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INFLUENCE OF AQUEOUS EXTRACT OF GINGER (*Zingiber officinale*) ON GROWTH PERFORMANCE, CARSASS CHARACTERISTCS AND ECONOMIC OF PRODUCTION OF BROILER BIRDS

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ABSTRACT: The study was conducted using one hundred-day old *Marshal Strain* broiler chicks to investigate the influence of ginger aqueous extract on growth performance, carcass quality and economic of production of broiler birds. The birds were randomly assigned to five treatments and replicated twice in a Completely Randomized Design. Each treatment consisted 20 birds with 10 birds per replicate. The birds were subjected to five experimental treatments designated as T1 (control, 0ml/L ginger aqueous extract), T2 (15mls/L ginger aqueous extract), T3 (30mls/L ginger aqueous extract), T4 (45mls/L ginger aqueous extract) and T5 (60mls/L ginger aqueous extract) respectively. Water, extract and feed were served *ad libitum*. The birds were offered the same diet throughout the experimental periods. Routine management practices were strictly followed. Data collected on final body weights, body weight gain, feed intake, feed gain ratio, different carcass parts and economics of production were subjected to one-way Analysis of Variance (ANOVA). The results showed significant ($P<0.05$) difference for weight gain, feed intake, feed gain ratio and feed efficiency. Total, weekly and daily weight gains were significantly higher in birds on ginger aqueous extract when compared with the control. Ginger aqueous extract had significant effect ($P<0.05$) on the price/kg feed consumed and price/kg bird. Price/kg feed consumed and price/kg bird increased with increased levels of ginger in broilers water. There was no significant ($P>0.05$) difference in all the parameters under organ characteristics measured. It all implies that GAE had no deleterious effect on any of the organs and therefore did not negatively affect their growth. It was therefore concluded that GAE in drinking water of broiler chickens could be a good phytobiotic up to 60mls/L without compromising the performance, meat quality of birds.

Keywords: Ginger, Carcass characteristics, Performance, Aqueous extract

INTRODUCTION

Poultry meat and eggs are important food for fulfilling the dietary needs of ever-growing human population (Mohammad *et al*, 2017). However, in large scale intensive poultry production, birds are exposed to many stressful conditions and diseases that result in serious economic loss (Fesseha, 2019). This necessitates the use of pharmaceutical products such as antibiotics as prophylactic and curative to ensure rapid growth and good health (Duwa *et al,* 2020). Recently, the use of in-feed antibiotics has been banned in many countries due to their residual side effect in animal products and the development of antibiotics resistant bacteria pathogens (Hosseinzadeh *et al*., 2014). Furthermore, uncontrolled use of antibiotics in animals leaves some residues in meat, milk and eggs which could be harmful to humans (Fathollah *et al*., 2014). Consequently, some authors have investigated alternatives to antibiotics (Joseph *et al* 2015).

Organic poultry is a new technology based on the use or supplementation of organic substances from plants, animals and other natural products in poultry production. This method focuses on the avoidance or usage of chemical compounds in diets or its use in a very low level for the sake of consumers (Amaduruoye *et al*., 2017). In the last

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decades, herbs and phytogenic compounds have attracted a lot of attention for their potential role as alternative to antibiotics growth promoters in monogastric animals (Yadgar and Yavuz, 2015). Many active ingredients from plants are considered as phyto-nutrients and have recently been tried in animal nutrition and physiology. Poultry is moving towards minimizing the use of synthetic antibiotics as growth promoters in animal diets. The interest to use the medicinal plants or their extracts is mainly due to its safety, healthy friendly, less cost and non-residual effects compared with synthetic chemical drugs (Khan and Naz, 2013). Several studies conducted on the use of herbs and spices as growth promoters in broilers have revealed beneficial effects for the health of broilers and function as antioxidant, enhance digestion by stimulating endogenous enzymes, improve utilization of digestive products by enhancing liver function, increase production of digestive enzymes and increase in body weight and feed conversion ratio (Karangiya *et al*,2016). The phytogenic and herbal products have received increased attention as a result of their acceptability among consumers as natural antibiotics and many have shown significant results (Gadde *et al.*, 2017). One of such herbal products is ginger (*Zingiber officinale*).

