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THE EFFECT OF GINGER ROOT POWDER (zingiber officinale) SUPPLEMENTATION ON BROILER CHICKS PERFORMANCE, BLOOD AND SERUM CONSTITUENTS

W.B. ZOMRAWI[1], KH.A. ABDEL ATTI[2], B.M. DOUSA[3], and A.G. MAHALA[2]

[1]*Department of Animal Production, Faculty of Agriculture and Natural Resources, University of Bakht Elruda, Sudan*
[2]*Department of Animal Nutrition, Faculty of Animal Production, University of Khartoum, Sudan*
[3]*Department of Poultry Production, Faculty of Animal Production, University of Gezira, Sudan*

*Email: dousa0017@gmail.com

ABSTRACT: *A study using one hundred and twenty eight unsexed day old broiler chicks (Ross 308) 32 birds/treatment with four replicates was conducted to evaluate the effect of ginger root powder as natural feed additives on growth performance, blood and serum constituents of broiler chickens. Four dietary treatments were formulated to meet the nutrient requirements of broiler chick containing ginger root powder at levels 0%, 0.5%, 1% and 1.5%. Result showed that significant decreased (P<0.05) were observed in feed intake and weight gain for birds fed 0.5% ginger root powder. There were no significant differences (P>0.05) in feed conversion ratio among all dietary treatments. Treatments had significant decreased (P<0.05) in pre-slaughter weight for birds fed 0.5% ginger root powder. No significant differences (P>0.05) were observed in dressing percentage. There were no significant effect (P>0.05) on serum glucose, total protein and creatinine. Significant differences were observed in serum triglyceride and cholesterol levels. There were no significant differences (P>0.05) among all dietary treatments in Hb percentage, PCV percentage, TRBcs, MCV, MCH and MCHC percentage. The results showed that the inclusion of ginger root powder at levels 0.5% and1% in the diet , had lowering effect on cholesterol levels, and the chick may tolerate up to 1.5% without adverse effect on growth performance and blood parameters.*

ORIGINAL ARTICLE

Key words: *Ginger root powder, Broiler, Serum cholesterol*

INTRODUCTION

Growth promoters or feed additives are primarily included to improve the efficiency of the bird's growth and /or laying capacity, prevent disease and improve feed utilization. Among all growth promoters, the most commonly used are antibiotics, although nowadays their use is decreasing towards total extinction (Biovet, 2005). Some growth promoters act as pro-nutrients because of the role they play in enhancing the physiology and microbiology of the animal. Many active ingredients from plant are considered as pro-nutrients and recently been tried in animal feeds (Biovet, 2005). Zingiber officinale is a perennial plant commonly known as ginger. Ginger may act as a pro-nutrient because of its the vast active ingredients that has been present in it. Herbs Hands Healing (2011) reported that ginger contains volatile oils like borneol, camphene, citral, eucalyptol, linalool, phenllandrene, zingberine, zingiberol (gingerol, zingirone and shogaol) and resin. Ginger's have medicinal properties are chemicals responsible for the taste, the most noteworthy being gingerol and shogaol. Ginger speeds digestion, and enhances by a protein digesting enzyme (zingibaine) found in ginger. It has antibacterial and anti-inflammatory actions, and ginger rhizome is known to lower blood cholesterol level in man. Ginger rhizome is widely used as a spice or condiment (Larsen et al., 1999). Therefore, objectives of this study were to evaluate the effect of ginger root powder supplementation as natural feed additives on broiler growth performance and blood constituents.

MATERIALS AND METHODS

Experimental diets

The dried ginger used in this experiment was obtained from the local market then ground into powder. Four diets were formulated to meet the nutrient required of the broiler chicks, diets 1, 2, 3 and 4. Diet 1 served as a control 0% (without ginger root powder inclusions). Diets 2, 3 and 4 contained 0.5%, 1% and 1.5% of ginger root powder respectively. The ingredient composition and calculated analysis of the experimental diets is shown in Table 1.

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Table 1 - Ingredients composition and calculated analysis of the experimental diets

	Levels of ginger root powder %			
Ingredients	**0**	**0.5**	**1**	**1.5****
Sorghum	65.85	65.4	65.1	64.93
Groundnut meal	15	14.2	14	14
Sesame meal	11.25	12	12	11.97
Wheat brand	1	1	1	0.7
Super concentrate*	5	5	5	5
Di-calcium	1.25	1.25	1.25	1.25
Salt	0.25	0.25	0.25	0.25
Lysine	0.15	0.15	0.15	0.15
Vitamin premix	0.25	0.25	0.25	0.25
Total	100	100	100	100
Calculated analysis				
ME (Kcal/Kg)	3110.4	3107	3104	3105
Crude protein %	22.09	22.07	22.03	22.05
Crude fat%	4.50	4.53	4.52	4.52
Crude fiber%	4.24	4.28	4.32	4.34
Calcium%	1.13	1.14	1.14	1.14
Available phosphorus%	0.47	0.47	0.47	0.47
Methionine%	0.46	0.46	0.46	0.46
Lysine%	1.19	1.19	1.19	1.18

*Super concentrate per kg = 40%Cp, 2000 kcal ME, 10% Ca, 1.38% Av. P, 12% Lysine, 3% Methionine. **Ginger analysis = 2601mj/kg, 89.29 DM%, 15,5 CP%,2.55 EE%, 13.56 CF%, 59.78 NFE%,8.6 Ash%.

