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Effects of Scent Leaf *(Ocimum gratissimum)* Extract on Hematology and Carcass Characteristics of Broiler Chickens.

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Target Audience: Poultry farmers, nutritionist, feed millers, extension officers

Abstract

The study assessed the effects of administering graded levels of scent leaf (Ocimum gratissimum) extract to broiler birds on haematological parameters and carcass characteristics. A total of Ninety-six-day-old commercial chicks (Anak Breed) were divided into four experimental groups of twenty-four (24) birds each, with three replicates of eight (8) birds per treatment in a completely randomized design (CRD). Treatment one received oxytetracycline, while treatments 2, 3, and 4 were given Ocimum gratissimum extract at different graded levels of 30, 60, and 90 ml per liter of water, respectively. After eight weeks, blood was collected from two (2) birds per replicate (six per treatment) for haematological studies; these birds were also evaluated for carcass characteristics. The results showed no significant differences (P>0.05) in all haematological parameters among treatments, and were within the accepted normal range for broiler chickens. However, there were significant differences (P<0.05) in live and dressed weights among treatment groups, but no significant effect (P>0.05) of the applied treatments on carcass yield. Phytochemical analysis of scent leaf extract (SLE) revealed bioactive compounds such as oxalate, phytate, tannins, saponins, flavonoids, alkaloids, and phenol, which help reduce cholesterol, improve health, feed intake, digestibility, absorption of minerals and vitamins, and boost immunity of the birds. SLE also showed antibacterial effects on some drug-resistant bacteria. Treatment 2 (30 ml/L) promoted the best performance in all the parameter of interest among the Treatment groups and is therefore recommended as an antibiotic alternative in Nigeria.

Keywords: *Scent leaf, hematological indices, carcass characteristics, broiler chickens, growth promoter, phytochemical*

Description of problem

Medicinal plants are plants that contain substances that could be used for therapeutic purposes and its value lies in bioactive phytochemical constituents that produce definite physiological action in the human and animal body (1). The utilization of medicinal plant and leaf extract in animal

production has found widespread scientific and commercial acceptance as a strategy to improve the health status and performance of the animals (2).

Leaf extract has appetizing and digestion-stimulating properties and an anti-microbial effect. leaf extract contains nutritional constituents such as crude protein, crude fibre, ether extract, total ash, and metabolizable energy that enhance the performance of the animals fed such extract (3). Leafy vegetables supply nutrients which could complement the inadequacies of most feedstuff. leafy vegetables are good sources of dietary fibre, carotenoids, vitamin C, foliate and certain minerals such as Calcium, potassium, sodium, magnesium, phosphorus, and Iron (4).

Ocimum gratissimum (scent leaf) is a leafy vegetable that is found throughout the tropics and subtropics, they are easy to cultivate and provide an inexpensive means of combating vitamin and mineral deficiency in developing regions of the world like Nigeria. Phytochemical evaluation of this plant has shown that it is rich in Alkaloid, Tannins, Saponins, Phytates, Flavonoids, and Oligosaccharides (5). These compounds at moderate levels can be essential and improve the acceptability, palatability, feed intake, digestibility, health status, carcass quality, and blood components of animals.

Phytogenic feed additives are incorporated into diets of animals in order to improve the feed properties, productivity, reproduction, and quality of animal products (6). However, commercial probiotics are expensive and sometimes unavailable to the small-scale farmers especially in the rural areas coupled with the ban on the use of synthetic antibiotic (6), these necessitated the search for alternative growth promoters and Phyto-biotic that are readily available and affordable to the farmers.

