International Journal of Livestock Research, Vol. 10 (7) July' 2020
http://www.ijlr.org
eISSN: 2277-1964
NAAS Rating 2020 – 5.36

Original Research

Effect of Dietary Supplementation of Ginger and Cinnamon on Blood Profile of Broilers

D. S. Gaikwad[1,2*] and Y. G. Fulpagare[2]

[1]Assistant Professor, Lovely Professional University, G.T. Road Phagwara, Punjab, INDIA
[2]Professor and Head, Department of Animal Husbandry and Dairy Science, PGI, Mahatma Phule Krishi Vidyapeeth, Rahuri, Maharashtra, INDIA

*Corresponding Author: dsgaikwad7@gmail.com

How to cite this paper: Gaikwad, D., & Fulpagare, Y. (2020). Effect of Dietary Supplementation of Ginger and Cinnamon on Blood Profile of Broilers. *International Journal of Livestock Research*, 10(7), 162-166. doi: http://dx.doi.org/10.5455/ijlr.20200306072321

Received : Mar 06, 2020
Accepted : Jun 12, 2020
Published : Jul 31, 2020

Abstract

The point of this research was to evaluate the result of the medicinal plants like cinnamon and ginger, as natural feed supplements on the blood characteristic of a broiler. The preliminary was directed with 140, day-old 'Vencob-400' chicks, which were divided into 7 treatment groups (Five chicks for each replicates) for example 20 chicks for every treatment groups. Dietary medicines comprised of basal eating regimen without any added substances T0 (Control), T1, T2, T3, T4, T5 and T6 getting 1.0%, 2.0% and 3.0% cinnamon and 1.0%, 2.0% and 3.0% ginger, individually. The blood parameters viz., cholesterol (HDL, LDL), serum triglycerides, haemoglobin showed significant differences at 2% cinnamon and 1% ginger as compared to control.

Keywords: Blood, Broiler, HDL, LDL and Herbal

Introduction

Medicinal plants have been utilized by people from remote occasions to fix or to reduce their sicknesses or illnesses. Additionally, they were utilized in the creatures with restorative closures, for their antidiarrheal, germicide, antimicrobial, and anti-inflammatory properties (Jaric *et al.*, 2015). For enhancing the broilers performance antimicrobial agents are added in broilers feed as sub-therapeutic doses (Kim *et al.*, 2008). Since 1946, antimicrobial agents (Growth promoters) are commonly added in feed, the birds are reared effectively greater feed efficiency. However, their subclinical incorporation in feed has arisen into a controversial issue worldwide due to the appearance of residue resistant strain of bacteria (Toghyani *et al.*, 2011). Consequently, their utilization of this poultry feed has been banned in many countries (Hashemi and Davoodi, 2010). Natural medical products beginning from herbs and flavours have been used as feed added substances for livestock and poultry. (Guo, 2003). Being naturally available, non-toxic, residue-free effect and abundant amount make them highly utilized as natural feed additives for poultry. These have many effects on animals and poultry birds which include stimulation of appetite, increased digestive enzymes secretion, immuno-stimulant, bactericidal, antiviral, and antioxidants etc. Herbal feed additives improve the digestive process and important component of the environment these products are safe, easily available economic and environment safety. Gurjar *et al.* (2018) concluded that synbiotic was most efficient, effective and economical herbal feed additive and can be used as an alternative to antibiotic growth promoter in broiler industry. Ginger is used as alternative to antibiotic growth promoters (Nikam *et al.*, 2019). Therefore, the target of this examination was to determine the effects of the utilization of ginger and cinnamon powder in broilers diet on serum cholesterol, HDL, LDL, haemoglobin and triglyceride.

