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Research Paper

Evaluation of Aqueous Extract of Neem (Azadirachta Indica) and Pawpaw (Carica Papaya) Leaf on Growth, Performance and Feed Conversion Ration of Broiler Chicken

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Abstract
This study was conducted to evaluation of aqueous extract of neem (Azadirachta indica) and pawpaw (Carica papaya) leaf on growth, performance and feed conversion ratio of broilers chicken. Sixty broiler chickens were used for the study and were intensively managed. The chicks were randomly assigned into five treatment groups replicated into two each administering 0ml extract, 30ml pawpaw leaf extract (PLE), 40ml PLE, 20ml neem leaf extract (NLE) and 40ml NLE and as defined as T_0, T_1, T_2, T_3 and T_4. Growth parameters (weekly weight gain, weekly feed intake and feed conversion ratio) were measured. Data were subjected to one way analysis of variance in a completely randomized design and significant differences were separated by Duncan Multiple Range Test at 95% probability. Results showed no significant differences ($P > 0.05$) in the weekly weight gains while significant differences ($P < 0.05$) were seen between the birds for FCR and feed intake at all ages except in their first experimental week (3^{rd} week of age). The birds on 20ml NLE had the highest weekly body weight gain (2.40) while the least body weights were seen on birds placed on 40ml NLE (2.09). FCR had no significance ($P > 0.05$) in week 1 for all treatments but there were significant differences ($P < 0.05$) for all other treatment at different ages. FCR favored birds placed on 40ml PLE with best dressed weight gains at the end. It was concluded that the use of aqueous extracts of PLE and NLE can be adopted as a replacement to growth promoters and antibiotics in broiler chicken production without any adverse effects, good feed assimilation rate and good feed conversion ability to meat at the end of production.

Keywords: *Neem leaf extract, Pawpaw leaf extract, growth, performance, feed conversion ratio, broiler chicken.*
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I. INTRODUCTION

Broiler production is the process of raising heavy meat breed chickens for the foal of producing high quality meat (Ufele, 2020).

Poultry and other animal product are excellent sources of high protein. As a result, the worldwide poultry sector has been steadily expanding for years, and it currently contributes significantly to filling the gap created by global protein deficiency by boosting meat and egg output annually (Aouaccheri, *et al.*, 2009).

One of the most intensive forms of animal husbandry is the production of meat and egg from chickens (FAO, 2020). It is a global industry that has met its principal goal of supplying a low-east source of animal protein (Augere-Granier, 2019). This success could be attributed to a variety of factors, including high – quality feed and illness control, which is aided in part by antibiotic use. The use of growth promoters has been adopted for several decades in animal production to enhance the animal's growth performance, increase their prime cuts yield and disease intramuscular fat deposition (Valenzuela *et al.*, 2017). However, as time went by poultry production became very expensive caused by the ever-increasing cost of feed ingredients, especially protein sources has resulted in declined in the productivity and profitability in intensive poultry production system. This condition has caused the prices of poultry product such as (egg and meat) to rise far beyond the purchasing ability of an average Nigerian (Onyimonyi, *et al.*, 2009) and due to the human and animals' health risks associated with the use of synthetic food additives as growth promotes in meat production, synthetic or antibiotic growth promoters are now being rejected in many countries. (Gonazalez and Angeles, 2017).

It becomes very important to exploit feed ingredients of lower cost and sound biological values that can help supplement the high costly conventional protein sources and reduce risk of animal and human health challenges.

Herbal plants such as garlic (Allium sativum), ginger (Zingiber officinale), Moringa oleifera, turmeric, fennel, fenugreek, nettle, Piper guineense (uziza leaf), Xylopia aethiopica (uda seed) (Sethy *et al.,* 2017, Yesuf *et al.,* 2017 and Gharehsheikhlou *et al.,* 2018) have phytochemicals have antimicrobial, antistress, antioxidants and immune-modulatory properties which made them potential growth promoters in animal production (Valenzuela *et al.,* 2017). The use of phytogenic feed supplement is now being considered in broiler production for enhancing their performance and health status.