Integration of *Ocimum gratissimum* into normal poultry nutrition has been found to promote growth, enhance health, blood formation, carcass quality, and performance as a result of its antioxidant and antimicrobial properties and the well-being of birds as well as save scarce resources spent on commercial anti-biotic, anti-microbial, vitamin, mineral additives. Hence, this study evaluated the e**ffects of *Ocimum gratissimum* extract on the hematology and carcass characteristics of broiler chicken.**

Materials and Methods

The research work was conducted at the poultry unit of the student research site of the Federal College of Agriculture, Ishiagu, Ivo Local Government Area of Ebonyi state, Nigeria. The college is situated on latitude 05°5' North and longitude 7°31' East, with a mean average rainfall of 1655mm and a prevailing temperature condition of 28.5°C as well as a relative humidity of about 80 - 85% as reported by (7).

Fresh leaves of *Ocimum gratissimum* were harvested within the region of Ishiagu. The freshly cut scent leaves with the stalk were separated from the stem, washed with clean water to remove dirt and sand, drained, chopped and weighed to obtain 100 g. This was then crushed with 0.5 litre of water and filtered with Whitman filter paper to obtain a homogenous extract of the scent leaves. The homogenous extract was prepared and served at intervals of two (2) times a week to the animals fresh according to treatments.

A total of Ninety-six (96) Day old commercial chicks (Anak Breed) were purchased from the reliable hatchery and were randomly allotted to four treatments in a

completely randomized design (CRD), Each treatment was replicated thrice (3) with eight (8) birds per replicate. Before the arrival of the birds, the brooding house and equipment were thoroughly cleaned and disinfected to curb the incidence of disease within the farm, litter material (wood shaven) was spread adequately on the floor of the pen. On arrival, the birds were placed on the litter covered with paper, fed commercial broiler diet and water containing anti-stress agent was provided. Other management procedures were strictly observed.

Ocimum gratissimum extract was added at 0, 30, 60 and 90 ml/liter of drinking water representing T_1, T_2, T_3, and T_4 respectively. Birds on T_1 (control) received synthetic antibiotics instead of leaf extract.

At the 8th week of the experiment, blood samples (2 miles) were collected from two birds randomly selected from each replicate of the treatment for the evaluation of haematological parameters. Blood collection was carried out by using a sterile needle to puncture the wing vein, and blood drawn into the syringe. The blood samples were collected into labeled sterile bottles containing EDTA (Ethyl diamine tetra acetic acid) as anti-coagulant. These samples were used in the Veterinary Laboratory of Michael Okpara University of Agriculture Umudike to determine haematological parameters such as: red blood cell, white blood cell, Haemoglobin and packed cell volume according to (8).

At the end of the feeding trial, two (2) birds per replicate were randomly selected, that is, six (6) per treatment. They were deprived of feed overnight to empty the gastrointestinal tract although water were given ad libitum, and then weighed before and after slaughtering. As soon as the birds were certified dead, they were immersed in steaming water to facilitate de-feathering. The carcass was then eviscerated. The different parts of the carcass (thigh, drum stick, breast muscle, wing, and back) were carefully removed, followed by the organs (spleen, gizzard, heart, liver, and intestine), The individual parts and organs were then weighed and expressed as percentage of live weight.

Proximate composition of the commercial feed and phytochemical analysis of the test ingredient were carried out according to standard scientific procedures (9; 10). Phytochemicals were analysed from the leaf extract, calculated and expressed as milligrams of quercetin equivalent per gram of extract (mg/g). All data collected were subjected to one-way analysis of variance (ANOVA) applicable to a complete randomized design (11; 12). The treatment Mean were compared using the Duncan Multiple Range Test at $P<0.05$ (13). All Statistical analysis were performed with SAS Software Procedure 2009.

Results and Discussion

Table 1 shows the proximate composition of the commercial starter and finisher diets (brand's name withheld) used in this study. The proximate analysis of commercial feed revealed the presence of Dry matter, Moisture content, Crude protein, Crude fiber, Ash, Ether extract, Nitrogen-free extract and Metabolizable energy.