Material and Methods

The information relating to growth and performance as affected by dietary cinnamon and ginger as a feed supplementation in broilers are clarified hereunder. The experimental feeds viz. broiler starter and finisher which were supplemented with cinnamon and ginger as per treatment details. The proximate composition of the rations is presented in Table 1. The crude protein (CP), crude fibre (CF), ether extract (EE), total ash (TA), nitrogen-free extract (NFE) and acid-insoluble ash (AIA) of starter ration were 23.00, 4.60, 4.80, 7.20, 60.40 and 1.25 per cent respectively and calculated metabolizable energy (ME) of the diet was 2863.811 Kcal/kg. The crude protein, crude fibre, ether extract, total ash, nitrogen-free extract and acid-insoluble ash of finisher ration were 20.00, 3.78, 4.30, 6.85, 65.15 and 1.44 per cent respectively and calculated metabolizable energy (ME) of the diet was 2939.75 Kcal/kg. At the end of the treatments two birds from each replicate randomly picked up for slaughter (6 per treatment) were slaughtered and blood samples were collected and centrifuged for 15 min at 3000 rpm to separate the serum and samples were stored at -20^{o}C for the determination of serum glucose, total protein, cholesterol (Godkar, 1994) and triglycerides using random and biomerinx kits. All data were analyzed by utilizing CRD (Snedechor and Cochran, 1994).

Table 1: Percent chemical constitution of experimental broiler feed on a dry matter basis

Nutrients	Broiler Ration/Feed	
	Starter	Finisher
CP	23	20
CF	4.6	3.78
EE	4.8	4.3
TA	7.2	6.85
NFE	60.4	65.15
AIA	1.25	1.44
ME (Kcal/kg)	2863.811	2939.75

Results and Discussion

Serum Total Cholesterol (mg/dl)

At 42nd day of age significant contrast (P≤0.05) was shown in CNP (cinnamon powder) and GRP (ginger root powder) supplemented birds compare to control. Serum total cholesterol values in treatment T_2 (131.41 ± 1.57 mg/dl) and T_4 (133.03 ± 3.24 mg/dl) was significantly reduced as compared to treatments and control group. It

indicated that supplementation of 2.0% CNP and 1% GRP supplement is most efficient for the reduction of serum total cholesterol than the rest of the treatments. Mohamed *et al.* (2012) showed that the effects of ginger on the characteristics of broilers, who reported that total serum cholesterol was decreased in 0.1 per cent (119.30 mg/dl) and 0.2 per cent (115.89 mg/dl) ginger than control (126.40 mg/dl) group. Hossain (2014) observed that average blood cholesterol was decreased in cinnamon supplemented group (156.17 ± 2.848) as compared to control (176.57 ± 4.041 mg/dl) group. In present study supplementation of broiler diet T_2 and T_4 cinnamon and ginger significantly ($P \leq 0.05$) decreased the cholesterol level. The cinnamic acid statistically reduced the activity of hepatic HMGCoA reductase, play important role in regulating cholesterol metabolism and reduced the total serum cholesterol level (Lee *et al*., 2007).

Table 2: Blood parameters in broilers fed the experimental diet

Treat.	Cholesterol (mg/dl)	HDL (mg/dl)	LDL (mg/dl)	TG (mg/dl)	HB (mg/dl)	Glucose (mg/dl)	Protein (mg/dl)
T_0	155.77± 6.70^{c}	75.59± 0.46^{a}	54.78± 3.18^{d}	88.62 ± 0.00^{b}	10.14± 0.06^{a}	186.63± 1.41	2.38± 0.26
T_1	152.57± 0.84^{bc}	80.91± 3.04^{ab}	49.39±1.40^{cd}	82.86± 1.24^{a}	10.23± 0.19^{a}	181.07 ± 1.31	2.81± 0.08
T_2	131.41± 1.57^{a}	89.55± 0.55^{c}	31.63± 0.90^{a}	80.04± 2.79^{a}	10.63± 0.03^{b}	182.37 ± 1.47	3.02± 0.04
T_3	145.08± 3.51^{bc}	83.48± 1.54^{bc}	40.81± 0.93^{b}	80.68± 1.57^{a}	10.29± 0.15^{ab}	181.87 ± 1.38	2.83± 0.25
T_4	133.03± 3.24^{a}	87.09± 2.36^{bc}	37.32± 1.30^{ab}	79.99± 0.53^{a}	10.65± 0.09^{b}	186.22 ± 0.87	3.06± 0.04
T_5	142.18± 3.42^{ab}	83.53± 3.97^{bc}	47.2± 3.41^{c}	81.12± 1.00^{a}	10.29± 0.10^{ab}	184.95 ± 1.97	2.9± 0.11
T_6	147.93± 3.75^{bc}	81.82± 0.86^{ab}	48.64± 0.81^{cd}	81.29± 0.92^{a}	10.19± 0.07^{a}	181.01± 0.62	2.66± 0.18
Mean	143.99± 3.29	83.13± 1.83	44.25± 1.70	82.08± 1.15	10.34± 0.09	183.44 ± 1.29	2.81± 0.14

