

**NSAP****47th Annual
Conference
(JOS 2022)****CONFERENCE
PROCEEDINGS**THEME
**SECURING ANIMAL
AGRICULTURE AMIDST
GLOBAL CHALLENGES****HAEMATOLOGY AND SERUM CHARACTERISTICS OF BROILERS FED DIETS
CONTAINING GRADED LEVELS OF GINGER (*ZINGIBER OFFICINALE*) RHIZOME MEAL
AS ADDICTIVE****Ewa, U. E.¹, Uzegbu, H. O.², Essen, P. O.¹, Onabanjo, R. S.¹**¹Department of Animal Nutrition and Forage Science, College of Animal Science and Production,
Michael Okpara University of Agriculture, Umudike²National Agricultural Extension and Liaison Services, Amadu Bello University, ZariaCorresponding author: emmauniteduk@yahoo.com**Target audience:** poultry farmers, feed millers, animal nutritionist**ABSTRACT**

*The study was carried out to investigate the haematology and serum characteristics of broiler chicken fed diets containing Ginger (*Zingibe officinale*) Rhizome meal as addictive. A total of one hundred and fifty (150) day old chicks (Ross) were purchased from reputable source at Ibadan. The birds were divided into 5 Diet groups after a stabilization period of 1 week. There were a total of 5 treatment each replicated into 3 in a complete randomized design experiment that lasted for 49 days. Diet 1 (0.0% ginger) was the control, Diet 2 (0.10% ginger), Diet 3 (0.15% ginger), Diet 4 (0.20% ginger), and Diet 5 (0.25% ginger). Haematological indices had significant ($p < 0.05$) differences in all the parameters measured among the treatment groups such as HB, PCV, RBC, TWBC, MCV, MCH, and MCHC, however birds fed diet 5 had the best values as HB (12.03), PCV (34.83), RBC (3.96), TWBC (23.80), MCV (95.23), MCH (30.40), and MCHC (34.56). For serum biochemistry, significant ($p < 0.05$) differences were only observed in globulin, glucose and cholesterol, however, in all the values obtained birds fed diet 5 had the highest values such as; total protein (4.20), albumin (2.16), globulin (2.05), glucose (148.67), cholesterol (82.14), urea (10.19) and creatinine (0.79). Therefore diet 5 containing 0.25 ginger is chosen as the best performed among others and is therefore recommended.*

Keywords: haematology, serum, biochemistry, ginger, graded

The blood of the domestic fowl contains erythrocyte, thrombocyte, non-granular leukocyte and granular leukocyte, suspended in plasma (Maxwell *et al.*, 1979). When blood clots in a blood sample bottle, a solid mass is formed. However on standing longer the clot will contract expressing a supernatant fluid which is called serum. This serum implies plasma minus fibrinogen and other clotting factors of plasma. This serum contains anti-bodies which make it possible for it to fight against diseases; thereby it is being used for prevention and treatment of diseases (Banerjee, 1998). Serum biochemical parameters have being reported to provide valuable information on the immune status of the animal (Kral and Suchy, 2000).

Recently, research has become more focused on the use of naturally occurring phytobiotics in replacing the chemically based feed additives (Herawati and Marjuki, 2011). This is due to the ban of use antibiotics products for poultry in many countries because of storage of undesirable residues in the meat and eggs of poultry products which may be harmful to Man when consumed (Diarra *et al.*, 2011). This has led to growing interest in the use of natural herbs and medicinal plants such as ginger, garlic, and onion as additives in poultry diets in order to maximize their potential output (Joke and Susan, 2007). *Zingiber officinale* is a perennial flowering plant commonly known as ginger. It belongs to the family of *Zingiberaceae* whose rhizome serves as storage organ. The plant is a knotted, thick and binge underground stem (Rhizome). The main important compounds in Ginger (*Zingiber officinale*) are gingerol, gingerdiol and gingerdione which have the ability to stimulate digestive enzymes, affect the microbial activity and having antioxidative activity (Dieumon *et al.*, 2019). When used in broiler diets, Ginger supplementation improve antiemetic, antiulcer, antipyretic, and cardio depressant among others (Jana *et al.*, 2019), antioxidant and reducing free radicals damage, increase production and reproduction and improves animal's health generally (Bosisio *et al.*, 2012). Therefore, this study was aimed at investigating the



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haematology and serum characteristics of broilers fed diets containing graded levels of Ginger (*Zingiber officinale*) rhizome meal as additive.

