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Research Paper

Evaluation of Aqueous Extract of Neem (Azadirachta Indica) And Pawpaw (Carica Papaya) Leaf On Feed Intake, Carcass Measurements And Cost Effectiveness Of Broiler Chicken

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Abstract
The present investigation was performed to evaluate of feed intake, carcass measurement and cost effectiveness of broiler fed aqueous extract of neem and pawpaw leaves. Sixty non-selected random bred birds were brooded together for thirteen days before allocation to their experimental treatments and replicates. They were allocated into five experimental treatments containing twelve birds each and six birds per replicate. Fresh aqueous extract of neem leaves (NLE) (Azadirachta indica) and pawpaw (Carica papaya) leaves (PLE) were added to different treatment T_0 no PLE and NLE (control), T_1 30ml PLE, T_2 40ml PLE, T_3 20ml NLE and T 40ml NLE. The trial lasted for six weeks after brooding. The result showed that there were no significant differences in body weight gains among the birds at 5% probability level. That is to show that the numerical differences among the birds were a thing of chance which implies that whether birds were fed with conventional or non-conventional feeds or with synthetic drugs or plant extracts they will equally give synonymous results in-terms of body weight gains on the condition they are from a reliable source, of good genetic makeup and good environmental conditions. From the general overview, it was evident that the experiment favoured birds in T4 (40ml NLE) because it has the highest body weight gain when compared to those in other treatments which may be due to the good phytochemical potential of neem which favours growth, immunity, hepatoprotective ability and increases feed absorption and assimilation. This strongly support the practice of organic farming and non-conventional feeding pattern to minimize cost of production, maximize profit and optimize output in agricultural investments.

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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, 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 ingredient, 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, 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

ingredient 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 have phytochemicals have antimicrobial, antistress, antioxidants and immune-modulatory properties which made them potential growth promoters in animal production (Valenzuela, 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).

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. Papaya is commonly utilized to boost the immune system and produce natural compounds that fight tumorcelss due to the presence of phytochemicals (Dharmarathnac, 2013), dried papaya leaves are used in medicine as a blood purifier and tonic (Sarker *et al.,* 2014). Phytochemical included in papaya leaf extract have been shown to increase platelet and red blood cell function (Nath *et al.,* 2012) positive result have been reported according to Oloruntola *et al.,* (2018) when pawpaw plants parts were used as supplements/ingredients in animal feed. Also; seeds, leaves and barks of neem trees have been demonstrated as antimicrobial activity against Gram positive and Gram – negative bacteria along immunomodulatory, antiphylammetory and antifungal (Pandey, 2014).

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).

Statement of the Problem

Due to the disadvantages like high cost of livestock production, especially in poultry, adverse side effect on health of birds and long residual properties of many synthetic drugs and growth promoters supplemented to the broilers to effect rapid growth. Given the important of safe poultry product to food security and contribution to Nation's gross domestic products; researchers are concentrating on the use of our ancient medicinal system to find beneficial herbs and plants such as pawpaw and neem leaves which can be safely used to increase the production.

Purpose of the Study

The major purpose of this research work is to evaluate of aqueous extract of neem (Azadirachta indica) and pawpaw (Carica papaya) leaf on feed intake, carcass measurements and cost effectiveness of broiler chicken

Objectives of the Study

i. To evaluate the potential of pawpaw and neem leaves as natural growth promoters in broiler production.
ii. To assess the effect of neem and pawpaw on carcass weight measurements of broiler birds.
iii. To evaluate the overall impact of adopting the use of pawpaw and neem leave as an alternative and cost reduction strategy in poultry production.

II. MATERIALS AND METHODS

Location 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). AIFCE 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^{0} on a vegetation of humid rainforest (Ogbomida and Emeribe, 2013).

Population of study

A total of sixty Anak 2000 strain

Management of experimental birds

The pen as well as all equipment (drinkers, lamp and feeders inclusive) used for the experiment was thoroughly washed and fumigated to reduce bacterial load. Infact, all brooding, rearing and managemental procedures for proper raising of birds was well adhered to. The experimental period lasted for six weeks starting from two weeks to eight weeks of life. All birds were placed on same 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. Ad-libitum feed was practiced throughout trial period, clean

drinking water was regularly provided to the animals as well litter materials were often changed to avoid any disease outbreak.

