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GROWTH PERFORMANCE, CARCASS, ORGAN AND HAEMATOLOGICAL CHARACTERISTICS OF BROILER CHICKEN GIVEN AQUEOUS EXTRACT OF WILD COLOCYNTH (*Lagenariabreviflora*) IN REPLACEMENT FOR ANTIBIOTIC

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ABSTRACT

An eight week study was conducted to evaluate the effect of replacing antibiotic with aqueous extract of Wild Colocynth (*Lagenariabreviflora*) [LB] on broiler chicken. Ten litres of boiled and cool water each were used to extracts 1kg, 2kg and 3kg LB which were denoted as Treatments (T) 3, 4 and 5 respectively while Neoceryl and untreated (Water) were Treatments 1 and 2. Five groups of forty day-old broiler chicks each were assigned to the five medication treatments in completely Randomized Design experiment consisting four replicates of ten birds each. Data collected were, feed intake, body weight, Feed conversion Ratio (FCR), mortality, haematology, blood serum, carcass and organs characteristics. These were analyzed using Analysis of Variance at 5% probability level. Results showed that Final weight (FWT) and Average Daily Gain (ADG) of the birds given T1 (2.5kg and 44.5g), T3 (2.57kg and 45.25g) and T4 (2.51kg and 44.40g) were similar and higher ($P<0.05$) than those given T2(2.12kg and 37.3g) and T5(2.26kg and 39.7g). The lowest FWT and ADG were observed in the birds that were not medicated. The FCR and Feed cost/kg gain were lower in birds given T1, T3 and T4 than those given T2 and T5. Feed intake, carcass weight, abdominal fat and blood serum parameters were not affected by medication treatments. The RBC and PCV of birds that were medicated were similar while values observed in untreated were lower. Highest mortality and WBC were observed in birds that were not treated. In conclusion, administration of Wild Colocynth (*Lagenariabreviflora*) extract at 1, 2 and 3kg/10litres of water enhanced the growth, survivability and health status of broiler chicken.

Keywords: Growth performance, blood profile, extracts wild colocynth replacement.

INTRODUCTION

Since its introduction in the 1930s, the use of antibiotic for man and livestock has become widespread round the Globe. Antibiotics are used for disease control in man and animal and for promoting growth in livestock animals. However, the use of antibiotic in livestock production either as a growth promoter or for disease treatment is becoming unpopular and has been banned in many countries of the world to prevent accumulation of its residues in the edible portion of the meat and subsequent transfer to the final consumers. The resultant effect of the accumulation of antibiotic in human food chains is the development of resistant strains of pathogenic organisms which renders available antibiotics ineffective against them. In order to forestall the problem of microbial resistance to available antibiotic, research efforts are geared towards looking for alternatives to synthetic antibiotic in the recent years (Stanton, 2013). Plants in form of herbs and trees are invaluable in the treatment and management of diseases since time immemorial. Medicinal plants are found throughout the world and a vast reservoir of them abounds in Africa where they are believed to have beneficial effect in the treatment of most prevailing diseases (Fasola, 2000; Okwu, 2006 and Adedapo*et al*., 2013). Spices, herbs and plant extracts have been reported to have beneficial effect on the health of broiler chickens due to their antioxidant (Hui,1996; Onasanwo*et al*.,2011b) and antimicrobial (Doorman and Deans, 2000) properties and their stimulating effect on endogenous enzymes secretion. Wild colocynth (*Lagenariabreviflora*Robert) is one of the medicinal plants that is native to most tropical environment including Nigeria. This plant which belongs to the family of cucurbitacae has been reported to have antiviral (Oridupa*et al*., 2011) and broad spectrum antibacterial activity and is used to treat small pox, measles, cold and schistosomiasis in man (Oladunmoye and Kehinde, 2011). It has also been documented to be effective in the treatment of Newcastle disease and coccidiosis in various animal species (Oridupa*et al*., 2011). The use of *Lagenariabeviflora* for the treatment of animal diseases will go a long way in reducing the use of antibiotics for the treatment of animal diseases and thus promoting the production of organic meat which is gaining wider acceptance with premium on it. The present study is therefore designed to evaluate the growth performance, carcass and organ quality as well as blood profile of broiler chickens given aqueous extract of the fruit of wild colocynth (*Lagenariabreviflora*) in replacement for synthetic antibiotics (Neoceryl).