MATERIALS AND METHODS.

The research was carried out at Michael Okpara University of Agriculture, Umudike Research farm. A total of 150 broiler chicken purchased from a reputable farm at Ibadan were randomly assigned to five treatment diets containing ginger meal at 0, 0.1, 0.15, 0.2, and 0.25 levels respectively in a completely randomized design after a stabilization period of 7 days. Feed and water were given ad libitum while necessary vaccines and other medications were administered as at when due. The experiment lasted for 49 days

Table 1 Composition of experimental straight diets for broiler chicken containing varying levels of Ginger Rhizome Meal (GRM)

Ingredients	Diet 1 (0.00%)	Diet 2 (0.10%)	Diet 3(0.15%)	Diet 4 (0.20%)	Diet 5 (0.25%)
Maize	60.00	60.00	60.00	60.00	60.00
Soyabean	30.00	30.00	30.00	30.00	30.00
PKC	3.50	3.50	3.50	3.50	3.50
FDFM (72.6%)	3.00	3.00	3.00	3.00	3.00
Bone meal	3.00	3.00	3.00	3.00	3.00
Common salt	0.25	0.25	0.25	0.25	0.25
Broiler premix	0.25	0.25	0.25	0.25	0.25
Total	100	100	100	100	100
Calculated values:					
ME (Kcal/Kg)	3032.31	3032.31	3032.31	3032.31	3032.31
Protein (%)	21.18	21.18	21.18	21.18	21.18

FDFN = Foreign Danish fish meal, PKC = Palm kernel cake

Note: Vitamin and trace mineral declaration 0.25kg of premix contains:-Vitamin A: 2400000 IU, vitamin D: 1000000 IU, vitamin E: 16000 IU, vitamin K: 800mg, vitamin B6: 1000 mg, vitamin B12: 6mg, Niacin: 8000mg, folic acid: 400mg, pantothenic acid: 3000mg, Biotin: 40mg, antioxidant: 3000mg, Cobalt: 80mg, copper: 2000mg, Iodine: 400mg, iron: 1200mg, Manganese: 1800mg, Selenium: 60mg, and Zinc: 14000mg.

Blood samples were collected at the end of 7th week through the wing vein using a sterile syringe and needle. Blood sample per chicken was collected into two sets of labeled sterile bottles. One set contained anti-coagulant (EDTA – Ethyl-diamine tetra acetic acid powder), while, the other set did not. The set of bottles containing anti-coagulant was used to determine the values of haematological indices such as size of red blood cell (RBC), white blood cell (WBC), haemoglobin (Hb), packed cell volume (PCV) and red blood cell count. Values obtained were used to calculate Mean corpuscular volume (MCV), Mean corpuscular haemoglobin (MCH), Mean Corpuscular Haemoglobin Concentration (MCHC). As follows:

Mean corpuscular volume (MCV) = $\frac{PCV \times 10}{RBC}$

Mean corpuscular haemoglobin (MCH) = $\frac{Hb \times 10}{RBC}$

Mean Corpuscular Haemoglobin Concentration (MCHC) = $\frac{Hb \times 100}{PCV}$

The set of bottles without anti-coagulant was used to determine the biochemical indices such as total protein, albumin, serum alkaline phosphatase, serum creatinine, and urea.

RESULT AND DISCUSSION



HAEMATOLOGICAL INDICES OF BROILER CHICKEN FED GRADED LEVELS OF GINGER

The result of hematological indices of broiler chicken fed graded levels of ginger is presented in Table 2. The result showed significant ($p < 0.05$) differences in all the parameters measured among the treatment groups.

Haematological indices had significant ($p < 0.05$) differences in all the parameters measured among the treatment groups such as HB, PCV, RBC, TWBC, MCV, MCH, and MCHC, however birds fed diet 5 had the best values as HB (12.03), PCV (34.83), RBC (3.96), TWBC (23.80), MCV (95.23), MCH (30.40), and MCHC (34.56). These notwithstanding the values obtained falls within the normal level for broiler birds (Mitruka and Rawsley, 1977., Ross *et al*, 1978).

