONS

At the end of the experiment, on the basis of the performance of broilers in respect to feed intake, body weight gain, FCR, dressed weight, it is observed that 1% ginger supplementation was superior in comparison to 2% ginger. Therefore, it is concluded that supplementation of ginger improves performance of broilers when added at the rate of 1% of broiler ration and can be a viable alternative to antibiotic growth promoter in the feeding of broiler chicken.

REFERENCE

1. Akhani SP, SL Vishwakarma, and RK Goyal, 2004. Anti-diabetic activity of Zingiber officinale in Streptozotocin-induced type I diabetic rats. Journal of Pharmacy Pharmacology, 56: 101-105.
2. Al-Homidan AA, 2005. Efficacy of using different sources and levels of Allium sativum and Zingiber officinale on broiler chicks performance. Saudi Journal of Biological Sciences 12: 96-102.
3. Al-Yahya MA, 1986. Phytochemical studies of the plants used in traditional medicine of Saudi Arabia. Fitoterapia, 57: 179-182.
4. Bhandari U, and JK Grover, 1998. Effect of ethanolic extract of ginger on hyperglycemic rats. International Journal of Diabetes, 12: 96-102.
5. Demir E, S Sarica, MA Ozcan, M Suicmez, 2003. The use of natural feed additives as alternatives for an antibiotic growth promoter in broiler diets. British Journal of Poultry Science, 44: S44–S45.
6. Dieumou FE, A Teguia, JR Kuiate, JD Tamokou and Doma UD, 2012. Effect of diets fortified with garlic organic extract and streptomycin sulphate on growth performance and carcass characteristics of broilers. International Journal of Livestock Production, 3: 36–42.
7. Farinu GO, SG Ademola, AO Ajayi-Obe and GM Babatunde, 2004. Growth, haematological and biochemical studies on garlic and ginger fed broiler chickens. Moor Journal of Agricultural Research, 5: 122-128.
8. Gardzielewska J, K Pudyszak, T Majewska, M Jakubowska, and J Promianowski, 2003. Effect of plant supplemented feeding on fresh and frozen storage quality of broiler chicken meat. Animal Husbandry Series of Electronic Journal of Polish Agricultural University, 6: 2.
9. Guo FC, 2003. Mushroom and herb polysaccharides as alternative for antimicrobial growth promoters in poultry (Unpublised doctoral dissertation). Wageningen University, Netherlands.
10. Herawati O, 2010. The effect of red ginger as phytobiotic on body weight gain, feed conversion and internal organs condition of broiler. International Journal of Poultry Science, 9: 963-967.
11. Javed, M, F Durrani, A Hafeez, RU Khan, and I Ahmad, 2009. Effect of aqueous extract of plant mixture on carcass quality of broiler chicks. Journal of Agricultural and Biological Science, 4: 37-40.

12. Karangiya VK, HH Savsani and SS Patil, 2016. Effect of dietary supplementation of garlic, ginger and their combination on feed intake, growth performance and economics in commercial broilers. Veterinary World, 9: 245-250.
13. Lamberg SL and R Rothstein, 1977. Laboratory Manual of Hematology and Urinalysis, West Port Connecticut, USA.: Avi. Publishing Company, Inc.
14. Madubuike FN, and BU Ekeyem, 2001. Non ruminant Livestock Production in the Tropics (p. 185). Gust-chuksGrapics, Owerri, Nigeria.
15. Manseh MK, S Kazemi and M Asfari, 2012. Influence of poly germander (trucriumpolium) and watercress (Nasturtium officinale) extract on performance, carcass quality and blood metabolites of males broilers. Research Options in Animal & Veterinary Sciences, 2: 66-68.
16. Moorthy M, S Ravi, KM Ravi and SC Edwin, 2009. Ginger Pepper and Curry Leaf Powder as Feed Additive in Broiler Diet. International Journal of Poultry Science, 8: 779 – 782.
17. Ogle M, 2013. Riots, Rage, Resistance: A Brief History of How Antibiotics Arrived on the Farm. Scientific American. Retrieved November 5, 2014.
18. Onimisi PA, II Dafwang and J Omage, 2005. Growth performance and water consumption pattern of broiler chicks fed graded levels of ginger waste meal. Journal of Agriculture, Forestry and Social Science, 3: 113-119.
19. Owen OJ and Amakiri, 2011. Serological and Haematological Profile of Bitter Leaf (V. Amgdalina) Meal. Advances in Agriculture Biotechnology, 1: 77-81.
20. Saeid JM, AB Mohamed and MA AL-Baddy, 2010. Effect of aqueous extract of ginger (zingiber officinale) on blood biochemistry parameters of broiler. International Journal of Poultry Science, 9: 944-947.
21. Taylor DJ, 2001. Effects of antibiotics and their alternatives. British Poultry Science, 412: 67-687.
22. Wegener HC, FM Aarestrup, P Benner-Smidt and F Bager, 1999. Transfer of antibiotic resistant bacteria from animal to man. Acta Veterinaria Scandinavica, 92: 51-57.
23. Zhang GF, ZB Yang, Y Wang, WR Yang, SZ Jiang, GS Gai, 2009. Effects of ginger root (Zingiberofficinale) processed to different particle sizes on growth performance, antioxidant status, and serum metabolites of broiler chickens. Poultry Science, 88: 2159-2166.