HDL (mg/dl)

The total cholesterol concentration was significantly increased in T_2 (89.55 ± 0.55 mg/dl) group than the untreated group at 42nd day of age. Thus, there was significant ($P \leq 0.05$) increment in high-density lipoprotein cholesterol values in all groups as compared to control. Najafi and Taherpour (2014) observed the HDL value highest in 0.4 per cent (43.58 mg/dl) ginger than 0.8 per cent (34.50 mg/dl) ginger and control group (31.31 mg/dl). Ademola *et al.* (2009) reported that statistically improvement in high-density lipoprotein cholesterol in broiler blood with addition of 1 (71.79 mg/dl), 1.5 (79.19 mg/dl) and 2 (73.12 mg/dl) per cent of ginger powder than control (66.10 mg/dl) in their ration.

LDL (mg/dl)

The total low-density lipoprotein was significantly ($P \leq 0.05$) lowered in (31.63 ± 0.90 mg/dl) in CNP 2% (T_2) and GRP 1% (T_4) (37.32 ± 1.30 mg/dl) supplemented birds than the control group at 42nd day of age. Ademola *et al.* (2011) reported that the reduction in serum LDL cholesterol values in 1.5 per cent (26.83 mg/dl) followed by 2 % (32.78 mg/dl), 1 % (42.78 mg/dl) and 0 per cent (86.95 mg/dl) of ginger in diet. Barazesh *et al.* (2013) and Najafi and Taherpour (2014) reported that the low-density lipoprotein was reduced in ginger supplemented broiler diet. The *Zingiber officinale* reported as best hypolipidaemic natural agent. The level of Serum LDL-c statistically lower ($P<0.05$) reported by Kamal *et al*. (2009)

Serum Triglyceride (mg/dl)

The significantly ($P<0.05$) lowest levels of triglycerides were observed in broilers fed CNP and GRP supplemented group as compared to control. In consistent with the findings of the present investigation Saeid *et al.* (2010) found that the utilization of ginger decreases the blood triglyceride. The present results were in agreement with Mohamed *et al.* (2012) who reported the reduction in the serum triglyceride with supplementation of ginger powder in broiler diets 116.10, 108.20 and 107.42 mg/dl for the levels of 0, 1.0 and 1.5 per cent, respectively. Ademola *et al.* (2009) reported that the effect of ginger on the blood parameter of broilers. He reported that decrease value of serum triglyceride was 207.21, 150.67, 125.00 and 134.63 mg/dl at the rate of 0, 1, 1.5 and 2 per cent ginger powder in broiler diet. Rafiee *et al*. (2014) also reported the decrease in the serum triglyceride with supplementation ginger in broilers.

Hemoglobin (mg/dl)

The significantly (P≤0.05) highest haemoglobin was recorded in T2 (10.63 ± 0.03 mg/dl) and T4 (10.65 ± 0.09 mg/dl). There was significant (P≤0.05) increase in serum haemoglobin values in all groups as compared to control group (T0). The present findings were in agreement with Najafi and Taherpour (2014) who reported that the increment in the serum haemoglobin with supplementation of cinnamon and ginger in broiler diets. Similar results were reported by Saleh *et al.* (2014) who observed that feeding of ginger oil in birds showed the highest amount of haemoglobin concentration than the control group.