Several herbal plants are used as growth promoters, antibacterial, antiparasitic, anti-cocciodial, anti-fungal, anti-tumor, and immune – boosters in chicken diets (Subapriya and Nagini, 2005). Antioxidizing properties of uda seed (Xylopia aethiopia) can be used for preventing and destroying cancerous tumors (Puvanendra, *et al.,* 2008).

The use of natural additives in poultry nutrition has gained attention due to their potential benefits in improving growth performance and health. Neem (Azadirachta indica) and pawpaw (Carica papaya) are two plants known for their medicinal properties including antimicrobial and growth-promoting effects. Pawpaw seeds and leaves were reported to have neutraceutical and antioxidant properties (Kadiri, *et al.,* 2016) as well as high dose of vitamin A, B and C, Papin and chymopapin while Neem is a antimicrobial plant that takes care of both Gram positive and Gram negative bacteria and also boost the immune system (Subapriya and Nagini, 2005).

The beneficial influence of neem leaf on growth performance (Nodu, *et al.,* 2016), carcass characteristics (Landy, *et al.,* 2011), hematological parameter (Nayaka *et al.,* 2013) and immune responses (Sharm, *et al.,* 2016) were also reported in broiler chickens.

The study therefore was designed to evaluation carcass measurement and cost effectiveness of broiler birds fed aqueous extracts of neem (Azadirachta indica) and Pawpaw (Carica papaya) in Owerri, Nigeria.

II. MATERIALS AND METHODS

Location and duration of the study:

The experiment was carried out at the poultry unit of Agricultural Research farm, Department of Agricultural Science Education, Alvan Ikoku Federal University of Education, Owerri, Imo State (AIFCE). It is located within the latitude $N5^{0}29^{1}$ and longitude $E1^{0}23^{1}$ with altitude of 200m above sea level. The weather condition of the experimental site is characterized by a mean rainfall of about 1850mm with high relative humidity of over 75% with ambient temperature of above 27^{0c} on a vegetation of humid rainforest (Ogbomida and Emeribe, 2013). The study lasted for 8weeks.

Experimental Procedures and Management

Sixty none selected Anak day old broiler strain of mixed sexes were used for the study. The birds were brooded for two weeks before being weighed prior to assignment to five treatments groups with 12 birds per treatment (T_0 -T_4) in a completely randomized design (CRD). Each treatment was replicated into two comprising of six birds each.

Bulvita (Multivitamin) and Albion doxycycline was given to all birds in water according to manufacturer's recommendation throughout the brooding period (two weeks) after which they were allocated to their different experimental groups from the third week (ie on the 13^{th} day). Only the control treatment was placed on antibiotics and Bulvita throughout the trial period while the rest treatments was placed on their different experimental extract at their own levels. All birds were fed ad-libitum all through the trial period using non-conventional diet with a calculated crude protein (CP) level of about 25% CP and calculated Metabolizable energy (ME) level of 2900kcal/kg at pre-started phase (day old to 8days), 24% CP level and calculated Metabolizable energy (ME) level of 2950kcal/kg at starter phase (9 – 27days) and 20% CP and calculated Metabolizable energy (ME) level of 3100kcal/kg at finisher phase (4 – 8weeks) from day old to 8weeks.

Table 1: Percentage composition of experimental diets

Feed ingredients	**Pre-starter diet**	**Starter diet**	**Finisher diet**
Yellow Maize	47	47	51
Full fat soyabean	30	20	16
Less fat soyabean	12.5	9	11
Groundnut cake	-	18	11.5
Fish meal	2	-	-
BWL concentrate	5	-	-
Limestone	1.5	2.5	6
Bone meal	1.5	3	4
Salt	0.5	0.5	0.5
TOTAL	100	100	100
Calculated CP (%)	25.73 (99%)	22.72 (99%)	19.75 (99%)
Calculated ME (Kcal/kg)	2900	2950	3100

Collection and preparation of Test ingredients (extracts)

Fresh leaves of Neem and Pawpaw leaves were sourced locally from within the AIFCE environs, washed thoroughly to remove contaminants, drained and mashed locally using mortar and pistil to extract the aqueous extracts (fresh juice) of both leaves. During the trial period (2weeks to 8weeks), all test ingredients were added in water for only four days and rest days was plain water which was done weekly. For both the test birds and control, four days medication and three days plain water was practised throughout the trial period. However, the aqueous extract of Pawpaw leaf Extract (PLE) and neem leaf extract (NLE) were administered at different levels namely:

T_0 zero PLE OR NLE (control) multivitamin and antibiotics
T_I 30ml PLE
T_2 40ml PLE
T_3 20ml NLE
T_4 40ml NLE

Parameters Measured:

Weekly body weight gain (2 – 8 weeks):

Weekly body weight gains were collected using sensitive weighing balance of range 1 – 500grams (g) on the day of administration of test ingredient (2weeks of age). Subsequently, weekly weighing was done using Salters weighing balance (range 100g – 20kilogram) which was used till end of trial for the birds. For the weekly weighing, all birds from each replicated were weighed to reduce error or bias in the experiment.

Weekly feed intake:

From two weeks of life to eight weeks of the trial, a stipulated quantity feeds were measured out and leftovers for the weeks were weighed to monitor feed intake for each treatment.

Mortality rate:

This comprises of the percentage mortality throughout the trial period as antibiotics were not given to the experimental bird.

Experimental design used

The data obtained from the experiment were subjected to one way analysis of variance (ANOVA) in a Completely Randomized Design (CRD) according to Steel and Torrie (1980). Significant differences were separated using Duncan Multiple New Range Test (1955) at 5% significance level.

Experimental design model is:

$X_{ij} = \mu + T_1 + \square_{ij}$

Where X_{ij} means any observation made in the experiment
μ means population mean
T_1 means treatment effect
$\square_{ij}$ means experimental error in experiment
i means number treatments
j means number of replicates

III. RESULT AND DISCUSSION

The result of the effect of PLE and NLE on the weekly feed intake and weekly body weight gains of broilers are presented below in tables 2 and 3.

Table 2: Descriptive Analysis of weekly body weight measurement of different treatments.

	T_0	T_1	T_2	T_3	T_4
Week 1	0.48 ± 0.01^{NS}	0.48 ± 0.02^{NS}	0.50 ± 0.02^{NS}	0.48 ± 0.02^{NS}	0.52 ± 0.01^{NS}
Week 2	1.10 ± 0.08^{NS}	1.02 ± 0.03^{NS}	1.05 ± 0.02^{NS}	0.99 ± 0.01^{NS}	1.02 ± 0.02^{NS}
Week 3	1.45 ± 0.07^{NS}	1.36 ± 0.05^{NS}	1.42 ± 0.06^{NS}	1.50 ± 0.06^{NS}	1.45 ± 0.05^{NS}
Week 4	1.78 ± 0.09^{NS}	1.76 ± 0.06^{NS}	1.67 ± 0.09^{NS}	1.90 ± 0.06^{NS}	1.68 ± 0.07^{NS}
Week 5	1.91 ± 0.10^{NS}	1.99 ± 0.09^{NS}	1.83 ± 0.09^{NS}	1.99 ± 0.06^{NS}	1.84 ± 0.06^{NS}
Week 6	2.32 ± 0.12^{NS}	2.32 ± 0.09^{NS}	2.11 ± 0.11^{NS}	2.40 ± 0.08^{NS}	2.09 ± 0.13^{NS}

From the study, the birds at different treatments showed no significant differences ($P > 0.05$) even though there were numerical differences when being compared that means the numerical differences was a thing of chance thereby strongly supporting the practice of organic farming and non-conventional feeding practicing as a sequel to save huge cost of production, maximize profit, minimize cost of production and finally optimization of output in an agricultural investment. The numerical differences in weekly body weight measurements were a thing of chance which implies that whether birds were fed with conventional or non-

conventional feeds or with drugs or plant extracts, they will equally give synonymous results in terms of body weight gains on the ground they are of same genetic makeup (strain) and of same environmental exposure.

From the study, the different ranges observed in weekly body weight measurements from 14th to 28th day were far higher than the ranges gotten by Toru, *et al.,* (2020) and Egbeyale, *et al.,* 2018 within the same ages except for Ahaotu, *et al.,* (2018) that recorded a higher body weight measurement (2612.5 -2972.5) at same age (35 days of age).

