EFFECT OF SCENT LEAF (*Ocimum gratissimum*) ADMINISTRATION ON GROWTH PERFORMANCE AND CARCASS TRAITS OF BROILER CHICKS

Ntc, Iyakutyc Jacob, Oleforuh-Okoleh, Vivian U. and Nwiidae, Blessing S.
Department of Animal Science, Rivers State University of Science and Technology, Nkpolu-Oroworukwo, P.M.B. 5080, Port Harcourt, Nigeria.
Corresponding author: iyaeddie.nte4@gmail.com; 08033407033, 07019135275

Abstract
This study aimed at investigating the effect of scent leaf (Ocimum gratissimum) administration on growth performance and carcass traits of broiler chicks. Ninety (90) seven days old broiler chicks used for the study were assigned in a completely randomized design (CRD) to three treatment groups identified as T1, T2 and T3 (0ml, 50ml, and 100ml aqueous extract of scent leaf(SL)/L of drinking water, respectively). The treatment was administered for 21 consecutive days. Data were obtained on body weight and feed intake. Different carcass traits were evaluated by sacrificing three birds per treatment. The final body weight, weekly body weight gain and feed conversion ratio were significantly (P<0.05) influenced by SL administration. Chicks on T3 were 96.69g heavier than those in the control group and had a better feed conversion ratio (1.67) compared to the control (1.92). Carcass weight and live weight increased significantly (p<0.05) in response to treatment with SL. Abdominal fat significantly (P<0.05) decreased with increase in SL in the drinking water. It could be concluded that, aqueous extracts of scent leaf at 100ml/L of drinking water could be used to improve growth performance and carcass traits of starter broiler chicks.

Key Words: body weight, broiler chicks, carcass weight, feed conversion ratio, scent leaf

Introduction

Antibiotics have been used widely not only to prevent and treat poultry diseases, but also for the improvement of meat and egg production (Ogle, 2013). However, many countries tend to minimize or prohibit the use of antibiotics because of their deleterious side effects on both animals and human beings. Alternatives to antibiotic growth promoters are, thus, necessary to ensure that animal protein production keeps pace with the expanding world population. Consequently, several non-therapeutic growth promoters such as enzymes, inorganic acids, probiotics, prebiotics and biogenic additives have been advocated as alternatives (Dinner, 2004, Dijk, 2004, Adams, 2005).

Biogenic additives (herbs, spices, plant extracts and essential oils) have been used for centuries to preserve food for man and to make it more appetizing, and are well recognized for their health benefits in many countries around the world. Recently, medicinal plants have been developed and proposed for use in feed as natural antimicrobials (Del Campo *et. al.*, 2000; Hseish *et. al.*, 2001). Compared with synthetic antibiotics or inorganic chemicals, these plant-derived products have proven to be natural, less toxic, residue free and are thought to be ideal feed additives in food animal production (Hashemi *et al.*, 2008). Some herbal leaves which have been used in poultry/broiler nutrition include bitter leaf (Owen and Amakiri: 2011; Oleforuh-Okoleh *et al.*, 2015). *Moringa oleifera* (Yang *et al.*, 2007), Rosemary leaves (Ghazalah and Ali, 2008) and *Leuceana leucocephala* (Hussain, *et al.*, 1991). Another important herbal leaf whose benefits can be harnessed in poultry nutrition is scent leaf (*Ocimum gratissimum*).

Scent leaf (*O. gratissimum*), the African variety of basil (*Ocimum sp*), is widely grown as a perennial herb in tropical Africa, South East Asia, India and Hawaii. It is highly recognized worldwide due to its versatile nutritional, anesthetic, and medicinal uses (Gill, 1992). Ijeh *et al.* (2004) noted that scent leaf is rich in alkaloids, tannins, phytates, flavonoids, oligosaccharides, terpenoids, thymol and saponin, with tolerable cyanogenic content. The proximate composition shows a crude protein of 4.7%, 10.8% crude fibre, and ash content of 12.24% (Mensah and Okoli (2008)). The essential oil (eugenol) present in scent leaf possesses antimicrobial activities against pathogenic strains of gram negative and gram positive bacteria and pathogenic fungus (Matasyoh, 2007). There are some documented studies on scent leaf on laboratory animals (Arhoghro *et al.*, 2009, and Offiah and Chikwendu, 1999). But there seem to be dearth of documented/published information on the relevance of scent leaf in broiler chickens. This study was, therefore, conducted to investigate the effects of scent leaf (*Ocimum gratissimum*) administration on the growth performance and carcass traits of broiler chicks.