Serum Glucose (mg/dl)

In agreement with our findings, Najafi *et al.* (2014) showed that no significant (P≤0.05) differences in blood glucose level among different treatments supplemented with cinnamon and ginger in broilers diet at 42nd day. In spite of our outcomes, there are gives an account of blood glucose decrease in dietary ginger supplemented group (Akhani *et al.,* 2004). This inconsistency might be defended as follows: the blood glucose levels are kept up by basic homeostatic components relying upon the phase of development and development, feed utilization, profitability and ecological changes. In contrast Mohamed *et al.* (2012) who showed reduction of serum glucose at 0.1 (153.56 ± 1.090 mg/dl) and 0.2 (150.21 ± 1.070 mg/dl) per cent of ginger than control (164.21 ± 1.040 mg/dl). Zomrawi *et al.* (2013) showed reduction in serum glucose when supplemented with 1 (168.25 mg/dl), 1.5 (176.0 mg/dl) and 2 (144.50 mg/dl) % ginger than control (183.5 mg/dl) group.

Serum Total Protein (mg/dl)

There was no significant difference between experimental treatments in terms of total serum protein. Present result was consistent with the results of Farinu *et al.* (2004) who found that ginger supplementation at a rate of 5, 10 and 15 g per kg of diet had no effect on total serum protein in broilers. In contrast Zomrawi *et al.* (2012) who reported that the decrease in the serum total protein with supplementation of 0 (5.48 mg/dl), 0.5 (2.63 mg/dl), 1.0 (3.9 mg/dl) and 1.5 (4.9 mg/dl) per cent of ginger powder in broiler diet.

Conclusion

The finding of this work very clearly informed that supplementation of cinnamon (2%) and ginger (1%) in broilers significantly (P≤0.05) decreased the cholesterol level, low-density lipoprotein and triglycerides. On the basis of this results we suggest that inclusion of cinnamon and ginger in broilers diet improved the blood profile of broilers.

Acknowledgements

The authors are grateful to the Mahatma Phule Krishi Vidyapeeth (MPKV), Rahuri, Maharashtra for providing the necessary facilities to carry out this research work.

Conflict of Interests

There is no conflict of interest.

Publisher Disclaimer

IJLR remains neutral concerning jurisdictional claims in published institutional affiliation.

References

1. Ademola, S.G., Farinu, G.O. and Babatunde, G.M. (2009). Serum lipid, growth and haematological parameters of broilers fed Garlic, Ginger and their mixtures. *World Journal of Agriculture Science*, 5(1):99-104.
2. Akhani, S.P., Vishwakarma, S.L. and Goyal, R.K. (2004). Anti-diabetic activity of *Zingiber officinale* in Streptozotocin-induced type I diabetic rats. *Journal Pharmacy Pharmacol*, 56: 101-105.