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MATERIALS AND METHODS

Experimental Site: The study was carried out at the poultry unit of Teaching and Research Farm of LadokeAkintola University of Technology, Ogbomoso, Oyo State, Nigeria between March and April 2019.

Source and Processing of the Test Ingredients: The wild colocynth used in this study was collected from fallow plots within the Teaching and Research Farm of the University. The synthetic antibiotics that was used (Neoceryl) was purchased from a veterinary shop located in Ibadan, Oyo State, Nigeria.

Preparation of the Extract: The fruits of the *Lagenariabreviflora* were cut into pieces with cutlass. Three concentration extracts of the fruit were prepared as follows:

One kilogram of the fruit was weighed out, milled with 10 liters of previously boiled and cool water and sieved using muslin cloth and the water completely squeezed into a container to obtain what was called 1Kg extract while the residue was discarded.

(b) Two kilograms of the fruit was weighed, milled with 10 liters boiled, cool water and sieved as described earlier to obtain 2Kg extract.
(c) Three kilograms of the fruits was processed as described earlier to obtain 3 Kg extract.

The extracts were kept in plastic bottles and stored in a refrigerator until they were used.

Feed Formulation: Broiler starter diet was formulated to contain 23% crude protein and 2900Kcal/kg metabolizable energy while the broiler finisher diet was formulated to contain 21.78% crude protein and 2800kcal/kg metabolizable energy. The ingredient composition of the diets is shown in Table 1.

Table 1: Gross Composition of Starter and Finisher Diets

Ingredient (%)	Starter	Finisher
Maize	45.00	47.00
Soy bean meal	18.00	16.00
Wheat offal	5.50	12.80
Corn bran	5.00	3.00
Palm kernel meal	6.0	6.75
Fish meal	3.00	2.00
Groundnut cake	13.00	7.00
Dicalcium phosphate	1.50	2.00
Oyster shell	1.95	2.50
Common salt	0.25	0.25
Lysine	0.25	0.20
Methionine	0.25	0.20
*Premix	0.30	0.30
Total	**100.00**	**100.00**
Calculated Analysis		
**ME (Kcal/kg)	2900	2800
Crude Protein	23.00	21.78
Crude fibre	4.20	4.0

*premix composition: Vitamin A, 200,000,00IU, Vit, D_3, 40,000,00 IU, Vitamin E (Mg) 460, Vitamin K_3(kg) 40, Vitamin B_1 (Mg) 60, Vitamin B_2 (Mg) 120, Niacin (Mg) 1,000, Calcium pantothenate (Mg) 200, Vitamin B_6 (Mg) 100, Vitamin B_{12} (Mg) 05, Folic acid (Mg), 20, Biotin (Mg) 1, Chlorine chloride (Mg) 8,000, Manganese (Mg) 2,400, Iron (Mg) 2,000, Zinc (Mg) 1,600 Copper (Mg) 170, Iodine (Mg) 30, Cobalt (Mg) 6, Selenium (Mg) 24, Anti-oxidant (Mg) 2,400.

** Calculated value ME = Metabolizable Energy

Experimental Birds and Management: Two hundred (200) day-old broiler chicks were used for this study. The birds were divided into five (5) equal groups of forty birds each and the groups randomly assigned to five medication treatments in a Completely Randomized Design Experiment with each treatment replicated four times to give ten (10) birds per replicate. The treatments were (i) Antibiotics/ Neoceryl (T1) (ii) No medication/Ordinary water (T2) (iii) 1kg extract (T3) (iv) 2 kg extract (T4) and (v) 3 kg extract (T5) . Medication treatments were applied at week 3 and 5. Neoceryl was administered at the rate of 5g/20litres of water as recommended by the manufacturer while 20ml of each extract was added to 10 liters of the drinking water .The birds were housed in a deep litter pen of 1×3m and the floor covered with wood shavings. Brooding temperatures were 32 – 35^{0}C, 28 – 31^{0}C and 25-27^{0}C for the 1^{st,} 2nd and3rd weeks respectively. Feed and water were served daily add libitum throughout the duration of the study. The study was conducted for a period of 56 days.