Table 2. Haematological indices of Broiler Chicken fed graded levels of ginger

Parameters	D ₁	D ₂	D ₃	D ₄	D ₅	SEM
HB (g/dl)	8.27 ^d	9.77 ^c	9.30 ^c	10.67 ^b	12.03 ^a	0.35
PCV (%)	25.50 ^d	30.50 ^b	28.00 ^c	31.33 ^b	34.83 ^a	0.86
RBC (*10 ⁶ cm ³)	2.86 ^d	3.45 ^b	3.20 ^c	3.56 ^b	3.96 ^a	0.10
TWBC (*10 ⁶ cm ³)	20.15 ^b	21.20 ^b	22.15 ^{ab}	22.55 ^{ab}	23.80 ^a	0.43
MCV (fl)	98.65 ^a	96.94 ^b	96.65 ^{bc}	96.26 ^{bc}	95.23 ^c	0.35
MCH (pg)	28.95 ^{bc}	28.30 ^c	29.12 ^b	30.07 ^{ab}	30.40 ^a	0.26
MCHC (g/dl)	32.64 ^b	32.02 ^b	33.26 ^{ab}	34.15 ^a	34.56 ^a	0.30

a-b-c. Means along the same row with different superscripts are significantly ($p < 0.05$) different. S.E.M= Standard Error of Mean. Hb=Haemoglobin, RBC=Red

Blood Cell, PCV=Packed Cell Volume, TWBC= total white blood cell, MCV= mean copular volume, MCH= mean copular hemoglobin, MCHC= mean copular hemoglobin concentration.

SERUM BIOCHEMISTRY OF BROILER CHICKEN FED GRADED LEVELS OF GINGER

The result of serum biochemistry of broiler chicken fed graded levels of ginger is presented in table 3

TABLE 3 Serum chemistry of Broiler Chicken fed graded levels of ginger

Parameters	D ₁	D ₂	D ₃	D ₄	D ₅	SEM
Total protein (g/dl)	3.82	3.72	4.53	3.92	4.20	0.13
Albumin (g/dl)	2.37	1.77	1.97	2.04	2.16	0.98
Globulin (g/dl)	2.10 ^a	1.95 ^{ab}	1.93 ^{ab}	1.89 ^b	2.05 ^{ab}	0.29
Glucose (mg/dl)	72.17 ^b	91.83 ^{ab}	90.83 ^{ab}	121.00 ^{ab}	148.67 ^a	9.76
Cholesterol (mg/dl)	105.59 ^a	105.22 ^a	97.54 ^{ab}	93.41 ^{ab}	82.14 ^b	3.00
Urea (mg/dl)	8.85	10.07	10.25	9.84	10.19	0.29
Creatinine (mg/dl)	0.76	0.73	0.73	0.83	0.79	0.23

a-b-c. Means along the same row with different superscripts are significantly ($p < 0.05$) different. S.E.M= Standard Error of Mean.

Apart from globulin, glucose and cholesterol which had significant ($p < 0.05$) differences among the Diet groups, other parameters didn't show any significant ($p > 0.05$) difference among the Diet groups.

For serum biochemistry, significant ($p < 0.05$) differences were only observed in globulin, glucose and cholesterol, however, in all the values obtained birds fed diet 5 had the best values such as; total protein (4.20), albumin (2.16), globulin (2.05), glucose (148.67), cholesterol (82.14), urea (10.19) and creatinine (0.79). Therefore diet 5 containing 0.25 ginger is chosen as the best performed among others and is therefore recommended. These all fall within the normal serum level for broilers (except for creatinine whose value was lower than the recommended level) as reported by researchers (Aiello and Mays, 1998., Sherif, 2013). Low creatinine is due to feed deterioration (Ologhobo, A. D. 1993)

CONCLUSION

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The performance of broiler chicken fed graded levels of ginger as regards to blood profile indices were all improved by 0.25% inclusion of ginger in the diet of broiler feeds. This implies that 0.25% inclusion of ginger can absolutely be components of broiler feed diet and can also be used as alternative to synthetic antibiotics, thus supporting weight gain to stem dependence of broiler farmers, especially the low holding backyard farmers on the importation/ production of various synthetic antibiotics in developing countries like Nigeria.

RECOMMENDATIONS

Ginger is recommended to replace synthetic antibiotics as this will enhance productivity and reduce health risk by consumers since good performance were observed in all the ginger treatment groups especially at 0.25 inclusion level of ginger.

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