Ginger is the rhizome of plant *Zingiber officinale*, consumed as expensive food, medicine or spice. Ginger is a perennial herb belonging to the family *Zingiberaceae* (Karangiya *et al.,* 2016). Ginger contains more than 140 phytochemicals as well as volatile oils, vitamins and minerals (Mahdy *et al.,*2017). Nigeria is rated as the fifth world producer of ginger with estimated annual output of 138000 tons (FAO, 2008). Ginger can be considered as one of the best options to fill the gap in preference to antibiotics. Ginger spice, a natural promoter, is rich in beneficial bioactive compounds and essential lipids, such compounds include shogaols, phenolic, gingerol, gingeriol, gingerdione which has the potential to stimulate digestive enzyme, attack microbial activities and possess ant oxidative property (Saiyed *et al*, 2015). Research conducted *in –vitro* showed that ginger extract might control the quantity of free radicals and the peroxidation of lipids (Oleforuh-okolah *et al* 2014). Ginger contains volatile oils like borneal, camphene, citral, eucalyptol, linalool, phenlllandrene, zingiberine, zingiberol and resin (Ogbuewu *et al*,2017). Positive effect of ginger on blood circulation, gastric secretion and enterokinase were reported by Khan *et al* (2012). The study therefore aimed at evaluating the effect of ginger on broilers growth performance, carcass characteristics and economics of production.

MATERIALS AND METHODS

Location of the Experimental site

This research work was carried out at the Poultry Unit of the Teaching and Research Farm of the Department of Agricultural Science, Adeyemi Federal University of Education, Ondo, Ondo State, Nigeria. It is situated on 350.52m above sea level at latitude 70º 25N and at longitude 50º 19E. The vegetation of the area is that of the rainforest characterized by hot and humid climate. The mean annual rainfall is 1500mm and the rain period is bimodal with a short break in August and mean annual relative humidity of 75% and mean temperature of 26-28^{0}C (Accuweather,2018).

Processing of Test Ingredients

The fresh ginger rhizome was purchased from Iyalaje market Ondo, Ondo State. They were thoroughly washed with clean water to ensure freedom from sand and residues. Thereafter, they were peeled and grated to tiny particles (0.5mm). The aqueous extract was prepared by adding 1 liter of boiled hot water to 15g of grated ginger in a non-metallic container. The mixture was allowed to infuse and cool at room temperature overnight for 12 hours. The extract was obtained by filtering and was thoroughly mixed at the rate of 15ml/L, 30ml/L, 45ml/L and 60 ml/L in drinking water for T2, T3, T4 and T5 respectively while ordinary water was used for T1 which is the control. Fresh extract was prepared daily and made available for the birds *ad libitum.*

Experimental Birds, Design and Treatment

A total of 100-day-old *Marshal Strain* broiler chicks procured fro Amo farms Ibadan, Oyo state were used for the study. The chicks were weighed and initial weights were recorded. They were then randomly assigned to five treatments with 20 birds per treatment and replicated twice with 10 birds per replicate in a completely Randomized Design. The chicks were offered the same diet throughout the experimental period

Management of Experimental Birds

The birds were housed in a deep litter pen and the litters were changed periodically as the occasion demands. Proper management, necessary vaccination and good environmental condition were maintained throughout the 8 weeks experimental period.

Data Collection

Growth Performance

Data were collected on growth performance traits which included daily feed intake, weekly body weight gain, final body weight gain, feed conversion ratio, feed efficiency etc.

Carcass Quality

At the end of the experiment, data for carcass quality were collected by randomly selecting 3 birds from each replicate. The birds were weighed, slaughtered following the conventional method, scalded, defeathered, and eviscerated and cut into primal parts. Data were collected on live shrunk weight, defeathered weight, dressed carcass (breast muscle, thigh, drum stick wing neck back) and internal organs.