Data Collection: Data were collected on feed intake, body weight and feed conversion ratio was determined from the two.

Feed Intake: A known quantity of feed was served daily at 7.30am and the leftover weighed at the same time the following day using electronic weighing machine. The difference in the two was taken as the feed consumed by the birds.

Weight Gain: Birds were weighed at the commencement of the study and weekly thereafter using electronic weighing scale and the weight gain determined as the difference between the values obtained in two consecutive weeks.

Feed Conversion Ratio: This was calculated by dividing feed consumed per bird by the weight gain of the bird over the same period of time.

Mortality: This was recorded as they occurred and the values were expressed as percentage of the total number of birds housed at the beginning of the experiment.

Feed Cost and Feed Cost per Kilogramme weight Gain: Feed cost was calculated from the prices of the ingredients used in the preparation of the feeds while feed cost per kilogramme live weight gain was determined from feed cost and feed conversion ratio.

Carcass Evaluation

At the end of 8 week duration of the experiment, two birds per replicate (8 birds/treatment) close to the average of the replicate were selected for carcass evaluation. The birds were tagged for easy identification, fasted for 24 hours and weighed individually to obtain pre-slaughtered weights. The birds were bled, defeathered and dressed to obtain carcass weight. Internal organs of the birds (Liver, spleen, gizzard, heart, pancreas, lungs, kidneys and proventriculus) and abdominal fat pad were excised, cleaned of the blood and weighed using electric weighing balance. Weights of the carcasses, internal organs and abdominal fat pad were expressed as the percentage of the pre-slaughtered weight of the birds. Carcasses of the birds were also cut into primal cuts (Head, shank, drumstick, wing, neck, breast, back and thigh) and expressed as percentage of the pre-slaughtered weight of the birds.

Haematological and Blood Serum Analysis

Blood Collection: Four birds per treatment were selected for blood collection. Blood collection was carried out through wing web vein. Blood samples for haematological analysis were collected into tubes that contained Ethylene diamine tetra acetic acid (EDTA) while blood samples for serum biochemical analysis were collected into plain vacutainer bottles without anticoagulant. Blood samples for serum analysis were centrifuged at 3000rpm for 10 minutes to separate and the serum decanted and kept at -20^{0}C until it was analyzed.

Haematological Analysis: The Packed Cell Volume (PCV) was determined using microhaematocrit methods described by Dacie and Lewis (1991). Haemoglobin concentration was determined by the cyanomethaemoglobin method of Kelly (1979). Red Blood Cells (RBC) and White Blood Cells (WBC) counts were determined using improved Neubauerhaemocytometer method as described by Jain (1986).

Blood Serum Analysis: Serum Alanine Aminotransferase (ALT) and Aspartate Aminotransferase (AST) activities were determined using spectrophotometric methods described by Rej and Holder (1983). Total Protein was determined using biuret methods as described by Kohn and Allen (1995). Serum albumin was evaluated using bromocresol green method (Peter *et al.,* 1982). Glucose and creatinine were measured spectrophotometrically using the procedure defined in commercial test kits (Biolabo, France). Blood cholesterol was determined using the methods of Pasin*et al.,* 1998

Laboratory Analysis: Feed samples from each medication treatments were subjected to proximate analysis using AOAC methods (AOAC,1990).

Data Analysis: Data collected were analyzed by One-way Analysis of Variance using SAS statistical software package (SAS, 1990) at 5% probability level. Where significances were indicated, Duncan's option of the same statistical software was used to separate the means.

