NSAP 47th Annual Conference (JOS 2022) CONFERENCE PROCEEDINGS
THEME: SECURING ANIMAL AGRICULTURE AMIDST GLOBAL CHALLENGES

EFFECT OF GRADED LEVELS OF PROCESSED NEEM (*Azadirachta indica*) LEAF AS FEED ADDITIVE ON GROWTH PERFORMANCE AND CARCASS TRAITS OF BROILER BIRDS

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ABSTRACT
A total number of 45 day-old broiler chicks were randomly assigned to three dietary treatments in a Completely Randomized Design (CRD) each with three replicates of 5 chicks per replicate. The experimental diets were control diet (T1) containing 0 g/kg, while T2 and T3 were fed diets containing 0.5 g and 1.0 g/kg neem leaf respectively. The experiment lasted for 56 days.Results obtained showed that birds fed neem leaf supplemented diets had no significant (P<0.05) differences in weight gains between treatment. However, there was slightly (but not significant)higher body weight gain and superior feed conversion ratio than the birds fed 0 g of neem leaf additive diet. There was no significant difference (P<0.05) in the feed consumption of birds among the treatments groups but T3 recorded numerically the highest feed intake and highest cost of feeds per/kg body weight gain in this study because of the incorporation of neem leaf in the diet. The result of this study showedthat 1g/kg of neem leaf in broiler diets did improve growth performance and carcass yield. Therefore it can be a variable alternative to antibiotic growth promoter in feeding of broiler chicken with higher economic result to the poultry farmer.
Key Words: Broiler, Neem leaf, feed additives

INTRODUCTION
Poultry farming plays a major role in bridging the protein gap in developing countries where average daily consumption is far below recommended standards. A major constraint to poultry production in Nigeria is the very high cost of conventional feeding stuffs especially the primary energy and protein sources. Leaf meals have been incorporated in the diets of poultry as a means of reducing the high cost of conventional protein sources (Nworgu *et al*., 2003). There is evidence in literature of the beneficial effects of using leaf meals from different sources in poultry production (D'Mello *et al*., 1987; Iheukwumere *et al*., 2008; Fasuyi *et al*., 2005). D'Mello *et al* (1987) observed that leaf meals do not only serve as protein sources but also provide some necessary vitamins, minerals and oxycaretenoids which cause yellow colour of broiler skin, shank and egg yolk. Neem tree (*Azadirachta indica*) is an indigenous tropical plant. The tree has been made popular in recent times in Nigeria where it is widely used in reforestation programmes of both State and Federal Agencies. According to Elangovan *et al* (2000), neem leaf yields mainly quercetin (Flavonoids) and nimbosterol (betasibosterol) as well as a number of liminoids (nimbin and its derivatives). Esonu *et al* (2006) reported that neem leaf meal has a proximate composition of 92.42 per cent dry matter; 7.58% moisture; 20.68 % crude protein; 16.60 % crude fibre; 4.13 % ether extract; 7.10 % Ash and 43.91% Nitrogen free extract. They further observed that carcass, liver, heart and gizzard weights of laying hens fed varying levels of neem leaves were significantly increased at 5% level of neem leaf inclusion. Sokunbi *et al* (2003) reported that feeding prepubertal pigs diets containing up to 10 % neem leaf meal will not lead to depression in the utilization of nutrients for weight gain. The main aim of this study was to evaluate the effect of neem leaf meal as growth promoter feed additives.

MATERIAL AND METHODS
Experimental site
The experiment was conducted in Federal University Dutsin-ma, Department of Animal Science Teaching and Research Livestock Farm, in Dutsin-ma Town Katsina state located in the Sudan savannah region of the country Nigeria.

Experimental birds and Management*:* A total of 45 day-old apparently healthy broiler birds were organized in a Completely Randomized Design (CRD) after 2 weeks brooding into 3 treatment groups (T1, T2 and T3) 15 birds each comprising of 3 replicates of 5 birds and fed experimental diets containing 0 g, 0.5g and 1g neem leaf powdered/kg for the three treatments respectively. Feed and water were given *ad libitum* from the brooding to the finishing stage which lasted for 56 days. All the chicks were reared in 9 deep litter pens.

Plant collection and preparation:Fresh neem leaves were collected from the neem trees and shade dried for about 1week. Exposures of sunlight were avoided to prevent the loss of active components. The dry leaves were ground using a pestle and mortar. Dried ground leaves were added as feed additive to see its effects on growth parameters and carcass traits. Data on body weight and feed intake were recorded.

Data Collection:Feed intake, body weight gain and feed conversion ratio were taken and calculated. Carcass analysis was conductedaccording to the procedure outlined and modified by (Aikpitanyi and Imasuen, 2019)

Data Analysis: Data obtained from the experiment were subjected to one-wayAnalysis of Variance (ANOVA) using Statistical Analysis Software (SAS 2002) and Duncan multiple range tests was used to separate treatment means.

RESULTS AND DISCUSSION

Table 1:- Proximate Analysis of Feed

FEED SAMPLE	PROPORTION
Dry Matter	84.08
Crude Protein	18.73
Crude Fibre	6.00
Oil	3.10
Ash	7.56
Nitrogen Free Extract	64.61

The proximate composition of the experimental diet was presented in table 1 which fall within the normal nutrient requirement of broiler birds by NRC, (1994).