Economics of Production

The live weights of the birds were measured at weekly interval. Feed consumed and feed conversion ratio were determined for growth performance indices. An appraisal of feed cost/ weight gain was conducted to determine the effect of aqueous ginger extract (AGE) on feed cost/kg animal produced.

Statistical Analysis

General Linear Model (GLM) was used to analyse the data collected on various parameters. The experimental model is as follows:

$$Y_{ij} = \mu_0 + T_i + e_{ij}$$

Where;
Y_{ij} = Individual observation on broiler
μ_0 = Overall mean
T_i = Treatment effect
e_{ij} = random error.

Data collected from different parameters were subjected to one-way Analysis of Variance (ANOVA) and where significant differences occurred; means were separated using Duncan Multiple Range Test (Duncan, 1955) with the aid of Statistical Package for Social Sciences(SPSS) Version 20

RESULTS AND DISCUSSION

Growth Performance

The results of ginger aqueous extract (GAE) on the growth performance of broilers are presented in Table 1. Result showed significant difference ($P<0.05$) in final body weight, weight gain, feed intake and feed gain ratio between birds on the control and treatment groups. This implies that the ginger aqueous extract had positive effect ($P<0.05$) on enhancing the performance of the birds in terms of final body weight, weight gains, feed intake and feed gain. This significant improvement may be due to the stimulatory effect of ginger extract on digestive juices, microflora and nutrient assimilation of the digestive tracts. The results are in agreement with the findings of Saiyed *et al*, (2015) who

reported that ginger increased feed intake and improved feed conversion ratio leading to increase in weight gain of the broiler birds. Similar results were also obtained by Talukdar *et al* (2017) and Sa'aci *et al.,* (2018). These authors reported increase weight gain and feed intake with broiler chickens fed ginger aqueous extract when supplied at 25mls and 50mls inclusion levels. In contrast, Wafaa *et al* (2012) observed that ginger aqueous extract did not influence weight gain, feed intake and feed efficiency when supplied at 2mls, 5mls and 10mls to their broiler chickens. This contrasting result may be as a result of lower dosage of GAE used in their study. Other factors like harvesting time and maturity state of herbs, parts of plant used, extraction methods, processing techniques, duration of conservation of extracts could affect negatively the chemical composition and potency of ginger extract.

The feed gain ratio was similar across the treatment groups except T5. It was highest at 60mls/l inclusion level of GAE having a value of 3.09 suggesting that the tested probiotic aided effective feed conversion to body mass in broilers.

Table 1: Growth Performance and Economics of Production of Broiler Chicks Administered Ginger Aqueous Extract (GAE)

	Ginger Aqueous Extract Inclusion Levels (ml/L)						
Parameters	**T1 (0)**	**T2(15)**	**T3 (30)**	**T4 (45)**	**T5(60)**	**SEM**	**LOS**
Initial body Weight (g)	253.60	263.85	264.65	266.95	278.70	2.99	NS
Final Body Weight (g)	1772.60^{a}	1858.55^{ab}	1889.45^{ab}	1941.05^{b}	2111.85^{c}	23.51	Sig
Total weight Gain (g)	1458.40^{a}	1608.45^{b}	1650.50^{b}	1673.95^{b}	1833.10^{c}	23.69	Sig
Weekly Weight Gain (g)	243.04^{a}	268.07^{b}	275.58^{b}	278.99^{b}	305.51^{c}	22.61	Sig
Daily Weight Gain (g)	32.72^{a}	39.29^{b}	39.36^{b}	39.85^{b}	43.25^{c}	6.54	Sig
Total Feed Intake (g)	4213.00^{a}	4317.90^{b}	4356.60^{ab}	4432.00^{b}	4963.50^{c}	35.74	Sig
Weekly Feed Intake (g)	702.17^{a}	710.34^{a}	726.06^{ab}	738.67^{b}	827.24^{c}	5.96	Sig
Daily Feed Intake (g)	100.31^{a}	101.54^{a}	103.73^{ab}	105.52^{b}	118.17^{c}	0.85	Sig
Feed Gain Ratio	2.56^{a}	2.65^{a}	2.72^{a}	2.77^{a}	3.09^{c}	0.04	Sig
Price/Kg Feed (₦)	738.00^{a}	776.00^{b}	816.00^{c}	856.00^{d}	896.00^{e}	5.64	Sig
Price/Kg Bird (₦)	1884.90^{a}	2061.10^{a}	2519.90^{b}	2333.13^{b}	2478.78^{b}	41.16	Sig