RESULTS

Table 2: Performance Characteristics of Broiler Chicken given Aqueous Extract of Wild Colocynth

Parameters	Neoceryl (T1)	Untreated/ Water (T2)	Ikg extract (T3)	2kg extract (T4)	3kg extract (T5)	P-value
Initial Wt(g)	38.00	37.00	37.50	38.00	37.00	-
FWT(kg)	2.53^{a}	2.12^{c}	2.57^{a}	2.51^{a}	2.26^{b}	0.02
ADG (g)	44.5^{a}	37.3^{c}	45.25^{a}	44.40^{a}	39.7^{b}	0.03
DFI(g)	102.4	111.09	103.17	103.03	111.10	0.12
FCR	2.30^{c}	3.00^{a}	2.28^{c}	2.27^{c}	2.80^{b}	0.03
Mortality (%)	6.25^{b}	16.3^{a}	6.7^{b}	6.2^{b}	6.1^{b}	0.02
Feed cost (#)	450	450	450	450	450	0.30
Feed cost/kg WT gain (#)	1033^{c}	1350^{a}	1026^{c}	1021^{c}	1260^{b}	0.30

^{abc}*Means bearing different superscripts along the same row are significantly different(P<0.05).*

FWT = Final weight; ADG = Average daily gain; DFI = Daily feed intake; T = treatment; Wt = Weight

Table 3: Carcass Characteristics of broiler chicken given Aqueous extract of Wild Colocynth in replacement for antibiotic

Parameters	Neoceryl (T1)	Untreated/ Water (T2)	1Kg extract (T3)	2Kg extract (T4)	3Kg extract (T5)	P-value
PreslaughteredWt (Kg)	2.28	2.24	2.27	2.26	2.25	0.20
Bled Wt (%)	87.27	88.10	89.30	88.70	88.40	0.30
Dressed Wt (%)	66.72	67.31	67.80	66.51	66.85	0.25
Head (%)	2.54^{b}	3.90^{a}	2.80^{b}	2.72^{b}	2.65^{b}	0.03
Shank (%)	2.73^{b}	3.86^{a}	2.92^{b}	2.68^{b}	2.72^{b}	0.02
Drumstick (%)	7.98	8.02	8.01	7.97	8.10	0.32
Wing (%)	8.25	8.65	8.62	8.83	8.32	0.30
Neck (%)	4.62	4.9	4.14	4.80	4.72	0.25
Breast (%)	17.98	17.95	18.17	18.05	18.22	0.30
Back (%)	12.72	12.62	13.10	12.65	12.42	0.20
Thigh (%)	9.85	9.41	9.53	9.60	9.72	0.12

^{ab}*Means bearing different superscripts along the same row are significantly different(P<0.05).*

T = Treatment; Wt = Weight

Table 4: Organ Characteristics of broiler chicken given aqueous extract of Wild Colocynth in replacement for antibiotic

Parameters (%)	Neoceryl (T1)	Untreated/ Water (T2)	1Kg extract (T3)	2Kg extract (T4)	3Kg extract (T5)	P-value
Liver	2.32	2.43	2.53	2.30	2.86	0.20
Spleen	0.10	0.13	0.12	0.10	0.09	0.30
Gizzard	2.82	2.85	2.88	2.91	2.74	0.30
Heart	0.62	0.56	0.52	0.52	0.54	0.10
Pancreas	0.31	0.33	0.30	0.33	0.62	0.20
Lung	0.56	0.52	0.53	0.55	0.51	0.30
Kidneys	0.38	0.39	0.39	0.38	0.70	0.10
Proventriculus	0.53	0.54	0.52	0.55	0.52	0.30
Abdominal fat (%)	2.33	2.12	2.10	2.11	2.05	0.20

T = Treatment

Table 5: Haematological and Blood Serum Characteristics of Broiler Chicken given Aqueous extract of Wild Colocynth in replacement for antibiotic (Neoceryl)

Parameters	Neoceryl (T1)	Untreated/ Water (T2)	1Kg extract (T3)	2Kg extract (T4)	3Kg extract (T5)	P-value
RBC($\times10^6$/mm^3)	2.42^a	1.46^b	2.33^a	2.41^a	2.43^a	0.03
WBC($\times10^3$/mm^3)	2.61^c	3.58^a	2.60^c	2.52^c	3.19^b	0.02
PCV (%)	35.40^a	33.20^b	35.80^a	34.70^a	34.90^a	0.03
Total protein (g/dl)	3.20	3.25	3.24	3.18	3.30	0.15
Albumin (g/dl)	1.58	1.62	1.67	1.56	1.52	0.20
Globulin (g/dl)	1.62	1.63	1.57	1.62	1.78	0.30
ALT (IU/l)	35.89	35.94	36.10	35.85	35.87	0.40
AST (IU/l)	78.92	79.73	79.52	79.25	79.55	0.20
ALP (IU/l)	53.66	54.36	54. 86	53.75	53.97	0.30
Creatinine (mg/dl)	0.57	0.62	0.60	0.58	0.58	0.10
Glucose (mg/dl)	162	161	163	160	162	0.20
Cholesterol (mg/dl)	63.40	62.90	64.20	64.10	63.70	0.30