Table 1: Feed formulas for the experimental birds

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

Test ingredients

Fresh leaves of Neem and Pawpaw leaves were sourced locally from within the 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, all test ingredients were added in water throughout the trial period (2weeks to 8weeks). 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)
T_I 30ml PLE
T_2 40ml PLE
T_3 20ml NLE
T_4 40ml NLE

Sampling technique used in the study

The sixty non-selected experimental birds were brooded together for 13days before allocation to their experimental treatments and replicates on the 14th day of experiment. They were allocated into five experimental treatments containing twelve birds each and two replicates of six birds each. Fresh aqueous extracts of the experimental leaves were added at different designated proportions to different treatments except for the control T_0 which was medicated with antibiotics, multivitamins, e.t.c. as the case maybe.

Parameters Measured:

- Feed intake throughout the experimental period (2 – 8 weeks)
- Carcass weight measurements
- Cost per chick
- Cost of feed per treatment
- Net profit per bird

Data collection and instrument data collection

From two weeks of life to eight weeks of the trial a stipulated quantity feeds both given and leftovers for the weeks were weighed to monitor feed intake for each treatment using Salters weighing balance (range 100g – 20kilogram). Also, cost effectiveness and profitability involved in raising the birds was evaluated as well as cost implication of the non-conventional feed used for production.

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).

Experimental design model is as:

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

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 and j means number of replicates.

III. RESULT AND DISCUSSION

Here discusses the evaluation of NLE and PLE on the weekly feed intake, carcass weight measurements and cost effectiveness of raising birds with the experimental leaves and profitability of using non-conventional feed as well as organic agricultural procedures in poultry production.

Table 2: 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}

Field trial, 2023.

From the table above, there was no significant differences 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. Comparing the total feed consumed per bird per treatment, there were no differences between them even though numerical differences existed. 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 3:Carcass traits of broilers

	T_0(control)	T_1(30ml PLE)	T_2(40ml PLE)	T_3 (20ml NLE)	T_4(30ml NLE)
Live weight	2.050 ± 0.227^{NS}	2.060 ± 0.008^{NS}	2.707 ± 4.910^{NS}	2.455 ± 0.148^{NS}	2.108 ± 0.266^{NS}
Eviscerated weight	1.705 ± 0.038^{NS}	1.790 ± 0.042^{NS}	1.525 ± 0.137^{NS}	1.990 ± 0.134^{NS}	1.672 ± 0.191^{NS}
Dressed weight	1.932 ± 0.030^{NS}	2.062 ± 0.055^{NS}	1.907 ± 0.101^{NS}	2.162 ± 0.052^{NS}	1.945 ± 0.225^{NS}
Thigh(drum stick)	0.373 ± 0.390^{a}	0.445 ± 0.003^{ab}	0.470 ± 0.448^{ab}	0.575 ± 0.072^{ab}	0.473 ± 0.026^{b}
Back	0.340 ± 0.035^{NS}	0.400 ± 0.000^{NS}	0.395 ± 0.017^{NS}	0.410 ± 0.024^{NS}	0.400 ± 0.029^{NS}
Breast	0.298 ± 0.023^{a}	0.415 ± 0.036^{ab}	0.478 ± 0.095^{ab}	0.530 ± 0.010^{b}	0.433 ± 0.023^{b}
Wing	0.235 ± 0.005^{NS}	0.295 ± 0.025^{NS}	0.223 ± 0.027^{NS}	0.245 ± 0.032^{NS}	0.230 ± 0.024^{NS}
Neck	0.076 ± 0.109^{a}	0.102 ± 0.009^{ab}	0.066 ± 0.014^{ab}	0.099 ± 0.005^{b}	0.092 ± 0.007^{b}
Head	0.049 ± 0.004^{a}	0.044 ± 0.002^{a}	0.059 ± 0.004^{ab}	0.048 ± 0.004^{ab}	0.050 ± 0.000^{b}
Shank	0.100 ± 0.005^{NS}	0.094 ± 0.009^{NS}	0.089 ± 0.007^{NS}	0.094 ± 0.007^{NS}	0.074 ± 0.022^{NS}