Materials and Methods

This study was carried out in the Poultry Unit of the Teaching and Research Farm, Rivers State University of Science and Technology, Port

Harcourt, Nigeria. Ninety (90) seven days old Niger broiler chicks with an average body weight of 138.50, brooded and raised in deep litter pens, were used for this study which lasted for 21 days. The chicks were allotted in a completely randomized design (CRD) to three treatment groups designated T1, T2, and T3 (0ml, 50ml, and 100ml of aqueous extract of scent leaf (SL) per Litre of drinking water, respectively). Each treatment group had three replicates with 10 chicks per replicate. Fresh scent leaves were purchased from the University Farm, dried under room temperature and then ground into a meal. 50g of the ground scent leaf meal was infused in 1L of boiled hot water overnight (12 hours). This was filtered in the morning and the measured quantity of filtrate according to the experimental treatment added to 1L of clean drinking water and served to the birds. The extract was prepared daily.

Standard routine management practices were carried out. Feed and water were given *ad libitum* throughout the experimental period, using commercial broiler starter diet purchased from the University feed mill and clean drinking water. Weighed quantity of feed was given to the birds daily and the body weight measured on weekly basis. Data collected on these parameters were used to obtain the weekly feed intake and the weekly body weight gain. On the last day of the study, three chicks per treatment were randomly selected, after a 12 hours fasting period, for carcass traits evaluation. The live weight, de-feathered weight, carcass/dressed weight, drumstick and thigh, wings, breast, back, and abdominal fat weights were recorded. Data obtained were statistically analyzed using a one-way analysis of variance (CRD) and the significant means at ($P<0.05$) separated using Duncan New Multiple Range Test (SPSS 2011).

Results and Discussion

Mean values of growth performance traits of chicks administered SL are presented in Table 1. Final body weight and weekly body weight gain values were significantly ($P<0.05$) different among treatment groups (at T3 but not T2), such that chicks on T3 were 96.69g heavier than those in the control group. This corroborates the findings of other researchers on the efficacy of herbs in promoting body weight gain in broiler chicks, (Durunna, 2011, Makonjuola *et al.*, 2014, Hashemipour *et. al.*, 2013). The feed intake of chicks in the three treatments groups were similar ($P>0.05$). However, increased dose of SL (100ml/L of drinking water) improved the FCR (the lower the FCR the higher it is for the chicks to convert feed consumed to meat). This confirms the report of Olobatoke and Oloniruha (2009) that inclusion of bitter leaf powder in cockerels feed significantly improved FCR. The higher efficiency in feed utilization observed in T3 could be attributed to the ability of the scent leaf to exhibit one of the primary mode of action of phytogenic feed additives of beneficially affecting the ecosystem of gastro intestinal microbiota through controlling potential pathogens as well as enhancing gastro-intestinal enzymes activity, resulting in increased intestinal availability of essential nutrients for absorption (Huffman *et. al.*, 1996 and Adaramonye *et. al.*, 2008).

Results obtained for carcass traits are presented in Table 2. The mean live weight, de-feathered weight and carcass weight were significantly ($P<0.05$) higher in T3 than T1 and T2, whereas the abdominal fat was greatly ($P<0.05$) reduced in T3. These results affirms the observations of Levic *et al.* (2007) which indicated a significant increase in edible parts and less abdominal fat of broiler chickens treated with botanicals. Isika *et al.* (2012) reported a reduction of up 70% in abdominal fat of broiler chicks fed botanicals compared to the control.

Table 1: Effects of graded doses of scent leaf extracts on performance parameters of broiler chicks

Traits	T1(0ml/L)	T2(50ml/L)	T3(100ml/L)	SEM	p-value
IBW(g)	137.01	142.03	137.34	4.87	0.548
FBW(g)	788.70^{b}	804.89^{b}	875.39^{a}	32.46	0.034
WWG(g)	217.23^{b}	220.95^{b}	252.68^{a}	9.83	0.021
TFI(g)	1250.20	1274.50	1260.25	23.30	0.604
WFI(g)	416.73	424.83	420.08	7.77	0.604
FCR	1.92^{a}	1.92^{a}	1.67^{b}	0.05	0.004

^{ab}Means on the same row followed by different superscripts are significantly different ($P<0.05$).
IBW = Initial body weight; FBW = Final body weight; WWG = Weekly weight gain; TFI = Total Feed intake; WFI = Weekly Feed intake; FCR = Feed Conversion Ratio; SEM = Standard error of the mean.