^{ab}*Means bearing different superscripts along the same row are significantly different(P<0.05).*

RBC = Red blood cell; WBC = White blood cell; PCV = Packed cell volume; ALT = Alanine aminotransferase; AST = Aspartate aminotransferase; ALP = Alkaline phosphatase; T = Treatment

The crude protein and the energy content of broiler starter used in this study were 23% CP and 2900Kcal/Kg respectively while the finisher diet contained 21.78% CP and 2800Kcal/Kg energy respectively. The performance of broiler chickens given aqueous extract of wild colocynth in place of antibiotic (Neoceryl) is shown in Table 2. Final Weight (FWT), Average Daily Gain (ADG), Feed Conversion Ratio (FCR), and mortality were significantly (P<0.05) affected by medication treatments. The FLWT, and ADWG of the birds that were given Neoceryl (T1), 1kg extract (T3) and 2Kg extract (T4) were similar and higher (P< 0.05) than those given no treatment/control (T2) and 3 Kg extract (T5). Birds that were given no medication had the lowest (P<0.05) values for these parameters. No significant effect of medication treatments was observed in the feed intake of the birds.

The FCR was not significantly different among the birds that were given Neoceryl (T1), 1Kg extract (T2) and 2Kg extract (T3). The values observed in these birds were lower (P<0.05) and better than those obtained in the birds given 3Kg extract (T3) and those that were not medicated. The highest (P<0.05) and the poorest FCR was observed in the birds that were not medicated (negative control). Mortality was higher (P<0.05) in the birds that were not medicated (T2) compared to those that were given Neoceryl and aqueous extract of *Lagenariabreviflora* (T1, T3, T4 and T5). Feed cost per kilogram weight gain was lowest in the birds given 2Kg extract, followed by 1 Kg extract, Neoceryl, 3kg extract and lastly water in that order. The carcass characteristics of the broiler chicken given aqueous extract of wild colocynth in replacement for antibiotic is shown in Table 3. Medication treatments had no significant (P> 0.05) effect on pre-slaughtered weight, bled weight, dressed weight, drumstick, wing, neck, breast, back and thigh. Head and shank weights were however significantly (P<0.05) affected by the treatments. Birds that were not medicated (T2) had bigger (P <0.05) head and larger (P < 0.05) shank compared with those given Neoceryl and extracts of the wild colocynth.

The organ characteristics of the birds given aqueous extract of *Lagenariabreviflora* is presented in Table 4. Medication treatments had no significant (P > 0.05) effect on the liver, spleen, gizzard, heart, pancreas, lung, kidneys, proventriculus and abdominal fat pad.

The haematological and serum biochemical characteristics of broiler chickens given aqueous extract of *Lagenariabreviflora* in replacement for Neoceryl) is shown in Table 5. Red Blood Cells (RBC), White Blood Cells (WBC), and Packed Cell Volume (PCV) were significantly (P<0.05) affected by the medication treatments. Total protein (TP), Albumin, Globulin, ALT, AST, ALP, Creatinine, Glucose and Cholesterol were however not significantly (P >0.05) affected by the treatments. The RBC and PCV were significantly (P< 0.05) lower in the birds that were not medicated (T2) than in those that were given Neoceryl or extracts of wild colocynth (T3, T4 and T5). The WBC was however higher (P <0.05) in the group given ordinary water (T2) than in other groups that were given Neoceryl (T1) or aqueous extracts of wild colocynth (T3, T4 and T5).