The feed relatively showed high dry matter content, nitrogen free extract, Ash, and ether extract but relatively low in crude fibre and crude protein. The results obtained in this present study for crude protein in starter and finisher phases falls below the standard range of 21-23% and 18-20%, respectively as

recommended by (14). The result shows low moisture content, adequate moisture content in feed helps in preventing spoilage and ensuring long shelf-life and good health of the animals. The metabolizable energy in both phases is above the normal range of between 2800 - 2900 and 3000 – 3100 Kcal/Kg, respectively as recommended by (15). This result indicates that the birds are shooting above their recommended energy requirement and not meeting their protein requirement.

Table 1: Proximate composition of commercial starter and finisher diets on percentage dry matter.

Nutrients (%)	Starter diet	Finisher diet
Dry matter	95.18	96.56
Moisture content	4.82	3.44
Crude protein	19.91	14.09
Crude fibre	3.80	2.65
Ash	5.25	5.04
Ether extract	4.45	4.95
Nitrogen-free extract	61.77	69.83
Metabolizable energy (Kcal/Kg)	3180	3164

Table 2 shows the results of phytochemical analysis of *Ocimum gratissimum* leaf extract. The analysis revealed the presence of bioactive compounds such as; oxalate, flavonoid, alkaloid, tannins, phenol, phytate and saponin which confers the medicinal, and anti-nutritional properties of *Ocimum gratissimum*. From the result, *Ocimum gratissimum* leaf extract contain less than 1.0% each of all the parameters except in phytate (1.75%). However, all the phytochemical components were within the safety level recommended for broiler chickens and rabbits according (16).

The phytochemical analysis result obtained in this study is relatively lower than the values obtained by (17); Oxalate (0.75), Phytate (5.56), Tannins (2.48), Saponins (3.52), Flavonoid (1.78), Alkaloid (1.07), and Phenol (0.73) for the same leaf extract. In the same analysis carried out by (17) to determine the phytochemical analysis of scent leaf, the presence of Cyanogenic glycoside, Anthraquinone, and Steroid were revealed but absent in this present study. According to the finding of (10) for the same leaf extract, it revealed the presence of Terpenoids in small concentrations which was not present in this present report. However, the efficacy of the leaf extracts may be due to the age and the period of harvest of plant materials as reported by (18; 10).

From this study, it was observed that bioactive components are abundant in the extracts of *Ocimum gratissimum*. According to (19), *Ocimum gratissimum* as a medicinal plant that contains bioactive substances would help in the reduction of cholesterol, improve feed intake, acceptability and digestibility of feed, absorption of mineral and vitamins, inhibit bacterial, viral and fungal infections and generally boost the immunity of these animals. It could be used orally as an antibiotic in poultry to prevent outbreaks of disease and enhance the blood and meat quality of broiler chicken.

The result of the haematological indices of

Table 2: Phytochemical analysis of Ocimum gratissimum leaf extract

Compound	Content (mg/100g)	SRL (mg)
Oxalate	0.56	1.3-1.8
Flavonoid	0.15	-
Alkaloid	0.82	3.50
Tannins	0.78	15.0
Phenol	0.38	-
Phytate	1.75	23.40
Saponin	0.45	7.02

SRL= Safe recommended levels

finisher broiler chickens administered varying levels of Ocimum gratissimum under various treatments is shown in Table 3. The result obtained in this study shows that there was no significant difference (P>0.05) among the treatment groups for all the hematological parameters observed.

Blood is a good indicator of mineral status of various animal species and to be used for accessing the nutritional status, health and disease condition of the animals (20). Ingestion of any dietary components have measurable effects on the blood composition and may be considered as appropriate measure of long-term nutritional status (21). Haematological studies have been found useful for disease prognosis and for the therapeutic and feed stress monitoring (22). All the haematological parameters measured fall within the normal range as recommended for healthy chicken by (23). This is totally in agreement with (24) who reported that when the haematological values fall within the normal range reported for the healthy animals, it is an indication that diet(s) did not show any adverse effect on haematological parameters during the experimental period but when the values fall below the normal range, it is an indication of anaemia.

Table 3: Haematological indices of broiler chickens administered varying levels of Ocimum gratissimum leaf extract.