The table above shows that there were significant differences ($p < 0.05$) on live weight, eviscerated weight and dressed weights and also carcass parts like neck, breast, thigh and head base on the investigation. The findings of this study were far higher than ranging between 1.93 - 2.16 for dressed weight as against 1.59 – 1.64, drum stick ranging between 0.37 – 0.56 as against 0.11 – 0.20, breast muscle being between 0.30 – 0.53 as against 0.14 – 0.42 and wing being between 0.22 – 0.30 as against 0.12 – 0.19; only the neck was within range (0.06 – 0.12) according to the report of Ezenwosu, *et al.,* (2022). This investigation somewhat disagrees with the finding of Ezenwosu, *et al.,* (2022) which showed that 40ml aqueous inclusion of paw-paw leaf meal, the head (0.75) was higher than the obtained data in the investigation with lower weights of neck (0.08), eviscerated weight (1.20) and dressed weight (1.61) when fed broiler birds with 40ml PLE. Generally, from the study 30ml PLE favored carcass parts like wing and neck, 40lml PLE favoured head and live weight, 20ml NLE favoured thigh, eviscerated weight, back and breast while control favoured only the shank.

Table 4:Cost Effectiveness/Profitability of Using Non-Conventional Feed Ingredients in Broiler Production.

For Pre-starter 64kg ÷25kg (a bag of conventional feed = 2.6 Approximately 3bags
25kg of conventional feed
Cost of a bag of conventional pre-starter feed (new hope feed) = 14500 X 3 (bags)
14500 X 3(bags)
= ₦ 43,500
- 26,394.80
₦17,105.2 profit from feed
For starter 90kg ÷25 = 3.6 Approximately 3bags because roll over from pre-starter
Cost of conventional feed = 13500 per bag
13500 X 3 (bags of feed)
40500.0
-34717.5

₦5782.5 profit from feed
For finisher 210kg/25kg = 8.4 Approximately 8.5 bags
Cost of conventional feed (new hope) 13500
13500 X 8.5 (bags) = 114750
-77507
₦37243 profit

At stater level, a bird fed ad-libitum under good management condition is expected to consume about 2.3 – 2.5kg feed from 1- 4 weeks of age while at finisher level 3.3 – 3.5kg feed from 4 – 8weeks of age or expected to consume about 1.0 – 1.1kg feed from 1- 2weeks of age (pre-stater phase), about 1.2 – 1.5kg feed from 2- 4weeks of age (stater phase) and finisher phase 3.3 – 3.5kg feed from 4 – 8weeks of age. From the study, its clear that at pre-stater phase ₦17,103.2 was profit realized from feeding with non-conventional feed, at starter phase profit was ₦5782.5 and finisher phase was ₦37243 making it a total of ₦60130.70k was saved from feeding with non-conventional feeds.

From the record above, it simply shows that birds feds good and balanced non-conventional feeds also attain market weights fast as to those fed conventional feeds, birds fed non-conventional feeds have greater profit margins and reduced cost of production too (minimization of cost, optimization of output and maximization of profit).

Table 5: Cost of production of bird per treatment (₦)

T0 (control)	T1	T2	T3	T4
14508.14^{b}	13097.72^{a}	13389.07^{ab}	12821.43^{a}	13267.99^{a}

The cost per chick production for the research was taken for all treatments from day one till the termination day of the research. The cost of production per bird for the control was ₦14508.14, for T1 ₦13097.72, for T2 ₦ 13389.07, for T3 ₦ 12821.43 and for T4 ₦ 13267.99. From the study, the birds at different treatments showed significant differences statistically. However, the cost of production for control being treatment fed with antibiotic was highest owing to the high cost of drugs when compared with birds fed without antibiotics (organically). In the other vain, birds fed with antibiotics over time do have antibiotic residues deposited in their muscles (residual effects of antibiotics) and when consumed by man can lead to effects like allergies, hepatotoxicity, mutagenicity, anaphylactic shock, immunopathological effects etc (Nisha 2008)

S/N	Feed Ingredient	Pre-starter Diet	Starter Diet	Finisher Diet
1	Maize	30	42.5	107
2	Full Fat soyabean	19	18	34
3	Less Fat soyabean	8	8	23
4	Limestone	1	2.5	13
5	BWL Concentrate	2		
6	Bone Meal	2	3	9
7	Fish Meal	2	-	-
8	Groundnut Cake	-	16.5	24
		64 (kg)	90kg	210(kg)
		₦26,394.80	**₦34717.50**	**₦77507.00**

IV. Conclusion

This study demonstrated that the inclusive of neem and paw-paw leaf meal will enhanced the growth performance of broilers birds. From the study, it was evident that aqueous inclusion of 40ml paw-paw leaf gave good live weight at the end of the experiment followed by inclusion at 20ml neem leaf in water. These plants are easily available around our environment, less competed for by man, readily available and not costly.

