EFFECT OF HERBS (GINGER AND TURMERIC) POWDER AT VARIED INCLUSION LEVEL ON GROWTH PERFORMANCE AND NUTRIENT UTILIZATION OF BROILER CHICKS

[*]Sunmola, T. A., Tuleun, C. D. and Orayaga, K. T.
*Department of Animal Nutrition, Joseph Sarwuan Tarka University Makurdi,
PMB 2373, Makurdi, Benue State, Nigeria
[*]***corresponding author:*** ta.sunmola@gmail.com

ABSTRACT
The present study was carried out to assess the effect of herb types (ginger and turmeric) powder and inclusion level on growth performance and nutrient utilisation of broiler chicks. A total of two hundred and ten day old chicks of equal initial weight (39.00 g) were allocated to seven dietary treatments each with three replicates of ten chicks per replicate. Seven experimental diets were formulated in a way that control diet (T_0) contained neither turmeric nor ginger. Birds in T_1, T_2 and T_3 were fed diets containing 0.20, 0.25 and 0.30 % ginger respectively, while birds in T_4, T_5 and T_6 were fed diet that contained 0.20, 0.25 and 0.30 % turmeric, respectively. The feeding trials were carried out for 28 days and parameters on growth performance and nutrient digestibility were measured. All growth parameters evaluated were not significantly different. Neither the herbs nor inclusion levels had significant effect on nutrients digestibility. It is concluded that inclusion of ginger and turmeric in the diets of broiler chicks showed no effect on growth performance and nutrient utilization. Therefore, ginger and turmeric above 0.30 % as feed additives in broiler chicks' diet can be considered.
Keywords: feed additives; herbs; growth; nutrients digestibility; cost

INTRODUCTION

Security threats for animal health resulting from escalating resistance of pathogens to antibiotics and accumulation of antibiotic residues in animal products (Stanaćev *et al*., 2011) resulted to globally need to remove antimicrobial growth promoters from animal diets. Arising from this, the premium price and high demand for organic products have necessitated the search for more acceptable alternative to antibiotics. Likewise, the intensive broiler production sector of the poultry industry is keen to ensuring the safety of broiler meat via the control or elimination of food-borne pathogens, thus, beneficial potential of various bioactive compounds have been reported to enhance animal performance and health, these includes phytogenic compounds, prebiotics, probiotics, essential oils etc (Stanaćev *et al*., 2011). Phytogenic compound' refers to the parts of various aromatic herbs and spices such as ginger, garlic, turmeric etc.) as well as to their respective plant extracts in the form of essential oils (Windisch *et al*., 2007). The biological activities of these phyto-molecules are well documented, as well as their antiviral, antitoxigenic, antiparasitic and insecticidal properties (Burt, 2004). Ginger and turmeric are well-known perennial plant and are widely used as a spice and treatment for certain ailments (Tapsell *et al*., 2006). Their root contains several compounds which have biological activities such as antioxidation, antimicrobial and pharmacological effects (Ali *et al*., 2008). The beneficial potential of ginger has been associated with its ability to inhibit carcinogenesis by reducing oxidative stress (Osawa *et al.,* 1995). Ginger and turmeric supplements in broiler chicken diets have been recognized for their strong stimulating effect on the immune and digestive systems in birds (Kafi *et al.,* 2017; Sunmola and Tuleun, 2023). Sahoo *et al.* (2019) reported that feed rations supplemented with ginger significantly enhanced body weight and gut health in broiler chickens. Sunmola *et al.* (2023) concluded that supplementation of yellow and white ginger at 0.25 % improves the performance of broiler chicks. This study was carried out to evaluate the effect of herbs (ginger and turmeric) powder at varied inclusion levels on growth performance and nutrient utilization of broiler chicks

MATERIALS AND METHODS

The study was conducted at the Poultry House of the Livestock Unit, Teaching and Research Farm, Federal University of Agriculture, Makurdi, Benue State, Nigeria. Fresh ginger and turmeric were separately procured from the local market within Makurdi town. The fresh rhizomes purchased were