Experimental birds and management

One hundred and twenty eight unsexed day old commercial broiler chicks (Ross 308) were used for the study. The birds were divided into 4 treatments (32 birds/treatment) with four replicates using completely randomized design (CRD). The birds were raised open sided house. In order to boost their immunity they vaccinated against Newcastle disease and infectious bronchitis on the eighth and 28th days of age, while Gumboro vaccine was administered on the 14th day of the experiment. Water and feed were provided *ad-libitum*.

Weekly feed intake and body weight was recorded. Mortality was recorded throughout the period of the study as it occurred. Feed conversion ratio (FCR) was calculated. At the end of the experiment 2 birds per replicate (8 birds/treatment) were randomly selected, leg banded, weighed and slaughtered for carcass evaluation. Pre-slaughter weight, dressing weight were obtained to calculated dressing percentage for each bird. The blood samples were taken from jugular vein during slaughtering and collected into tubes and allowed to clot and sera separated by centrifugation at 3000 rpm for 5 minutes.

Chemical analysis

Plasma glucose and cholesterol were determined by enzymatic calorimetric methods using Kit GOD-PAP (Randox Laboratory Ltd. London). Plasma total protein was determined as shown by (King and Wootton, 1965). Creatinine according to Jaff reaction method. Hemoglobin concentration (Hb) was determined using Hemoglobin – Drabkin Kit. The packed cell volume (PCV) of Erythrocytes of whole blood was measured using a microhaematocrict centrifuge (Hawksley, London). The Erythrocytes (RBC) were counted using Hayems solution. Mean corpuscular volume (MCV), Mean Corpusular heamoglobib (MCH) and Mean corpuscular haemoglobin concentration (MCHC) also were calculated.

Statistical analysis

All the data obtained were subjected to analysis of variance. The software used was the statistical package for social science (SPSS). Differences of means determined by the Duncan Multiple Range Test as described by Steel and Torrie (1980).

RESULTS

The overall growth performance of broilers chicks fed the various levels of ginger root powder is shown in table (2). Feed intake were decreased significantly ($P<0.05$) in treatment 0.5% compare to other treatments, weight gain also were significantly ($P<0.05$) lower in the treatment 0.5% compared to other treatments. There were no significant differences in feed conversion efficiency among the treatments ($P>0.05$). Pre-slaughter weight were significantly lower ($P<0.05$) in treatment 0.5% compared to other treatments. There were no significant differences ($P>0.05$) in dressing percentage among the treatments. Mortality were not significantly affected ($P>0.05$) by the treatments.

Serum constituent's results and shown in Table 3. Serum glucose, total protein and creatinine had not differ significantly affected by the dietary treatments ($P>0.05$). Serum triglyceride were significantly lower ($P<0.05$) for control group and 0.5% supplemented with ginger root powder compared to other treatments, serum cholesterol were significantly lower ($P<0.05$) in 0.5% and 1% groups compared to 0% (control group).

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Blood parameters results are shown in Table 4. There were not significant differences among all groups with respect to hemoglobin concentration (Hb), packed cell volume% (PCV), the erythrocytes (RBC), mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH) and mean corpuscular hemoglobin concentration (MCHC).

Table 2 - Effect of dietary ginger root powder on growth performance of the broilers

Parameter	Levels of ginger root powder %					
	0	0.5	1	1.5	SEM	Sig
Feed intake (g/bird)	3160.31 [b]	2764.78 [a]	3163.69 [b]	3228.31 [b]	89.06	*
Weight gain (g/bird)	1447.56 [ab]	1267.47 [a]	1468.63 [b]	1449.37 [ab]	55.91	*
Feed conversion ratio	2.18	2.19	2.15	2.24	0.045	NS
Pre-slaughter weight (g/bird)	1489.06 [b]	1310.28 [a]	1506.55 [b]	1492.81 [b]	55.25	*
Dressing (%)	75.88	75.91	76.26	75.15	0.86	NS
Mortality (%)	0.00	0.50	0.50	0.25	0.24	NS

[a,b]: Mean with different superscripts along rows are significantly different (P<0.05). NS=Non-significant difference (P>0.05). SEM = standard error of treatment means

Table 3 - Effect of dietary ginger root powder on serum constituents of the broilers

Parameter	Levels of ginger root powder %					
	0	0.5	1	1.5	SEM	Sig
Glucose (mg/dL)	151.67	171.63	177.67	177.67	9.35	NS
Total protein (g/dL)	5.58	2.63	3.9	4.9	1.09	NS
Triglyceride (mg/dL)	44 [a]	25.67 [a]	62.33 [b]	99.33 [c]	10.65	*
Cholesterol (mg/dL)	94.33 [b]	66.33 [a]	58.33 [a]	128 [c]	7.46	*
Creatinine (mg/dL)	0.17	0.11	0.17	0.15	0.03	NS