^{abcd} Mean values within row having different superscript differ significantly (P<0.05), Sig = Significant, NS= Not significant, LOS= Level of Significance, SEM= Standard Error of Mean

Economics of Production

The ginger aqueous extract (GAE) had significant effect (p<0.05) on price per kg feed consumed and price per kg bird. The lowest cost (₦738.00) per kg feed obtained in birds supplied with the control GAE (0ml/l significantly (P<0.05) increased to ₦776.00 (15mls/L GAE), ₦816.00 (30mls/l GAE), ₦856.00 (45mls/l AGE) and ₦896.00 (60mls/l AGE) respectively (Table 1). This implies that the price/kg feed increased with the increasing levels of GAE in the treatment. The same trend was observed in price per kg bird. This significant effect may be attributed to the essential oils in ginger, which stimulates the activities of pancreatic enzymes in guts, thus promoting digestion and absorption leading to high feed intake in broiler chicken. Similar results were observed by Sa'aci *et al (*2018).

Carcass Characteristics

The results of ginger aqueous extract (GAE) on the carcass characteristics of broilers are presented in Table 2. The results showed that there is no significant difference (P>0.05) in all the parameters tested. This result is contrary to the findings of Oluwafemi (2017), who reported a significant difference of carcass and internal organ weight of birds treated with dietary inclusion of ginger at 1%, 2%, 3% and 4% levels

There was no significant difference (P>0.05) in the dressing weight of birds in all the treatments. Though T1 recorded the lowest value (1369.33) and the value increased as the inclusion level of ginger aqueous extract (GAE) increased. The dressing percentage of birds in this study is in agreement with the findings of Kirkpinzar *et al*, (2024) on broiler chicken fed garlic and oregano oil supplementation. The authors observed that supplementation of ginger and oregano oil has no significant effect on the carcass dressing weight and primal cut of the experimental birds. The result is however contrary to the reports of Gadde *et al* (2017) who recorded a significantly higher dressing percentage in birds fed ginger aqueous extract. The non-significant (P>0.05) difference in all the internal organs of the birds treated

ginger aqueous extract in this study suggests ginger aqueous extract is non-toxic and therefore would not pose any threat of inflammation on the internal organs of the birds.

By implication GAE had no deleterious effect on any of the organs of the birds and therefore did not negatively affect their growth. The result obtained in this study confirmed the earlier findings of Amaduruoye *et al,* (2017) and Sa'aci *et al* (2018) who fed broiler chicken with ginger root and reported similar values for most carcass parameters.

Table 2: Carcass and Organ Quality of Broiler chickens Administered Ginger Aqueous Extract (GAE)