Generally, the experiment favoured birds in T_4 (20% NLE) most which recorded highest body weight (2.40kg) gains when compared to birds in other treatments than the control which may be to the antimicrobial properties of neem which may have added in reducing the harmful microorganisms in the intestines of the birds thereby increasing absorption of digested feeds. Similar suggestions have been made by Esonu, *et al.,* (2006)

The result of the study is in agreement with the study carried out by Nusrat, (2022) who reported that the use of neem and extract as growth promoter improved the weight gain of broilers. Allinson, *et al.,* (2013) reported that herbal extract enhances the performance in poultry, increasing the feed intake and weight gain ratio by significantly decreasing the bacterial and ocytes count. It also agreed with the work of Mostofo, *et al.,* (2015) that the effect of neem and papaya leaf extract to the growth performance of broilers was of positive end. Similar findings were observed by Mahejabin, (2015) who reported that the supplementation of neem and papaya extract in the feed efficiency had a good effect on body weight gains in broilers. Similarly, Onyimonyi and Onu (2009) observed that 2.0% inclusion of Papaya leaf meal in the diet of broilers improve their body weight. These findings were in corroboration with Shihab *et al.,* (2017) who observed that broilers fed neem powder (1.0-3.0g1kg) can show significant improvement in the body weight gain.

Table 3: Weekly feed intake per treatment (kg/week/replicate)

	Week 1	Week 2	Week 3	Week 4
Control	3.39 ± 0.01^{NS}	3.39 ± 0.19^{a}	4.50 ± 0.10^{ab}	7.43 ± 0.23^{a}
Treatment 1	3.15 ± 0.05^{NS}	3.51 ± 0.09^{a}	4.99 ± 0.02^{b}	6.83 ± 1.10^{a}
Treatment 2	3.30 ± 0.10^{NS}	3.52 ± 0.12^{a}	4.30 ± 0.30^{a}	8.17 ± 0.23^{a}
Treatment 3	3.36 ± 0.16^{NS}	3.93 ± 0.29^{a}	4.61 ± 0.19^{ab}	5.76 ± 1.56^{a}
Treatment 4	3.77 ± 0.23^{NS}	3.75 ± 0.15^{a}	4.00 ± 0.00^{a}	7.39 ± 0.01^{a}

^{abc} means on the same row with different superscript are significantly different ($P<0.05$)

The table above shows that there were no significant differences ($P>0.05$) between birds for all treatments for week 1 every numerical difference was as a result of chance. From week 2 – 4, there were significant differences between them which will likely be as a result of the different experimental plant extracts used for the experiment. The result of the study is synonymous with the study carried out by Ahaotu *et al.,* (2018) who reported that performance implication of feeding different levels of pawpaw leaf meal on finisher broiler birds for control diet (395.93kg/treatment) and also within the recorded range for the study done by Egbeyale, *et al.,* (2018) who recorded between 372.96 – 386.89kg/ treatment for the starter phase and between 796.32 – 870.73kg/ treatment for the finisher phase.

Table 4: Feed conversion ratio (FCR)

	Week 1	Week 2	Week 3	Week 4
Control	7.05 ± 0.41^{NS}	3.27 ± 0.22^{a}	3.11 ± 0.02^{a}	4.17 ± 0.17^{ab}
Treatment 1	6.61 ± 0.24^{NS}	3.44 ± 0.12^{a}	3.64 ± 0.12^{b}	3.86 ± 0.50^{a}
Treatment 2	6.60 ± 0.45^{NS}	2.92 ± 0.51^{a}	2.99 ± 0.09^{a}	4.91 ± 0.18^{b}
Treatment 3	6.97 ± 0.40^{NS}	3.81 ± 0.17^{a}	3.05 ± 0.22^{a}	3.96 ± 0.01^{a}
Treatment 4	7.35 ± 0.58^{NS}	3.27 ± 0.32^{a}	2.78 ± 0.13^{a}	4.41 ± 0.07^{ab}

^{abc} means on the same row with different superscript are significantly different ($P<0.05$)

The table above shows that shows that there were no significant differences statistically ($P\geq0.05$) in week 1 for all treatments that the numerical differences were a thing of chance while there were statistical differences ($P\leq0.05$) for all ages. The FCR was very poor in week 1 for all treatments, and better for other ages in other treatments but favored mostly birds placed on 40mls PLE. Even though, there were significant differences statistically ($P\leq0.05$).