[a,b]: Mean with different superscripts along rows are significantly different (P<0.05). NS=Non-significant difference (P>0.05). SEM = standard error of treatment means

Table 4 - Effect of dietary ginger root powder on some hematological parameters

Parameter	Levels of ginger root powder %					
	0	0.5	1	1.5	SEM	Sig
Hb %	58.06	55.94	56.92	59.06	17.07	NS
PCV %	30	25.75	26	26.75	2.37	NS
TRBcs (x106/µL)	2475000	2600000	2566666.7	2900000	320683.22	NS
MCV (fl)	138.48	103.8	101.3	94.73	22.83	NS
MCH (pg)	64.01	58.18	57.83	53.93	5.17	NS
MCHC %	51.60	56.02	57.81	58.67	2.43	NS

[a,b]: Mean with different superscripts along rows are significantly different (P<0.05). NS=Non-significant difference (P>0.05). SEM = standard error of treatment means

DISCUSSION AND CONCLUSION

Feed intake were significantly lower in birds fed 0.5% ginger root powder, whereas it showed similar value to the control group in birds fed 1% and 1.5% ginger root powder. This may be due to associated effect of the feed ingredients of 0.5% level (Scott et al., 1982). This result could be compared with the work of Ademola et al. (2009) who reported higher feed intake of broilers on diet supplemented with ginger. The results were however not in agreement with the report of Herawati, (2010) who stated that broilers fed 2% dried supplementary red ginger meal had significantly lower feed intake than those on the control diet. The decreased feed intake resulted in corresponding decrease in weight gain and pre-slaughter weight in this group, Feed conversion ratio were not significantly differ among all groups, this results disagreed with the work of Moorthy et al. (2009) and Onimisi et al. (2005) who reported significantly better feed conversion ratio in ginger fed groups of broilers compared to control. The dressing percentage did not differ significantly among the dietary treatments.

Serum triglyceride were significantly lower for control group and 0.5% supplemented with ginger root powder compared to other treatments, this result cannot be explained. Serum cholesterol were significantly lower for birds supplemented with 0.5% and 1% compared to the control group. This effect may be attributed to the ginger possesses anti-hypercholesterolemia activity. This is consistent with the well-observed effect of ginger on lowering blood cholesterol level (Fuhrman et al., 2000; Andallu et al., 2003).

In conclusion it seem that inclusion of ginger root powder in the broiler chicks diet at levels of 0.5% and 1% decrease serum cholesterol concentration. Chick tolerate up to 1.5% without adverse effect on performance and blood constituents.

REFERENCES

Ademola SG, Farimu GO and Babatunde GM. 2009. Serum lipid, growth and haematological parameters of broilers fed garlic, ginger and their mixtures. World Journal of Agricultural Science 5(1): 99-104.

Andallu B, Radhika B. and Suryakantham V. 2003. Effect of aswagandha, ginger and mulberry on hyperglycemia and hyperlipidemia .Plants Foods Hum. Nutr. 58:1-7. {Web of Science} {Medline}.

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Scienceline/Journal homepages: http://www.science-line.com/index/; http://www.ojafr.ir

Biovet S and Laboratories A. 2005. The Intensive Production and the Spreading of High Productivity Genetic stocks have conditioned the common use of chemical substances known as "Growth Promoters". www. Thepigsite.com/articles.

Fuhrman B, Rosenblat M, Hayek T, Ccoleman R. and Aviram M. 2000. Ginger extract consumption reduces plasma cholesterol, inhibits LDL oxidation and attenuates development of atherosclerosis in atherosclerotic, apolipoprptein E-deficient mice. J. Nutr. 130: 1124-1131. {Abstract/Free Full Text}.

Herawati Veterinary Medical School University of Brawijaya Malang 65145 Indonesia 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(10): 963-967.

Herbs Hands Healing Ltd 2011. Traditional Western Herbal Product. Ginger Extracts from in a Nutshell Ginger by Jill Rosemary Davies .http://www.herbs-hands-healing.co.uk/.Rertrieved July 12, 2011.

King ES and Wooton JGP. 1965. Determination of total protein in plasma or serum. In: Medical Biochemistry. Pp. 139-140, Churchill, London.

Moorthy M, Ravi, KM and Edwin SC. 2009. Ginger Pepper and Curry Leaf Powder as Feed Additive in Broiler Diet. International Journal of Poultry Science 8(8): 779-782.

Onimisi PA., Dafwang II and Omage, JJ. 2005. Growth performance and water consumption pattern of broiler chicks fed graded levels of ginger waste meal. J. Agric., Forestry and Social Sci., 3: 113-119.

Scott, M. L., Nesheim, M. C. and Young, R. J. 1982. Nutrition of the chicken. M. L. Scott and Associates, Ithaca, New York.

Steel RGD and Torri JH. 1980. Principles and procedures of statistics: A Biometrical Approach.2nd ed. McGraw Hill, Kogakusha Ltd, Tokyo.

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