washed with clean water to remove the accompanied debris and subsequently chopped into smaller pieces using sharp knives. The chopped rhizomes were sun-dried on a flat and clean concrete floor to constant weight. They were ground using a hammer mill of 2mm to obtain their powder. The samples were airtight for subsequent laboratory analysis and feed additive usage. Two hundred and ten unsexed 1-day old broiler chicks obtained from a reputable hatchery in Ibadan, Oyo State, Nigeria. They were randomly distributed into seven treatments, each having three replicates with ten birds per replicate housed in deep litter compartments. All the diets were formulated to meet standard nutrient requirements of broiler chicks according to NRC (1994) from day 1 to 28 as shown in Tables 1. Data were collected weekly on feed intake, body weight, weight gain and feed conversion ratio. Two birds per replicate group were selected at the end of week three, transferred into metabolic cages. 3-days acclimatization period were allowed for the birds, and the respective diets were offered. Daily feed intake and daily faecal output were recorded for 4 days. The droppings were collected per replicate once daily, weighed and dried in an oven at 70° C to constant weight. Dried excreta were bulked and ground, experimental diets and feacal samples were used to determine their respective proximate constituent according to AOAC (2006). Data obtained were subjected to ANOVA using SAS (2002) software package and the means that were significantly different ($P<0.05$) were separated using Duncan's Multiple Range Test (DMRT) as contained in the same SAS software package.

Table 1: Gross composition of the experimental starter broiler diets

Rhizome varieties	Ctrl	Yellow ginger			Turmeric		
Rhizome levels %	0	0.20	0.25	0.30	0.20	0.25	0.30
Treatments	T_0	T_1	T_2	T_3	T_4	T_5	T_6
Yellow maize	53.00	53.00	53.00	53.00	53.00	53.00	53.00
Soya bean meal	30.55	30.55	30.55	30.55	30.55	30.55	30.55
Groundnut cake	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Brewer's dried grains	2.60	2.60	2.60	2.60	2.60	2.60	2.60
Rice bran	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Bone meal	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Blood meal	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Palm oil	1.00	1.00	1.00	1.00	1.00	1.00	1.00
L-Lysine	0.15	0.15	0.15	0.15	0.15	0.15	0.15
Herbo-Methionine	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Vit./min. premix*	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Common salt	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Rhizome	0.00	0.20	0.25	0.30	0.20	0.25	0.30
Calculated analysis							
ME (Kcal/kg)	2939	2941	2941	2942	2939	2940	2940
Crude protein (%)	23.34	23.26	23.24	23.22	23.27	23.25	23.23
Crude fibre (%)	4.02	4.00	4.00	4.00	4.03	4.03	4.03
Ether extract (%)	4.75	4.81	4.83	4.84	4.76	4.76	4.76
Lysine (%)	1.49	1.48	1.48	1.48	1.48	1.48	1.48
Methionine (%)	0.55	0.54	0.54	0.54	0.54	0.54	0.54
Calcium (%)	1.29	1.29	1.29	1.29	1.29	1.29	1.29
Available Ph (%)	0.71	0.71	0.71	0.71	0.71	0.71	0.71

**To provide the following per kg of diet vitamin A – 15,000.00IU, Vitamin D3 - 3, 000,000IU, Vitamin E- 30,000IU, Vitamin K3,000mg, Vitamin B1 3000,mg Vitamin B2-6000mg, Vitamin B6- 5,000mg, Vitamin B12-40mg, Biotin 200mg, Niacin-40,000mg, Pantothenic acid 15,000mg, Folic acid 2,000mg, choline 300,000mg, Iron 60,000mg, manganese 80,000mg, copper 25,000mg, Zinc 80,000mg cobalt 150mg, Iodine 500mg. (feed formulation was done using the feedwin software application);* Ctrl =control, ME – metabolizable energy, BDG - Brewer dried grain, Ph – Phosphorus, Vit./min. – vitamin/mineral

RESULTS AND DISCUSSION

Non-significant final weight, daily weight gain, daily feed intake and feed conversion ratio among the birds fed diets containing different herb types (ginger and turmeric) and there different inclusion levels (Table 2) confirms the findings of Akbarian *et al*. (2012), who reported non-significant differences when broiler chicks were fed diets supplemented with turmeric at different inclusion levels . Guil-Guerrero *et al*. (2017) did not find significant differences in the performance of broiler

chickens fed varied dietary levels of herbs. Non-significant effect recorded may suggest that the inclusion levels of the herbs (ginger and turmeric) were low; Sunmola *et al*. (2022) reported that herbal plant provides some compounds that enhance digestion and absorption of some nutrients in the diets which enhances growth of the birds. Non-significant ($p>0.05$) effect observed on feed intake may implies that addition of herbs had no negative impact on the palatability and acceptability of the diet up to 0.30 %. There were no interactive effects (Table 3) between the herb types at different inclusion levels.