Also, the use of non-conventional poultry feed ingredients minimizes high cost of poultry production and in return generate profit for farmers.

Again, the use of non-conventional feed for broilers made a huge gain by drastically reducing the cost of production and at the same time the attaining market weight within a recorded time as compared when fed with conventional diets which are scare and on the high side.

V. Recommendation

i. I will recommend that commercial livestock farmers should apply the use NLM and PLM as an alternative to feed additives, antibiotics and growth enhancement in poultry production.
ii. I will also recommend further research focusing on the combined effects of these extracts on growth and performance in broilers which would be beneficial to fully understand their potential impact.

iii. I will recommend solely the use of non-conventional feeds in raising of broilers as a sequel to maximization of profit and optimization of output in an agricultural investment.

REFERENCES

[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]. Asari, J. Z. U. and Hag, A., Yousaf, M., Ahmad, T. and Khan, S. (2008). Evaluation of different medical plants as growth promotes for broiler chicks Sarhad Journal of agriculture, 24(2):323-330.

[3]. Bandayopadhyay, U., Biswas, K. and Sengupta, A. (2004). Clinical Studies on the effect of neem (A. indica) bark extract on gastric secretion and gastroduodenal ulcer life sciences 2004;75(24):2867-2878.

[4]. Dharmarathba, S. L. C. A., Wickramasinghe, S., Waduge, R. N., Rajapakse, R. S. V. J. and Kularatne, S. A. M. (2013). Does Carica papaya leaf extract increase platelet count, An experimental study in a murine model. Asian pacific Journal of Tropical Biomedicine.; 3(9): 720-724.

[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]. Fellah, R., Kian, A. and Azafor, A. (2013). A review of the role of five kinds of alternatives to in-feed antibiotics in broiler production. J Vet Med. Anim. Health. 5 (11): 317-321.

[8]. Gayathri, S. L. and Arun, K. (2019). Utilization of neem leaf meal in poultry, poultry line, 2019. Department of livestock production and mgt, College of Veterinary Science and Animal husbandry Bhubaneswar Odisha University of agriculture and technology Odisha -751003 prinepd Scientist ICAR-CIWAB hubaneswar, Odisha 751003

[9]. Ghimeray, A. K., Jin, C. W. and Ghimire, B. K, D. H. (2009). Antioxidant activity and quantitative estimation of azadirachtin and nimbin in A-indica A. Juss grown in foothills of Nepal. Africa Journal of Biotechnology. 2009;8(13):3084-3091.

[10]. Harish, K. G., Ghandra, M. K. V. P., Jagannadha, R. A. and Nigini, S. (2009). Nimoholide a Limonid from a. indica inhibit proliferation and induces apoptosis of human chroion carcinoma (Be Wo) cells- Investigational New Drugs;27(3):246-252.

[11]. Hossain, M. A., Al-Toubi, W. A. S., Weli, A. M., Al-Riyani, D. A. and Al-Sabah, J. N. (2013). Identification and Characteristics of chemical compounds on different crude extract from leaves of omani neem Journal of Taibah University for Science 2013;7(4)181-188.

[12]. Hossain, M. A., Shah, M. D. and Sakari, M. (2011). Gasn chromatograph-mass Spectrometry analysis of various organic extract of Merrimia borneensis from Sabah. Asia Pacific Journal of Tropical Medicine. 2011;4(8):637-641.

[13]. Kadiri, O., Olawoye, B., Fawale, O. S. and Adalumo, O. A. (2016). Nutraceulacal and antioxidant properties of the seeds, leaves and fruits of Carica papaya: potential relevance to human diets, the food industry and the pharmaceutical industry – a review. Turkish J Agric Techn.4(2): 1039-1052.

[14]. Kokate, C., Purohit, A. P. and Gokhale, S. B. (2010). Pharmacognosy; Maharashtra, India: NIrali Prakashan; 2010.

[15]. Kuma, G. H., Vidya, P. R., Vinithini, G., Vidiaya, l. P. and Nagini, S. A. (2010). Neem Lomonoid Azardirachtin and nimbolide in an anomd model of oral oncogenesis. Investigational New Drugs. 2010;28(4):392-401.

[16]. Leader, B., Baca, Q. J. and Golden, D. E. (2008) Protein therapeutics: a summary and pharmacological classification. Nat Rev. Drug Discav;7(1):21-39.

[17]. 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.