DISCUSSION

The protein and the energy levels of the broiler starter (23% CP and 2900Kcal/Kg respectively) and finisher (21.78CP and 2800Kcal/Kg respectively) diets meet the recommendations of NRC (1994) for broilers at these phases of production.

The similarity in the weight gain of the birds that were given Neoceryl, 1kg extract and 2kg extract is an indication that the birds were not adversely affected by the administration of the extract of *Lagenariabreviflora* at these levels. The lowest weight gain recorded by the birds that were not medicated could be due to subclinical level of disease infection. This infection was probably controlled by Neoceryl and *Lagenariabreviflora* extract in these birds. It has been reported that the fruit of wild colocynth is widely used in West Africa as herbal remedy for treating digestive disorder and serves as wound antiseptic in man and for treating coccidiosis and Newcastle disease in livestock animals (Adedapo*et al.,* 2013). Extract from *Lagenariabreviflora* has also been reported to contain Phytochemicals; phenol, alkaloids carotenenoids and flavonoids and other compounds (Adeyemi*et al.,* 2018) that have been reported to have potential for prophylactic and therapeutic treatment of diseases in man and animal. The depression that was observed in the weight of the birds given 3Kg extract (T5) compared to those that received 1Kg and 2 Kg extracts (T3 and T4) could be due to high concentration of phytochemicals which probably had negative effect on the growth of the birds. This study revealed that feed intake of the birds was not

affected by the medication treatment. This is an indication that the palatability of the feed was not compromised as a result of medication. Feed conversion ratio was observed to be better and lower in birds given Neoceryl, 1kg extract and 2kg extract but was poor and higher in the group that were not medicated. This can be attributed to higher growth recorded in the medicated groups compared to those that were not medicated.

The higher mortality that was observed in birds that were not medicated (T2) compared to the medicated ones (T1, T3 T4 and T5) can be attributed to disease infection. Neoceryl (antibiotic) and wild colocynth are known to have ant-microbial properties (Adedapo*et al.,* 2013) that help in disease control in man and livestock animals. The lower feed cost per kilogramme weight gain observed in T1, T3 and T4 is a direct consequence of better feed conversion and higher growth rate recorded in these treatment groups. The heads and the thighs of birds that received no medication were larger than those obtained in the groups that were given Neoceryl or extract of the fruits. This can be attributed to poor growth observed in these birds. The lower RBC and PCV that were observed in the birds that were not medicated can be attributed to subclinical level of infection and its negative effect on red blood cell formation (Haematopoesis). The higher RBC, PCV and Hb that were observed in the birds that were medicated in this study agree with the report of Saba *et al.,* (2009) who also observed higher PCV, Hb, and RBC in the Wistar rats administered with ethanolic extract of whole fruit of *Lagenariabreviflora*. However, lower WBC that was observed in the same group of birds disagrees with the report of the same author. This study revealed that the highest concentration of *Lagenariabreviflora* (3Kg extract) induced lower WBC than those given 1Kg extract and 2 Kg extract. This disagree with the report of Ekunseitan*et al.,*(2017) who observed no significant difference in the WBC of laying chicken medicated with 200g/4l and 300g/4l *Lagenariabreviflora*. However, this could be due to the difference in the methods employed in the extraction.

CONCLUSION

It can be concluded from the study that oral administration using 1, 2 and 3kg extract of *Lagenariabreviflora* fruits in 10litres of water increased weight gain, feed conversion ratio, health status and reduced mortality of broiler chicken.

REFERENCES

A O A C (1990). Official methods of analysis 15th Ed. Association of Official Analytical Chemists.Washington D.C.

Adedapo, A., Adewuyi, T. and Sofidiya, M. (2013).Phytochemistry, anti-inflammatory and analgesic activities of the aqueous leaf extract of Lagenariabreviflora in Laboratory animals. Rev. Biol. Trop., 6 (1) : 281-290.

Adeyemi, M., Ekunseitan, D.A., Abiola, S.S., Dipeolu, M. A., Egbeyale, L. T., and Sogunle, O.M.(2017). Phytochemical Analysis and GC-MS Determination of Lagenariabreviflora R. Fruit.International Journal of Pharmacognosy and phytochemical Research, 9(7):1045-1050 doi:10.25258/phyto.v9i07.11178

Dacie, J.V. and Lewis, S.M. (1991) Practical Haematology. 7th Edition, Churchil Livingstone, Edinburgh, 54-79.