3. Aleem, K.R. and Shagufta (2009). Clinical evaluation of the efficacy of a combination of zanjabeel (Zingiber officinale) and amla (Emblica officinalis) in hyperlipidaemia. *Indian Journal of Traditional Knowledge*,3: (8) 413-416.
4. Aniket, S., Nikam, M., Dhumal, M., Deshpande, K. and Gaikwad, S. (2019). Effect of Ginger and Thyme Essential Oils as an Alternative to Antibiotic Growth Promoters on Performance, Immune Status and Economics of Broiler Production. *International Journal of Livestock Research.,* 9(7): 32-39.
5. Barazesh, H., Pour, M.B., Salari, S. and Abadi, T.M. (2013). The effect of ginger powder on performance, carcass characteristics and blood parameters of broilers. *International Journal of Advanced Biological and Biomedical Research*., 1(12):1645-1651.
6. Farinu, G.O., Ademola, S.G., Ajayi Obe, A.O. and Babatunde, G.M. (2004). Growth, haematological and biochemical studies on garlic and ginger-fed broiler chickens. *Moor Journal of Agricultural Research,* 5:122–128.
7. Godkar, P.B. (1994). Textbook of medical laboratory technology. Bhulani publishing house, Mumbai., 219-222.
8. Guo, F.C. (2003). Mushroom and Herb Polysaccharides as Alternative for Antimicrobial Growth Promoters in Poultry. PhD Dissertation, Wageningen University, The Netherlands.
9. Hashemi, S.R. and Davoodi, H. (2010). Phytogenic as new class of feed additive in poultry industry. *Journal of Animal and Veterinary Advances*, 9: 2295-2304.
10. Hossain, M.M., Howlader, A.J., Islam, M.N. and Beg, M.A.H. (2014). Evaluation of locally available herbs and spices on physical, biochemical and economical parameters on broiler production. *International Journal of Plant, Animal and Environmental Sciences,* 4(1): 317-323.
11. Jaric, S., Macukanovic-Jocic, M. and. Djurdjevic, L. (2015). An ethnobotanical survey of traditionally used plants on Suva planina mountain (south-eastern Serbia) Journal *of Ethnopharmacology* 175: 93–108.
12. Kim, S.W., Fan, M.Z. and Applegate T.J. (2008). Nonruminant nutrition symposium on natural phytobiotics for health of young animals and poultry: mechanisms and application. *Journal of Animal Science* 86:138-139.
13. Kumar, S., Gurjar, M., Vaishnava, C.,. Sharma, M., Parashar, M. and Nagda, R. (2018). Effect of Dietary Supplementation of Cinnamon (Cinnamomum cassia) Powder and Synbiotic as Alternative to Antibiotic Growth Promoter on Economic Efficiency of Broiler Chicks. *International Journal of Livestock Research,* 8(10), 298-306
14. Lee, M. K., Park, Y. B., Moon, S. S., Bok, S. H., Kim, D. J., Ha, T. Y., Jeong, T.S., Jeong, K. S. and Choi, M. S. (2007). Hypocholesterolemic and antioxidant propertiesof 3-(4-hydroxyl) propanoic acid derivatives in highcholesterol fed rats. *Chemico-Biol Interactions.* 170: 9–19.
15. Mohamed, A.B., Mohammed, A M.A. and Jalil, A.Q. (2012). Effect of Ginger (*Zingiber officinale*) on performance and blood serum parameters of broiler. *International Journal of Poultry Science* 11(2):143-146.
16. Najafi, S. and Taherpour, K. (2014). Effects of Dietary Ginger, Cinnamon, Synbiotic and Antibiotic supplementation on performance of broilers. *Journal of Animal Science Advances,* 4(1):658-667.
17. Rafiee, A., Kheiri, F., Rahimian, Y., Faghani, M., Valiollahi, M.R. and Miri, Y. (2014). The effect of ginger root (*Zingiber officinale*) and cumin (Cuminumcyminum) powder on performance, some haematological traits and intestinal morphology of broiler chicks. *Research Opinions in Animal and Veterinary Science,* 4(2):96-100.
18. Saeid, J.M., Mohamed, A.B. and AL-Baddy, M.A. (2010). Effect of Aqueous Extract of Ginger (*Zingiber officinale*) on Blood Biochemistry Parameters of Broiler. *International Journal of Poultry Science,* 9(10): 944-947.
19. Saleh, N., Allam, T., Abd El-latif, A. and Ghazy, E. (2014). The effects of dietary supplementation of different levels of Thyme (*Thymus vulgaris*) and Ginger (*Zingiber officinale*) essential oils on performance, haematological, biochemical and immunological parameters of broiler chickens. *Global Veterinaria* 12(6):736-744.
20. Toghyani, M., Gheisari, A., Ghalamkari, G. and Eghbalsaied, S. (2011). Evaluation of cinnamon and garlic as antibiotic growth promoter substitutions on performance, immune responses, serum biochemical and haematological parameters in broilers chicks. *Livestock Science,* 138: 167-173.
21. Zomrawi, W.B., Abdel Atti, K.A. A., Dousa, B.M. and Mahala, A.G. (2012). The effect of ginger root powder (*Zingiber officinale*) supplementation on broiler chicks performance, blood and serum constituents. *Journal of Animal and Feed Research,* 1(6):457-460.

****