Parameters	0M/L	30M/L	60M/L	90M/L	SEM	NR
PCV (%)	33.00	35.33	34.00	33.67	0.64^{NS}	34.83
RBC ($X10^{12}$)	3.55	4.23	3.98	3.99	0.22^{NS}	3.96
WBC ($X10^{12}$)	12.27	7.73	7.60	10.00	0.13^{NS}	23.80
Hb (g/dL)	11.10	11.96	11.47	11.30	1.29^{NS}	12.03
MCHC (g/dL)	33.63	33.86	33.71	33.55	0.06^{NS}	34.56
MCH (pg)	31.35	28.31	29.07	28.34	0.59^{NS}	30.40
MCV (fL)	93.22	83.60	86.25	84.44	1.76^{NS}	95.23

PCV=Pack c ell volume, RBC=Red blood cell, WBC=White blood cell, Hb=Haemoglobin, MCH=Mean corpuscular haemoglobin, MCHC=Mean corpuscular haemoglobin concentration, MCV=Mean corpuscular voulume, SEM=Standard error of mean, NR=Normal range

Table 4 shows the results of carcass characteristics of broilers chicken fed different inclusion levels of Ocimum gratissimum leaf extract. Significant (P<0.05) differences were recorded in the mean values obtained for live weight and dressed weight while all other parameters were not significant (P>0.05) affected.

The carcass evaluation revealed that there was no significant (P>0.05) difference in all the parameters examined across the treatment. This revealed that Ocimum gratissimum leaf extract has no detrimental effect on the birds. Higher numerical values were observed among the treatment groups in all the parameters when compared with the T1 (control). The non-significant (P>0.05) difference observed in the carcass parameters was contrary to the findings of (25) who obtained higher breast yield in broilers fed thyme leaf extract but agrees with the report of (26) who compared a diet with the inclusion of 100 ppm of oregano leaf extracts in replacement of an antibiotic. (16) also reported that carcass characteristics of birds were not negatively affected when Oregano leaf extracts were fed to birds. It also agrees with the concept that plant extracts improved the carcass yield of broiler chicken.

The result obtained in the organs weight shows similar values for the heart, intestine, liver, spleen, and gizzard. This result obtained in the study shows that the use of Ocimum gratissimum leaf extract can improve the yield of carcasses in broilers. The range of values obtained in this study for the gizzard, liver and spleen were higher than 2.40 – 3.57% (for gizzard), 1.67 – 2.00% (for liver) and 0.08 - 0.10% (heart); and for the intestine and heart is within the range (5.67 – 7.00%) and (0.40 – 0.67%) respectively as reported by (27) when Petiveria alliacea Root Meal was supplemented in the diet of broiler chickens.

Table 4: Carcass characteristics of broiler chickens administered varying levels of Ocimum gratissimum leaf extract.

Parameters	0M/L	30M/L	60M/L	90M/L	SEM
Live weight (Kg)	1.62^{ab}	2.03^{a}	1.40^{b}	1.92^{ab}	0.09
Dressed weight (Kg)	1.07^{ab}	1.43^{a}	0.98^{b}	1.33^{ab}	0.07
Dressing percentage (%)	66.73	70.44	69.45	69.53	1.70^{NS}
Thigh (%)	14.94	17.61	17.18	15.75	1.03^{NS}
Breast (%)	31.21	27.25	31.39	28.70	1.09^{NS}
Back-cut (%)	23.49	26.18	19.41	21.25	1.19^{NS}
Drumstick (%)	15.61	15.76	15.09	15.84	0.66^{NS}
wing (%)	14.94	14.18	10.54	12.03	0.71^{NS}
Gizzard (%)	3.38	3.81	3.29	4.03	0.16^{NS}
Liver (%)	2.48	3.19	2.53	2.58	0.14^{NS}
Heart (%)	0.55	0.65	0.46	0.41	0.06^{NS}
Spleen (%)	0.16	0.21	0.18	0.21	0.02^{NS}
Intestine (%)	6.24	6.92	6.31	6.07	0.38^{NS}