Table 2: Performance traits of broiler chicks fed different herbs (Ginger and Turmeric) at varied inclusion levels

	Control	Herb types			Inclusion level (%)			
Parameters		Ginger	Turmeric	SEM	0.20	0.25	0.30	SEM
AIW (g)	39.00	39.00	39.00	0.00	39.00	39.00	39.00	0.00
AFW (g)	817.58	789.23	816.49	12.85	761.78	806.78	840.03	18.05
ADWG (g)	27.81	26.79	27.77	0.45	25.81	27.42	28.60	0.66
ADFI (g)	46.38	45.27	46.05	0.64	45.41	45.02	46.55	0.89
FCR	1.69	1.68	1.66	0.02	1.76	1.64	1.64	0.04

AIW = average initial weight; AFW = average final weight; ADWG = average daily weight gain; ADFI = average daily feed intake; FCR = feed conversion ratio; SEM = standard error of mean

Table 3: Interaction effect of herbs (H) x inclusion levels (IL) on growth performance on broiler chicks

H x IL / Parameters	T_0	T_1	T_2	T_3	T_4	T_5	T_6	SEM
AIW (g)	39.00	39.00	39.00	39.00	39.00	39.00	39.00	0.00
AFW (g)	817.88	723.94	800.15	843.59	799.61	813.41	839.46	12.98
ADWG (g)	27.82	24.46	27.18	28.74	27.17	27.66	28.48	0.46
ADFI (g)	46.37	44.62	44.44	46.74	46.19	45.60	46.35	0.61
FCR	1.69	1.82	1.64	1.62	1.70	1.66	1.63	0.03

T_1 = Control diet; T_2 = 0.2 % ginger powder; T_3 = 0.25 % ginger powder; T_4 = 0.30 % ginger powder; T_5 = 0.20 % turmeric; T_6 = 0.25 % turmeric; T_7 = 0.30 % turmeric

Effect of different herb types at varied inclusion levels on nutrient digestibility of broiler chicks is presented in Tables 4. Inclusion of ginger or turmeric had no significant ($p<0.05$) effect on all nutrient digestibility parameters evaluated, neither of the herb types showed interactive effect across the dietary inclusion levels. Non-significant differences observed were in consonance with that of Kafi *et al.* (2017) who reported non-significant ($p>0.05$) effect on nutrient utilization of broiler chickens fed dietary ginger and turmeric powder. Neither of the herb types had interaction effect (Table 5) across the inclusion levels.

Table 4: Nutrient utilisation of broiler chicks fed different herbs (Ginger and Turmeric) at varied inclusion levels

	control	Herb types			Inclusion levels (%)			
Parameters		Ginger	Turmeric	SEM	0.20	0.25	0.30	SEM
Dry matter	80.15	78.28	78.81	0.66	76.93	78.69	80.01	0.90
Crude protein	73.03	72.13	74.86	1.09	74.67	74.01	71.81	1.55
Crude fibre	69.27	69.42	73.86	1.27	72.23	71.49	71.21	1.94
Ether extract	72.35	69.66	74.16	1.17	72.98	69.50	73.24	1.59
Nitrogen free extract	68.26	70.60	72.30	1.14	71.25	74.03	69.07	1.46

Table 5: Interaction effect of herbs (H) and inclusion levels (IL) on nutrient digestibility of starter broiler chicks

H x IL / Parameters (%)	T_0	T_1	T_2	T_3	T_4	T_5	T_6	SEM
DM	69.51	72.81	70.20	69.00	71.64	77.11	70.31	1.10
CP	73.03	74.75	69.46	72.19	73.60	78.57	71.42	1.09
CF	69.28	72.68	64.98	70.62	71.79	78.02	71.79	1.26
EE	72.35	73.24	65.80	69.94	72.72	73.21	76.56	1.17
NFE	68.28	71.93	71.25	68.64	70.57	76.82	69.51	1.13

DM = Dry Matter; CP = Crude protein; CF = Crude Fibre; EE = Ether Extract; NFE = Nitrogen Free Extract; SEM = standard error of mean; T_1 = Control diet; T_2 = 0.2 % ginger powder; T_3 = 0.25 % ginger powder; T_4 = 0.30 % ginger powder; T_5 = 0.20 % turmeric; T_6 = 0.25 % turmeric; T_7 = 0.30 % turmeric

CONCLUSION

Based on the results obtained, it can be concluded that the inclusion of both herbs (ginger and turmeric) in the diets of broiler chicks up to 0.30 % total diet had no adverse effect on the growth performance and nutrient utilisation. Therefore, ginger and turmeric above 0.30 % as feed additives in broiler chicks' diet should be considered.

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