	Ginger Aqueous Extract Inclusion Levels (ml/L)						
Parameters	**T1 (0)**	**T2(15)**	**T3 (30)**	**T4 (45)**	**T5(60)**	**SEM**	**LOS**
Liveshrunk (g)	2033.00	2073.33	2096.33	2112.67	2127.87	125.33	NS
Defeathered (g)	1876.33	1979.67	1995.33	2010.00	2053.67	130.72	NS
Dressed Carcass (g)	1369.33	1431.00	1432.33	1441.00	1442.00	82.47	NS
Thigh (%)	16.40	16.55	16.74	17.06	17.19	0.91	NS
Drumsticks (%)	15.23	15.35	15.38	15.59	16.90	1.24	NS
Breast muscle (%)	36.85	38.39	38.48	39.29	38.43	2.20	NS
Wing (%)	12.21	12.42	12.97	12.97	13.40	0.96	NS
Back (%)	15.08	15.74	16.52	17.63	18.26	2.01	NS
Neck (%)	4.85	5.89	4.97	5.26	5.37	0.31	NS
Shank (%)	4.22	4.64	4.65	4.66	4.69	0.48	NS
Head (%)	2.28	2.44	2.54	2.55	2.61	0.20	NS
Liver (%)	1.73	1.78	1.90	1.94	2.07	0.27	NS
Pluck (%)	0.53	0.53	0.57	0.65	0.66	0.11	NS
Gizzard (%)	2.70	2.81	2.98	3.10	3.40	0.50	NS
Intestine (%)	4.35	4.41	4.92	5.11	5.90	1.26	NS
Heart (%)	0.43	0.43	0.44	0.44	0.69	0.18	NS

NS= Not significant, LOS= Level of Significance, SEM= Standard Error of Mean

CONCLUSION AND RECOMMENDATION

Judging from the findings of this study, ginger aqueous extract improved broiler chicken performance by increasing feed intake and weight gain of birds, although with higher cost of production. The carcass and internal organs of the birds were not compromised with inclusion levels of ginger aqueous extract up to 60ml/L Thus broiler farmers could explore GAE in broiler water up to 60ml/L to enhance birds growth, carcass and organ yield. It is therefore recommended that poultry farmers can use up to 60mls/L of Ginger aqueous extract in the diets of broiler chickens without compromising the performance and meat quality of the birds.

REFERENCES

Accuweather, (2018). Weather for Ondo Nigeria. *http://www.accuweather.com/en/ng/Akure/253317/weather forecast/253317. Retrieved on November 15, 2018*

Amaduruoye, W., Ikwunze, K., Oguike, M.A and Onunkwo, D.N (2017). Influence of ginger (Zingiber officinale) on Histology, Blood profile and Internal organ characteristics of broilers. *Nigerian Journal of Animal Science*. (2):153-164.

Duncan, D.B. (1955) Multiple Range and Multiple F-Test. Biometric,11: 1-42

Duwa, H., Amaza, I.B., Dikko, M.I., Raymond, T.B., Paullyne, U.U. (2020). Effect of ginger (Zingiber officinale) on the growth performance and nutrient digestibility of finishers broiler chickens in semi arid zone of Nigeria. *Journal of Animal science* vol 22 (3): 279-286.

FAO (2008). Food and Agricultural Orgaization of United Nations Economic and Social Deparment. The statistical Division Top ten Ginger production.

Fathollah, A., Maryam, M. and Mohammad, J. (2014). Determination of antibiotic consumption index for animal originated foods produced in animal husbandry in Iran. *Journal of Environmental Health Science and Engineering, Vol. 12 No 1 Pp*12-22.

Fesseha, H (2019). Probiotics and its potential role in poultry production: A review. *Veterinary Medicine, Open Lournal* 4 (2):69-79.

Gadde, U. Kim W.H., Oh, S.T and Hyun S.L (2017). Alternatives to antibiotics for maximizing growth performance and feed efficiency in poultry: A review, *Animal Health Research Reviews 18 (1): 26-45.*

Hosseinzadeh, H., Alaw Qotbi, A.A., Seidavi, A., Norris, D and Brown D. (2014). Effect of differ ent level of coriander (*Coriandrum sativum* L) seed powder and extract on the serum bichemcal parameters, micribiota and immunity in broiler chicks. *Scientific World Journal*.Vol 20 Pp 11.