Dorman, H. J. D. and Deans, S. G. (2000). Antimicrobial agents from plants: Antibacterial activity of plant volatile oils. Journal of applied Microbiology, 88: 308-316.

Ekunseitan D. A., S.S. Abiola, O.O. Oluwatosin, O.M. Sogunle, O.O. Adeleye, L.T. Egbeyale, and O.S.Iyasere (2017). Health status of laying birds administered extracts of Lagenaria breviflora managed under two housing systems. Canadian Journal of Animal Science, 97 (1): https://doi.org/10.1139/cjas-2015-0156.

Fasola, T. R. (2000). Screening Nigerian Plants for their medicinal importance. Journal of ScienceResearch,6 (1): 51-57.

Hui, Y.H. (1996). Oleoresins and essential oils. In: Hui, Y.H, editor. Bailey's industrial oil and fat products. New York, Wiley-Interscience Publication, Pp 145-153.

Jain, N. C. (1986). Scanning electron micrograph of blood cells. In: Schalm's Veterinary Haematologyedited by Lea, P and Febiger (Philadelphia) 463 - 470.

Kelly, W. R. (1979). Veterinary Clinical Diagnosis.4th edition.BalliereTindall, London.

Kohn R. A., and Allen M. S. (1995). Enrichment of proteolitic activity relative to nitrogen in preparation from the rumen for in vitro studies. Animal Feed Science and Technology, 52(1&2):1-14.

National Research Council. 1994. Nutrient Requirements of Poultry: Ninth Revised Edition, 1994. Washington, DC: The National Academies Press. https://doi.org/10.17226/2114.

Okwu, D. E. and Josiah, C. (2006).Evaluation of the clinical composition of two Nigerian medicinalplants.Afri. J. Biotech., 5:357-361.

Oladunmoye, M.K. and Kehinde, F.Y. (2011) Ethnobotanical Survey of Medicinal Plants Used in Treating Viral Infections among Yoruba Tribe of South Western Nigeria. African Journal of Microbiology Research, 5: 2991-3004.

Onansanwo, S. A., Singh, N., Saba, A. B., Oyagbemi, A., Oridupa O. and G. Palit (2011). Anti-ulcerogenic and in vitro antioxidant activities ofLagenariabreviflora (LB) wholefruitethanolicextract in laboratory animals. Pharmacognosy Res.,3:2-8.

Oridupa, O. A., A. B. Saba and L. K. Sulaiman (2011).Preliminary report on the antiviral activity of the etanolic fruit extract of Lagenariabreviflora Robert on Newcastle Disease virus. Trop. Vet.,29(1):22-33.

Pasin, G; Smith, Smith, Gary M, O'Mahony (1998).Rapid determination of total cholesterol in egg yolk using commercial diagnostic cholesterol reagent. Food Chemistry, 61 (1): 255-259. DOI: 10.1016/S0308-8146(97)00072-1

Peter, T., Biamonte, G. T. and Doumas, B. T. (1982).Protein (Total Protein) in serum, urine and cerebrospinal fluids; Albuminin serum.In Selected Method of clinical Chemistry.Editedb by Paulkner W R, MeitesS(American Association for clinical Chemistry. Washington, D. C) 9.

Rej, R. and Hoder, M. (1983).Aspartate Transaminase. In: Methods of enzymatic Analysis 3rdedition. Edited by Bergmeyer H. U., Bergmeyer J and andGrassl M (Weinhein: Verlag- Chemie, :416-433.

Saba, A. B., Oridupa, O. A., and Ofuegbe, S. O. (2009). Evaluation of haematological and serum electrolyte changes in winstar rats administered with ethanolic extract of whole fruit of Lagenariabreviflora Robert. J. Med. Res., 3:758-762.

SAS (1990).SAS Procedure Guide.Version 6, 3rd Edn, SAS Institute, Inc. Cary, N.C.Stanton, T.B. (2013).A call for antibiotic alternatives research. Forum: Science and Society, 21(3):111 – 113.

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