$^{a, ab, b}$ *Means in the same row with different superscripts are significantly different (P<0.05*

Conclusion and Applications

The findings of this study conclude that:

1. *Ocimum gratissimum* extract in broiler diets could be effectively utilized without any adverse effect on the hematological indices and carcass qualities of broiler chickens.
2. The use of *Ocimum gratissimum* leaf extract at inclusion rates of 30ml/L in broiler diet (water) could be used instead of synthetic antibiotics since the whole world is fighting against the use of antibiotics in animal production.
3. Due to the efficacy of *Ocimum gratissimum* leaf extract (juice), more research work is required to be carried out on other species of poultry birds and since age of leaves was not considered, this might influence the nutrient content in leaves.
4. Adoption of incorporating *Ocimum gratissimum* juice or leaf meal in the diet of farm animals will serve as substitute (phyto-biotics) and reduce the use of synthetic antibiotic which have negative effects on both the farm animals and the farmer because most of these growth promoters are expensive and scarce and tends to influence production cost and efficiency. Therefore, Farmers are encouraged to plant scent leaves (*Ocimum gratissimum*) around their premises for immediate access to antibiotics.

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References

1. Sofowora, E. A, (2008). Medicinal plants and traditional medicine in Africa. *John Wiley and Sons LTD*, Pp 1-10.
2. Zhang, P., Zhang, H., Ma, C., Lv, Q., Yu, H. and Zhang, Q. (2024). Effect of ginseng stem leaf extract on the production performance, meat quality, antioxidant status, immune function, and lipid metabolism of broilers. *Frontiers in Veterinary Science,* 11:1463613. doi:10.3389/fvets.2024.1463613
3. Djakahia, B., Louis, G. B. and Soumaila, D. (2011). Effects of Moringa oleifera on growth performance and health status of young post-weaning broilers. *Research Journal of Poultry Science. 4(1):248-32.*
4. Olomu, J. M. (1995). Monogastric Animals Nutrition, Principles and Practice. *Jachem Publication, Benin.* pp. 70-72.
5. Fagbohun, E. D., Lawal, O. U, and Ore, M. E. (2012). The proximate, Mineral and Phytochemical analysis of the leaves of *Ocimum gratissimum L., Melanthera scanens A, and Lea guineensis L.,* and their Medicinal value. *International Journal of Applied Biology and Pharmaceutical Technology. Vol 3-ISSN 09764-4550.*
6. Windisch, W., Schedle, K., Plitzer, C., and Kroismavr, A. (2008). Use of Phytogenic products as feed additives