Table 2: Effects of graded doses of scent leaf extracts on carcass traits of broiler chicks.

Traits	T1(0ml/L)	T2(50ml/L)	T3(100ml/L)	SEM	p-value
Live weight(g)	835.67[b]	795.00[b]	908.33[a]	31.54	0.037
De-feathered weight(g)	773.88[b]	743 30[b]	832.75[a]	25.14	0.031
Carcass weight(g)	506.89[b]	493.91[b]	580.10[a]	15.84	0.003
Dressing %	60.67	62.16	64.37	2.58	0.408
Drumstick and thigh*	33.01	33.29	29.99	2.03	0.273
Breast*	29.07	26.23	28.53	1.82	0.321
Wing*	15.34	16.47	15.85	1.50	0.759
Abdominal fat*	2.80[a]	2.25[b]	1.32[c]	0.59	0.384

[ab] means on the same row with different superscripts are statistically different $p<0.05$
*Weights expressed as relative % of carcass weight.

Conclusion

Aqueous extract of scent leaf at 100ml/L of drinking water (T3) seemed to improve efficiency of feed utilization which translated in improved body weight gain, live weight, carcass weight and reduced abdominal fat. Hence, scent leaf might be an effective natural growth promoter. However, there is need for more studies on the effect of its administration (either via feed or water) on various physiological parameters to ascertain its safety as a feed additive for broiler chicks.

References

Adam, C. 2005. Nutrition-based health. *Feed International*, 2:25-28

Adaramoye, O.A., O. Akintayo, J. Achem and M.A. Fafunso, 2008. Lipid-lowering effects of methanolic extract of *Vernonia amygdalina* leaves in rats fed on high cholesterol diet. *Vasc. Health Risk Manage.*, 4: 235-241.

Arhoghro, E. M., Ekpo, K. E. E. and Ibe, G. O. 2009. Effects of aqueous extracts of scent leaf (*Ocimum gratissimum*) on Carbon tetrachloride induced liver damage in albino wister rats. *African Journal of Pharmacology*, 3(11):562-567

Beuchat. L. R. and Golden, D. A. 1989. Antimicrobials occurring naturally in foods. *Food Tech.* 43:134-142

Del Campo, J., Amiot, M. J. and Nguyen-The, C. 2000. Antimicrobial effect of rosemary extracts. *Journal of Food Protection*, 63:1359-1368.

Dibner, J. 2004. Organic Acids: Can they replace antibiotic growth promoters? *Feed International*, 12:14-17

Dijk, A. V. T. 2004. Testing acidifiers and other AGP alternatives. *Feed International*, 5:10-12

Durunna, C.S., I.I. Chiaka, O.E. Ebenebe, A.B. Udedibie, M.C. Uchegbu and O.N. Durunna, 2011. Value of bitter leaf (*Vernonia amygdalina*) meal as feed ingredient in the diet of broiler finisher. *Int. J. Agric. Rural Dev.*, 14: 722-726.

Ghazalah A.A., and Ali, A.M. 2008. Rosemary leaves as dietary supplement for growth in broilers. *International Journal of Poultry Science*, 7(3): 234-239.

Gill, L.S. 1992. Ethnomedical uses of plants in Nigeria. Benin City: Uniben Press; Pp176-177.

Hashemi, S.R., Zulkifl:, Hair-bejo, M., Karami, M., and Soleimani, A.F., 2009. The effects of *Euphorbia hirta* and acidifier supplementation on growth performance and anti oxidant activity in broiler chickens Proceedings of the 21st Vet Association Malaysia (VAM) Congress, Aug.7-9. Port Dickson, Malaysia, Pp:215-217.

Hashemipour, H., Kermanshahi, H., Golian, A. and Veldkamp, T. 2013. Effect of thymol and carvacrol feed supplementation on performance, antioxidant enzyme activities, fatty acid composition, digestive enzyme activities, and immune response in broiler chickens. *Poultry Science*, 92:2059-2069

Hsiesh, P. C., Mau, J. C. and S. H. 2001. *Antimicrobial effects of various combinations of plant extracts. Food Micobiol. 18: 35-43*

Huffman, M.A., K. Koshimizu and H. Ohigashi, 1996. Ethnobotany and Zoopharmcognosy of

Hussian, J., Satyanarayana-Raddy, P.V.V. and Reddy, V.R. 1991. Utilization of Leucanea leaf meal by broilers. *Br. Poult. Sci.*, 32:131-137.