Growth Performance of the Broilers Fed Neem Leaf as Feed Additive

The result of this study revealed that the birds exposed to the influence of Neem leaf as additive in their diets recorded higher body weight gain, high feed intake and positive feed conversion ratio than the birds fed the control diet free of the additive (Table 2). However there was no statistical significance observed for these findings. The cost of producing 1kg weight of bird was highest in treatment T3 (fed 1gram of neem leaf) then followed by T2 and T1 recorded the least and there was statistical significance observed for this finding (Table 2). The result in table 2 showed that the initial weights of the broilers were homogenous amongst the entire treatment groups. However, group 3 (birds treated with neem leaf at 1.0g as feed additive) recorded the highest weight gain (1.142) followed by group 2(birds treated with neem leaf at 0.5g as feed additive) (1.100), while birds on the control group recorded the lowest weight gain (1.063). Also birds treated with 1g of neem leaf recorded the highest feed conversion ratio (3.309), followed by the birds treated with 0.5g of neem leaf (3.216) then the control group recorded the least (3.125) feed conversion ratio. For total feed cost, because of the inclusion of neem leaf powder, then followed by the bird treated with 0.5gram while the control group is the lowest. This result is in consonance with the work of Onyimonyi *et al* (2009) who recorded significant improvement in the average of body weight and body weight gain when neem leaves powder was added to broiler diets at 0.5 % of inclusion. Also, Wankar *et al* (2009), Singh *et al* (2014) and Shihab *et al* (2017) all reportedsignificant improvements in the average body weight gains when neem leaves powder were addedto broiler diets at levelsof 1, 2, 3 g/kg. Landy *et al* (2011) reportedsignificant decline in average body weights of broilers when powder of neem leaves were added to broiler dietsat levels of 7 and 12

grams / kg. The reason for this may be due to the environmental condition in which research was carried out (hot season) which may be responsible for non- significant feed intake. and this supported the statement made by Kalam et al., (2010) that high ambient temperature, whether acute or chronic in nature, significantly hinders growth of animals. Reduced growth has been considered a problem of reduced feed intake (Kalam et al., 2010). These results may also be due to antimicrobial and antiprotozoal properties of neem, which help to reduce the microbial loads of birds and improved the feed consumption of the birds.

Table 2:-Performance Characteristics of Broilers Fed Neem Leaf as Feed Additive

	Levels of neem leaf inclusion (g/kg)			
Parameters	0 (T1)	0.5 (T2)	1.0 (T3)	SEM
IWT(kg)	0.39	0.45	0.41	0.05
FWT(kg)	1.46	1.55	1.56	0.10
WGT(kg)	1.06	1.10	1.14	0.12
TFI(kg)	3.52	3.48	3.52	0.11
FCR	3.13	3.22	3.39	0.27
TFC(kg)	956.28^{c}	1092.32^{b}	1251.65^{a}	34.51
FC(kg)	850.0^{b}	1009.9^{ab}	1207.0^{a}	83.08
Mortality%	6.67	13.33	6.67	6.67

SEM: Standard Error of Mean, IWT:initial weight gain, FWT: Final weight gain, WT: Weight gain, TFI: Total feed intake, FCR: Feed conversation ratio, TFC: Total feed cost, FC: Feed cost, Means with the same superscripts letters are not significantly different (P≤0.05)

Carcass Characteristics of Broilers Fed Neem Leaf as Feed Additive

The result in Table 3 show that T3 recorded the highest carcass traits (live weight, plucked weight, thigh, back, wing, intestine heart, proventriculus, breast, gizzard) while T2 recorded lower weights for carcass traits except neck weight (7.115) and the control group recorded the least carcass traits in all groups. There was statistical significant difference observed in live weight and wing weight.

Table 3:- Carcass Characteristics of Broilers Fed Neem Leaf as Feed Additive

	Levels of neem leaf inclusion (g/kg)			**SEM**
Parameters	0 (T1)	0.5 (T2)	1.0 (T3)	
Live weight	1.29^{a}	1.37^{ab}	1.42^{b}	0.037
Plucked weight	75.51	80.14	85.19	5.48
Thigh	18.87	19.70	21.96	1.15
Back	9.89	11.05	11.47	0.51
Breast	19.22	20.53	23.97	1.99
Wing	7.07^{b}	8.42^{ab}	9.56^{a}	0.64
Neck	6.12	7.12	7.09	0.36
Intestine	3.76	3.76	4.33	0.53
Gizzard	1.67	1.45	1.92	0.38
Heart	0.43	0.43	0.49	0.04
Liver	1.61	1.71	1.77	0.17
Proventriculus	0.48	0.45	0.54	0.03

Means with the same superscripts letters are not significantly different (P≤0.05)

Durrani *et al* (2008) found significant improvement in relative weight (liver, heart and gizzard) when adding the neem leaves powder at the rate of 3gram/kg. The results however disagreed with the findings of Shihab *et al* (2017) who founded that there were no significant differences between treatments in relative weight (liver, heart and gizzard) when adding the neem leaves powder to broiler diet at a rate of 2

grams / kg and Kharde and Soujanya (2014) who reported no significant differences between treatments on carcass parameters (heart, gizzard and liver) when adding the neem leaves powder to broiler diet at a rate of 1,2 grams / kg and 0.5, 1 grams / kg garlic powder. The reason for this may be due to the bitter taste of neem. At lower dose neem may serve as an appetite stimulant which may encourage the bird to consumed more feed leading to better carcass trait however at higher dose the bitter taste will make the bird go off feed which reduce the carcass trait hence decline in weight gain as said by Landy *et al* (2011). These results may also be due to antimicrobial and antiprotozoal properties of neem, which help to reduce the microbial loads of birds and improved the feed consumption of the birds.

CONCLUSION

The result of this study suggested that 1g of neem leaf did improve the growth performance and carcass trait, Therefore it can be a variable alternative to antibiotic growth promoter in feeding of broiler chicken with higher economic result to the poultry farmer.

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