Joseph, O.U., Harriet, M.N.F., Solomon, O.O. and Vivian U.O.O. (2015). Evaluation of growth performance, haemotological and serum biochemical response of broiler chicken to aqueous extract of ginger. *Journal of Agriculture Science* 7: 4 -6

Karangiya, V.K., Savsani, H.H., Garg, D.D, Murthy, K.S., Ribadiya, N.K and Vekary, S.J (2016). Effect of dietary supplementation of ginger, garlic and their combination of feed intake, growth performance and economics in commercial broilers. *Veterinary World*. Volume 9 245-250.

Khan, R.U and Naz, S. (2013). The applications of probiotics in poultry production. *World's Poultry Science Journal Vol. 69 issue https;//doi.org/10.1017.*

Khan, R. U., Naz S., Nikousefat, Z., Tufarelli, V., Javdani, M., Qureshi, M., Laudadio, V. (2012). Potential application of ginger (*Zingiber officinale*) in poultry diets. *World Poultry Science Journal* 68:245-252.

Karangiya, V.K., Savsani, H.H. Patil S. S., Garg, D.D., Murthy, K.S., Ribadiya, N.K., Vekariya, S.J. (2016). Effect of dietary supplementation of garlic, ginger and their combination on feed intake, growth performance and economics in commercial broiler s. *Veterinary World* 9 (5):245-250.

Mahdy, M.S.A. Islam M.F., Hasan M.N, Habib A. and Sikder, M. H (2017). Effect of dietary supplementation of ginder on feed conversion ratio, carcass physiognomics and haematological parameters in broiler. *Research in Agriculture Livestock and Fish* 4 (3):173-119.

Mohammad, D.M., Umair, H.K., Uruj, T., Bahar-EMustafa and Asad, F. (2017). Antimicrobial drug, resudues in poultry products and imlpications on public health. A review. *International Journal of Food Properties, 20* (7); 1433-1446.

Ogbuewu, I.P., Mbajorgu.C.A and Okoli, V. (2017). Antioxidant activity of ginger and its effect on blood chemistry and production physiology of poultry. *Comparative Clinical Pathology* 28:655-660.

Oleforuh-Okoleh, V.U, Chukwu, G.C and Adeolu, A.I. (2014). Effect of ground ginger and garlic on growth performance and economic of production of broiler chickens. *Journal of Bioscience Biotechnology*, 3 (3) :217-220.

Oluwafemi, U.I (2017). Effect of ginger on performance and blood parameters of broilers. *International Journal of poultry science 11 (2): pp 143-146*

Sa'aci, O.J., Alabi, O.J., Brown, D. and Ng'ambi, J.W. (2018). Effect of Aqueous Ginger (*Zingiber officinale*) Extract on Growth Perormance, Nutrient Digestibility and Economy of feed conversion of broiler Chicken. *Animal Nutrition and feed Technology* (18): 225-235.

Saiyed, M.A., Joshi, R.S., Savatiya, F.P., Patel, A.B., Mishra, R.K and Bhagora, N.J (2015). Study on inclusion of probiotic, probiotic and its combination in broiler diet and their effect on carcass characteristics and economics of commercial broilers. *Veterinary World* 8:225-231.

Talukder, S., Hasan, M.M., Al Noman, Z. Sarkar, Y.A., Paul. T.K and Sikdar, M.H. (2017). Effect of dietary supplementation of ginger extract on growth, carcass characteristics and haematological parameters of broilers. *Asian Journal of Medical and Biological Research* 5: 211- 215.

Yadgar, G.S., and Yavuz, G. (2015). Sumac (*RhusCoriaria* L). and Ginger (*Zingiber officinale*) as feed additive in poultry Nutrition KSU. *Journal of Natural Science* ,18 (3). 44 – 48.

Wafaa, B. Z., Khadiga, A.A., Bakheit, M.D and Ahmed G.M. (2012). Effect of ginger root (*Zingiber officinale)* powder supplementation on broiler chicks performance, blood and serum constituents. *Journal of Animal feeds Research*, 1 :457-460