IV. CONCLUSION

This study revealed that the inclusion of neem and paw-paw leaf meal will enhance the growth performance of broilers birds. It was evident that aqueous inclusion of 20ml neem leaf extract gave good live weight at the end of the experiment followed by inclusion at control and 30ml paw-paw leaf extract (aqueous). These plants are easily available around our environment, less competed for by man, readily available and not costly.

REFERENCE

[1]. Ahaotu, E. O., Kwushue, V. and Ahaotu, E. O. (2018). Performance implication of feeding different levels of Paw paw (Carica papaya) leaf meal on finisher broiler birds. Journal of Poultry Science and Technology, www.jakraya.com/journal/jpst, volume 06, issue 01, Pp 1-4.

[2]. Allinson, I. B., Ekunseitan, D. A., Ayoola, A. A., Ogunade, M. and Njoku, C. P. (2013). Effect of herbal supplement on growth response and faecal egg count in cockerels. Journal of Animal Feed Research 3 (2013): 68 – 73, ISSN 2228 – 7701.

[3]. Aouacheri S., Saka R., Djafer G., Lefranc, (2009). Protective effect of diclofenac towards the oxidative stress induced by paracetamol toxicity in rats. Annals de Biology Clinique 67(6), 619-27.

[4]. Augère-Granier M. (2019). The EU poultry meat and egg sector; Main features, challenges and prospects, in depth analysis. Available at: https://www.europarl.europa.eu/RegData/e tudes/IDAN/2019/644195/EPRS_IDA (201 9)644195_EN.pdf. Accessed on 14th March, 2020.

[5]. Egbeyale, L. T., Ijaduola, O. A., Sogunle, O. M., Sonibare, A. O., Ayo-Ajasa, O. Y., Adeleye, O. O. and Adewole, F. A. (2018). Air-dried neem leaf extract: effect on the growth performance and blood profile of broiler chicken. Nigerian Journal of Animal Production, Nig. J. Anim. Prod. 2018, 45 (5):59 – 66.

[6]. Esonu, B. O., Emenalom, O. O., Udedibie, A. B. I., Anyanwu, G. A. Madu, U. and Inyang, A. O. (2006) "Physiological responses on laying birds to Neem (Azadirachta India) leaf meal-based diets, body weight, organ characteristics and hematology". The online Journal of Health and Allied Sciences 4-4.

[7]. Gharehsheikhlou H.R., Chamani M., Seidavi A.R., Sadeghi A.A., Mohiti-Asli M. (2018). Effect of fennel and savory essential oils on performance, carcass characteristics and blood parameters of broilers. Journal of Livestock Science 9: 23-31.

[8]. Kadiri, O., Olawoye. B. and Vernonia A (2016). An underutilized vegetable with nutraceutical potentials – A review. Turkish Journal of Agriculture – Food Science and Technology. 2016;4(9):763- 768.

[9]. Landy, N., Ghalamkari, G. H. and Toghyani,M. (2011). Performance, carcass characteristic and immunity in broiler chickens fed dietary neem (Azadirachta indica) as an alternative for antibiotics growth promoter. Livest. Sci. 2011; 142 (1-3): 305 – 309.

[10]. Mahejabin, N. (2015). "Effect of neem, turmeric and Papaya leaf extract on growth performance of broilers". International Journal of National and Social Sciences 2.2:17-21.

[11]. Mosotofa, K., Farjana, B., Zinat, S., Luttuzzaman, A. K. M., Abdullah-Al, M., Khondoker, J. A. and Mahbub, M. (2015). Effect of Neem, Mishyinda and Papaya leaves as growth promoters in broiler chicks. International Journal of Natural and Social Sciences 2 (2015): 49 – 55, ISSN 2313 – 4461.

[12]. Mostofa, K. (2015). "Effect of herbal supplement on growth response and the egg account of cockerels". Journal of animal feed Research 3:68-73.

