GROWTH RESPONSE OF BROILER CHICKENS TO *Picralima nitida* SEED MEAL AND EXTRACT AS A PHYTOADDITIVE

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ABSTRACT
The global ban on synthetic drugs has motivated the need to source alternative biological material that can replace or complement the activity of synthetic drugs, one of which is *Picralima nitida* which has good profile of phytoadditives and antimicrobial activity. This study thereby evaluated the growth response of broiler chickens to *Picralima nitida* seed powder (PnSP) and extract (PnSE) in feed or water with or without routine medications. A total of 150 day-old Arbor Acre chicks were randomly allotted to 5 dietary treatments denoted A-E with 3 replicates per treatment. The birds were fed the same basal diet of which control birds were without PnSP or PnSE, however, 0.1% PnSP was added to diets B and C while 25ml/L of PnSE was added to the drinking water of those on treatment D and E with or without medication respectively for 49 days and the chickens were treated humanely following the established ethical norms. Final Live Weight (FLW), Average Daily Gain (ADG), Average Daily Feed Intake (ADFI), Feed to Gain Ratio (FGR) and survivability were observed. Data collected were subjected to a one-way analysis of variance and treatment means separated using Duncan Multiple Range Test. Results indicated that FLW and ADG ($P<0.001$) improved with PnSP/PnSE with or without routine medications at the starter phase; however, those on the control diet had the least values for FGR at the finisher and pooled phases. In conclusion, *Picralima nitida* improved broiler growth performance however; the combination of PnSP with synthetic medication was more effective.

Keywords: Performance, *Picralima nitida*, seed meal, extract, powder

INTRODUCTION
In the United States, the first usage of antibiotics dates back to the late 1940s. Pigs and other simple-stomached animal species, such as poultry, grew well when fermentation products of the bacteria strain *Streptomyces aureofaciens* were added to their diets (Pham *et al*., 2019). However, the overuse of antibiotics has led to clinical and microbiological evidence of antibiotic-resistant bacteria that may be zoonotic and cause harder-to-treat diseases (Oleforuh-Okoleh *et al*., 2015). The use of antibiotics has been restricted in numerous nations due to increasing health concerns. Following the ban, there is a growing need to identify alternatives to synthetic antibiotics in the production of chicken.

Several plant leaves and root have been used as growth promoters for broiler chickens, including turmeric root meal (Odunsi *et al*., 2017), *Morinda lucida* (Lala *et al*., 2017) and Crude pawpaw latex (Haruna and Odunsi, 2018). Due to their wide range of antimicrobial (Dorman and Deans, 2000) and gut microflora manipulation (Hashemi *et al*., 2014), these plants have been reported to be effective growth promoters.

Two (2) g/kg *Morinda lucida* (Brimstone) leaf meal with or without standard treatment (antibiotics and anti-coccidiostat) was reported to improve growth performance; intestinal health and tissue microbial count of broiler chickens (Lala *et al*. (2017). Oleforuh-Okoleh *et al*. (2015) evaluated the impact of banana leaf infusion and powder (50 ml/L of drinking water and 50 g/kg of feed, respectively) on the blood profile and performance of broiler chickens and reported favourable growth responses.

Therefore, this study seeks to provide information on the use of *Picralima nitida* (K. Schum) Hallier powder and aqueous extract in the feed and water of broiler chickens. Growth performance was used as a measure of response.

MATERIALS AND METHODS
Description of Experimental Site
The study was carried out at the Broiler Unit, Teaching and Research Farm, Ladoke Akintola University of Technology, Ogbomoso.

Procurement, Preparation and Processing of *Picralima nitida* Seeds

The Procurement, Preparation and Processing of *Picralima nitida* Seeds has been described by Haruna and Odunsi (2022). The seeds were cleaned, de-hulled and diced into small sizes to facilitate air-drying at room temperature for 4 days when constant weights were obtained. The dried seeds were milled with Super Master (SMB-2977) electric blender into powder form termed *Picralima nitida* Seed Powder (PnSP) and stored in an air-tight container and kept in a cool place until needed animal trial.