Ijeh, I. I., Njoku, O. U. and Ekenza, E. C. 2004.

Medicinal Value of *Xylopia aethiopica* and *Ocimum gratissimum. Journal of Medicinal Aromatics Science 26:44-47*

Isika, M.A., F.U. Igene and C.A. Eneji, 2012. Influence of bitter leaf and ginger supplementation on growth and haematological indices of broiler chickens. Resilience of Agricultural Systems Against Crises, September, 2012, Gottingen-Kassel/ Witzenhausen.

Levic, J., Sredanovic, S., Duragic, O., Levic, Lj and Pakov, V. 2007. New feed additives based on phytogenics and acidifiers in animal nutrition. *Biotech. in Anim. Husbandary* 23(5-6): 527-534

Makanjuola, B. A., Obi, O. O., Olorungbohunmi, T. O., Morakinyo,O. A., Oladele- Bukola , M. O. and Boladuro, B. A. 2014. Effect of *Moringa oleifera* leaf meal as a substitute for antibiotics on the performance and blood parameters of broiler chickens. *Livestock Research for Rural Development. Volume 26, Article #144.* Retrieved January 29, 2016, from http://www.lrrd.org/lrrd26/8/maka26144.htm

Matasyoh, L.G., Matasyoh, J. C., Wachrra, F. N., Kinyua, M. G. Thairu,. Muigai, A. W. and Mukaima, T. K. 2007. Chemical composition and antimicrobial activities ofthe ssential oil of *Ocimum gratissimum* L. growing in Eastern Kenya. *African Journal of Biotechnology* 6(6):760-765.

Mensah, J.K., Okoli, R.I., Ohaju-Obodo J.O. and Eifedi, K. 2008. Phytochemical, nutritional and medical properties of some leafy vegetables consumed by Edo people of Nigeria. *African Journal of Biotechnology*, 7:2304-2309.

Offiah, N. V. and Chikwendu, A. U. 1999. Anti-diarrhoea effects of *Ocimum gratissimum* leaf extract in experimental animals. *Journal of Ethnopharmacology,* 68 (1-5):327-330.

Ogle, M. 2013. Riots, Range Resistance: A brief history of how antibiotics arrived in the farm. Scientific American. https://en.wikipedia.org/wiki/Antibiotic_use_in_livestock Retrieved April 5, 2015.

Oleforuh-Okoleh, V. U., Olorunleke, S. O. and Nte, I. J. 2015. Comparative Response of Bitter Leaf (*Vernonia amygdalina*) Infusion Administration on Performance, Haematology and Serum Biochemistry of Broiler Chicks. *Asian Journ. of Anim. Sci, 9: 217- 224.*

Olobatoke, R.Y. and J.A. Oloniruha, 2009. Haematological assessment of bitter leaf (*Vernonia amygdalina*) efficiency in reducing infections in cockerels. Proceedings of the World Congress on Medicinal and Aromatic Plants, November 9-14, 2008, Cape Town, South Africa, pp: 472-473.

Owen, A.J., Amakiri, A.O. 2012. Serological and hematological profile of broiler finishers fed graded level of bitter leaf *(Vernonia amygalina)* meal. *Adv. Agric. Biotechnol.*, 1:77 -81.

Shelf, L. A. 1983. Antimicrobial effects of spices. J. of Food Safety, 6: 29-44

Vernonia amygdalina, a Medicinal Plant used by Humans and Chimpanzees in the Wild. In: Compositae: Biology and Utilization, Hind, D.J.N., P. Caligari and S.A.L. Smith (Eds.). Royal Botanic Gardens, Kew, ISBN-13: 9781900347006, pp: 351-360.

Yang, R.Y., Chang, L.C., Hsu, J.C., Weng, B.B.C., Palada, M.C., Chadha, M.L. and Lavasseur, V. 2007. Nutritional and functional properties of *Moringa oleifera* leaves from Germ plasm to plant, to health in Moringa Leaves: Strategies, standards and market for better impacts on nutrition in Africa. AVRDC – The World Vegetable Centre. http://203-6.245.61/fulltext_pdf/doc/2005-2007/do15749_pdf.