for swine and poultry. *Journal of Animal Science. 86(14):140-148.*

7. FCAI (2015). Metrological station, Federal College of Agriculture Ishiagu, Ebonyi State, Nigeria.
8. Shamila, F. S., Packirisamy, M., and Ayyakkannu, P. (2019). Comparison of Manual Versus Automated Data Collection Method for Haematological Parameters. *Biomed Research International*, 15: 11372-11376.
9. AOAC, (2000). Association of Official Analytical Chemist Methods of Analysis. *6th Edition. Washington DC, USA.*
10. Umar, M., Nkemelu, C. P., Sagir, M. R., Mohammed, S. Y., Ajiya, G. K., Mohammed, I. B., Yaya, A. A., Kigbu, A. A., Ojo, S. A., Abdulkarim, I. M., Tafinta, I. Y., and Amuta, I. C. (2019). Evaluation of Phytochemical, Antimicrobial Activities and Toxicological Analysis of Scent Leaf (*Ocimum gratissimum* L.) Leaf Extracts. *Asian Journal of Research in Medical and Pharmaceutical Sciences. VOL. 7(3): 1-11.*
11. Steel, R. G. D, and Torrie, H. J. (1980). Principles and Procedure of Statistics, A biochemical approach *2nd Edn. Me Graw HIl Inc, New York page 137.*
12. SAS (2009). Statistical analysis systems. SAS/STAT user's guide statistical analysis. Institute inc. version 6, 3rd edition Cary North Caroline, USA. Page 943.
13. Duncan, D.B. (1955). Multiple range and multiple F tests. *Biometrics,* 11:1-42.
14. Kekeocha, C. C. (1994). Poultry Production handbook. *Macmillan Publishers Ltd London, pp 66- 189.*
15. Aduku, A.O. (2018). Tropical feedstuff analysis table. *Department of Animal Science, Faculty of Agriculture, Ahmadu Bello University, Samaru, Zaria, Nigeria.*
16. Alagbe, J. O. and Oluwafemi, R. A. (2019). Performance and haematological parameters of broiler chicks gives different levels of dried lemon grass (*Cymbopogon citratus*) and garlic (*Allium sativum*) extract. *Journal of Microbiology and Microbial Infections* 2: 39-45.
17. Udochukwu U., Omeje F. I., Uloma, L. S, and Oseiwe, E. D. (2015). Phytochemical analysis of *Vernonta amygdalina and Ocimum gratissimum* extracts and their antibacterial activity on some drug-resistant bacteria. *American Journal of Research Communication,* 3(6): 225-235.
18. Ogundare, A. O. (2011). Antibacterial properties of the leaf extracts of *Vernonia amygdalina, Ocimum gratissmum, Corchorois olitorius and Manihot palmate Journal of Microbiology and. Antimicrobials.* 3(4): 77-86.
19. Ibrahim, T. A., Lola A., Adetuyi, F. O, and Jude-Ojei, B. (2009). Assessment of the antibacterial activity of *Vernonia amygdalina* and *Ocimum gratissimum* leaves on Selected food borne pathogens. *International Journal of Third World Medicine. 8(2): 23-24.*
20. Islam. M. S., Lucky, N. S., Islam M. R., Ahad, A., Das, B. R., Rahaman, M. M. and Saddini, S. (2004). Hematological parameters of fayoumic, Assil and local chickens reared in Suchet region in Bangladesh. *International Journal of Biotechnology, 3(3):182-185.*
21. Maxwell, M. H., Robetson, G. W and

McCongruodala, C. C. (1990). Composition of haematological values in restricted and ad libitum fed domesticated fowls. RBC characteristics. *British Poultry Science.* 60:1474-1484.

22. Olabanji, R.O., Farinu, G.O., Akinlade, J.A and Ojebiyi, O.O (2007). Growth performance and haematological characteristics of weaner rabbits fed different levels of wild sunflower (Tithonia diversifolia HemsL A. Gray) leaf blood meal mixture. *Proceedings of 32nd Annual Conference of the Nigeria Society of Animal Prouction,* 207-209.
23. Ewa, U. E., Essen, P. O., and Innocent, M. K. (2023). Organs' weight and blood profile of broiler chickens fed diets containing graded levels of ginger (Zingiber officinale) rhizome meal as additive. *Nigerian Journal of Animal Science and Technology.* 6(1):100-106.
24. Minka, N. S and Ayo, J. O (2007). Physiological responses of transported goats treated with ascorbic acid during the hot-dry season. *Animal Science Journal*.78:164-172
25. Jamroz, D., Wiliczkiewicz A., Wertelecki T., Orda J., and Skorupinska J. (2005). Use of active substances of plant origin in chicken diets based on maize and domestic grains. *British Poultry Science, 46:485-493.*
26. Zhang, K. Y., Yan, F, Keen C. A. and Waldroup, P. W. (2005). Evaluation of Microencapsulated essential oils and organic acids in diets for broiler chickens. *International Journal of Poultry Science, 4(9):612-619.*
27. Odetola, O. M. (2016). Growth Response, Haematology and Carcass Characteristics of Broiler Chickens fed Diets Supplemented with *Petiveria alliacea* Root Meal. *Federal College of Animal Health and Production Technology, P.M.B 5029, Moor Plantation, Ibadan, Nigeria. Nigerian Journal of Animal Science. (2):370 – 379.*