[18]. Mohammad, A. and Alzohairy, (2016). Therapeutics role of A. indica and their active constituents.

[19]. Mohammed, A. and Alzoharg, (2016). Department of Medical Laboratories, College of Applied Medical Sciences, Zassim University, P.O. box 6699, Buraidah Saudi Arabia.

[20]. Mostofa, K. (2013). "Effect of herbal supplement on growth response and the egg account of cockerels". Journal of animal feed Research 3:68-73.

[21]. Nath, D. D., Rahman, M. M. and Akters, F. (2012). Effects of Tulsi, black pepper and cloves extracts as a growth promoter in broilers. Bangladesh Journal of Veterinary medicine 10:33-39.

[22]. National Research council (NRC), (1992). Neem Atre for Solving Global Problems. National Academy Press, Washington D.C

[23]. Nisha, A. R. (2008). Antibiotic residue – a global health hazard. Veterinary World Vol. 1 (12): 375 – 377. www.veterinary world.org. veterinary world Vol. 1 No 12

[24]. Nunes, P. X., Silva, S. F., Guedes, R. J. and Almeida, S. (2012). Phytochemicals as Nutraceuticals global Approaches to their roles in nutrition and health. In Tech (2012) Biological oxidations and Oxidants activity of natural products.

[25]. Nurcahyani, N., Busman, H., Satyarsoss, Rcohmawati, P. D. and Kanedi, M. (2018). Antispermatogenic effects of seeds extract of papaya (Carica papaya) in mice. The pharma chem. J. 5 (4):18-22.

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

[27]. Okonkwo, J. C. and Uba, J. C. (2017). "Hematological indices of various breeds of broiler chicken fed mimosa diplotricha leaf me" International Journal and Biosciences 6.4:189-192.

[28]. Olorunta, O. D. (2018). Serum biochemistry and histological studies in growing rabbits fed diets supplemented with Mucunna pruriens leaf meal. Arch current Res int. 2018; 15(1-10).

[29]. 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.

[30]. Onyimonyi, A. E. (2022). "Performance and economic characteristics of broilers (thesis Bangladesha Agricultural uni

[31]. Padhi, M. K., khadanga, S. P., Behera, K., Sahoo N., Agrawalla, J., Khadanga, S., Mahapatra, M.R. and Parni, S. S. (2017). Effect of turmeric supplementation on oxidants and immunity of broilers birds. Journal of livestock Sci. 8:103-106.

[32]. 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.

[33]. Rahmani, A. and Aldebasi, V. H. (2006). Potential role of Carica papaya and their constituents in the prevention and treatment of diseases.

[34]. Rahmani, A. H. and Aly, S. M. (2015). Nigella Sativa and its active constituents thymoquinone shows pivot role in the disease prevention and treatment, Asian Journal of Pharmaceutical and Clinical Research 2015;8(1):48-53.
[35]. Rahmani, A. H., Alzohary, M. A., Khan, M. A. and Aly, S. M. (2014). Therapeutic Implication of black seed and its constituent thymoquinone in the prevention of molecular pathways. Evidence based complementary and Alternative Medicine 2014: 2014:13.
[36]. Sarker, E. H., Khokon, J. U. and Rahma, M. A. (2014). Comparative efficacy of probiotic papaya leaves and v.7 AD3E as a growth promoter on broilers. International Journal of Natural and Social Sciences: 26-32 social studies on broiler chicken experimentally infected with Eschericha coli and supplemented neem Vet-world 9(7): 735-741.
[37]. 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.
[38]. Sithisarn. P., Supabphol. R. and Gristsana, F. W. (2005). Antioxidant activity of Siamese neem tree (VP 1209) Journal of Ethnopharmacology 2005; 99(1):109-112.
[39]. Torun, K. P., Hasan, M. M., Haque, M. A., S., Sarker, Y. A., Sikder, M. H., Ali-Khan, M. A. H., Sakib, M. N. and Kumar, A. (2018). Dietary supplementation of neem (Azadirachta indica) leaf extracts improved growth performance and reduced production cost in broilers. Veterinary world, Open Access and Perr reviewed journal, Jun; 13 (6): 1050 – 1055.
[40]. Vivi, T. and Prashot, V. A. (2015). Review on Medicinal Properties of Carica papaya Linn. Asian Pac. J Trop. Dis; 5(1):1-6. The performance of broiler birds fed varying levels of roasted pigeon pea (Cajanues cajan) seed meal. Pakistan Journal of nutrition.