[13]. Nayaka, H. B. S., Umakantha, B., Ruban, S. W., Murthy, H. N. N. and Narayanaswamy, H. D. (2013). Performance and heamatological parameters of broilers fed neem, turmeric, vitamin E and their combinations. Emir. J. Food Agric. 2013:25 (6): 483 – 488.

[14]. Nodu, M. B., Okpeku, M., Akpoveta, Z. A. and Iroegbu, D. O. (2016). Evaluation of Azadirachta indica leaves extracts on heamatology and biochemical profiles, organs weight and growth parameters of broiler chicken. J. New Sci. 2016; 32 (5): 1879 – 1884.

[15]. Nusrat, M., Mahbub, M.,Fatema, A., Shobhan, D. and Morshedul, A. (2015). Effect of Neem, Papaya and Tumeric on growth performance of broiler (Thesis Bangladash Agricultural University Mymensigh): 45. International Journal of Natural and Social Sciences 2 (2015): 17 -21, ISSN 2313 – 4461.

[16]. Ogbomida, E. and Emeribe, C. (2013). Advance in Environmental research 2-2234-1772.10.12989

[17]. Oloruntola, O. D., Agbede, J. O., Ayodele, S. O., Ayedun, E. S., Daramola, O. T. and Oloruntola, D. A. (2018). Glricida leaf meal and multi- enzyme in rabbit diet effect on performance, blood, indices, serum metabolites and oxidant. J Anim Sci. Techn 10:24.

[18]. Onyimonyi, A. E., Adeyemi, O. and Okeke, G. E. (2009). Performance and economic characteristics of broilers fed varying dietary levels of neem leaf meal (Azadirachta indica). International Journal of Poultry Sci., 8 (3): 256 – 259.

[19]. Puvanendran, S., Wickramasingner, A., Karumaratnr, D. N., Carr. G., Wijesundara D. S. A., Adersen, R. and Karunaratne, V. (2008) Antioxident Constituents from Xylopia champ; on pharmaceutical biology, 46(5), pp 352-354.

[20]. Sethy K., Swain P., Behera K., Sahoo N., Agrawalla J., Khadanga S., Mahapatra M.R., Parhi S.S. (2017). Effect of turmeric (Curcuma longa) supplementation on antioxidants and immunity of broiler birds. Journal of Livestock Science 8: 103-106.

[21]. Sharma, V., Jahkar, K. K. and Dahiya, S. (2016). Immuno-pathological studies on broiler chicken experimentally infected with Escherichia coli and supplemented with neem (Azadirachta indica) leaf extract. Vet. World 2016; 9 (7): 735 – 741.

[22]. Shihab, I. M., Mushtag, T. B., Al-Zuhariy, S. M. A., and Shamaael, S. M. (2017). Impact of Supplementation Neem Powder (Azadirchta indica) to diet broiler in immunological physiological and productive traits advances in environmental Biology, 11(3):44-45.

[23]. Steel, R. G. D. and Torrie, J. H. (1980). Principles and procedures of statistics, McGraw. Hill Co. Inc. New Yor. Pp 633.

[24]. Subapriya, R. and Nagini, S. (2005). Medicinal properties of Azadirachta indica leaves: A Review. Asian Pacific Journal Cancer Prevention. 6: 515-520.

[25]. Subapriya, R. and Nagini, S. (2005). Medicinal properties of neem leaves: a review. Current Medicinal Chemistry Anticancer Agents. 5:149-156.

[26]. Torun, K. P., Mehedi, H., Anowarul, H., Sudipta, T., Yousuf, A. S., Mahmudul, H. S., Mohammad, A. B. N., Ali, K., Mohammed, N. S. and Alip, K. (2020). Dietary supplementation of Neem (*Azadirachta indica*) leaf extracts improved growth performance and reduced production cost in broilers. Open access peer review Journal, Vet World, vol. 13 (6), 1050- 1055, PMC 7396339.

[27]. Ufele, A. N., Nwafor, C. J., Offor, V. and Nwankwo, S. I. (2020). Effects of Azadiracha Indica and Moringa Oleifera Leaves on the Growth Performance and Packed Cell Volume of Broiler Chicken. Animal Research International, Vol. 17, (Issue 2), Pp. 3658 - 3664