Experimental birds, treatments, management and the layout

One hundred and fifty (150) day-old broiler chicks (Arbor Acre) from a reputable hatchery in Ibadan, Nigeria were used for the experiment. The birds were randomly allotted to five dietary treatments (A-E) of 3 replicates each after the initial weight has been taken using Century digital scale. The birds were subjected to standard poultry routine practices such as brooding, vaccination and with or without medication throughout the experimental period and the general instructions of institutional rules for the care and use of laboratory animals were strictly followed in the execution of this investigation. Chickens were treated humanely following the established ethical norms (World medical association declaration of Helsinki 2013). The birds were offered five (3) Iso-nitrogenous and iso-caloric broiler starter (0-3 weeks) and finisher (4-7 weeks) as well as drinkable water ad-libitum on daily basis throughout the experiment which lasted for seven (7) weeks. Analysed composition of the control diets were presented in Table 1. The birds were all fed the same basal diets and the optimum inclusion level of PnSP (0.1%) reported by Haruna and Odunsi (unpublished data) was included in the diet of those in treatment B and C while the 25 ml bitter leaf extract/litre of water recommended by Rafiu *et al*. (2019) was adopted for inclusion dose of PnSE in treatment D and E. Both PnSP and PnSE replaced the administration of antibiotics on days 2-6, anti-coccidiosis on days 15-25, tylosin on days 30-34 and finally anti-coccidiosis on days 37-38.

Data collection

Zootechnical Performance

Zootechnical performance parameters measured are feed intake (AFI), average weight gain (AWG), feed to gain ratio (FGR) and survivability.

Proximate Analysis

The proximate composition of starter and finisher diets was determined by using the A.O.A.C. (2000) methods.

Statistical analysis

The data collected were subjected to a two-way analysis of variance (ANOVA) using the procedure of SAS (2003). Significant mean differences were determined using Duncan's Multiple Range Test of the same package at a 5% significant level.

Table 1: Analysed composition of starter and finisher diets (DM %)

Ingredients (%)	(Starter) 0-4 weeks	(Finisher) 4-7 weeks
Crude Protein	23.05	19.91
Ether Extract	5.05	4.66
Crude Fibre	4.31	5.09
Ash	7.10	6.90
Dry Matter	93.11	93.55
NFE**	53.60	56.99
Metabolizable Energy (kcal/Kg)***	2875.67	2903.66

** Nitrogen Free Extract, *** Calculated from ingredient analysis table

RESULT

The effects of *P. nitida* seed powder (PnSP) / *P. nitida* seed extract (PnSE) on growth performance during the starter phase (1-21 d), finisher (22-49) and pooled (day 1-49) are presented in Table 2. At starter phase, the FLW and ADG were positively and significantly ($p<0.001$) influenced by PnSP and PnSE while there were no significant ($p=0.15$, $p=0.62$ and 0.45) differences for FI, Feed: Gain and % Survivability. At the finisher phase (22-49 d) Positive significant ($p=0.05$, 0.04 and <0.001) values were recorded with the use of PnSP and PnSE with or without medication on ADG, ADFI and FGR

respectively; however, no significant effect was observed on FLW (p=0.13) and percentage survivability (p=0.45) of the birds. Following the same trend with the finisher phase, PnSP and PnSE with or without medication improved (p=0.01) ADFI and FGR when pooled together. Numerically, the FLW ranged between 2955.93 g (PnSE+M) to 3358.33 g (PnSP+M) and survivability ranges from 93.33% (PnSE+M) to 100.00% (PnSP-M and PnSE-M).

Table 2: Growth performance of broiler chickens subjected to PnSP and PnSE with or without routine medications

Parameters (g)	A Control	B PnSP+M	C PnSP-M	D PnSE+M	E PnSE-M	SEM	P. Value
Starter							
Initial live weight (g)	40.84	40.99	39.76	40.81	41.01	0.23	0.46
Final live weight (g)	872.6^{b}	951. 7^{a}	925. 0^{a}	955.2^{a}	923.3^{a}	8.89	<0.001
Average daily gain (g)	39.6^{b}	43.4^{a}	42.2^{a}	43.5^{a}	42.0^{a}	0.42	<0.001
Average daily feed intake (g)	56.1	66.4	65.4	64.8	61.7	1.48	0.15
Feed : Gain	1.41	1.53	1.55	1.49	1.47	0.03	0.62
%Survivability	96.7	100.0	100.0	100.0	100.0	0.67	0.45
Finisher							
Final live weight (g)	3298.8	3358.3	3141.1	2955.9	3123.3	54.60	0.13
Average daily gain (g)	86.7^{a}	85.9^{a}	79.2^{ab}	71.5^{b}	78.6^{ab}	1.99	0.04
Average daily feed intake (g)	149.8^{b}	173.5^{a}	162.9^{ab}	173.8^{a}	161.1^{ab}	3.04	0.04
Feed : Gain	1.73^{c}	2.02^{a}	2.06^{b}	2.45^{a}	2.05^{bc}	0.07	<0.001
%Survivability	100.0	96.7	100.0	96.7	100.0	0.91	0.58
Pooled							
Average daily gain (g)	66.5	67.7	63.3	59.5	62.9	1.11	0.13
Average daily feed intake (g)	109.6^{b}	127.6^{a}	121.1^{ab}	127.1^{a}	118.4^{ab}	2.07	0.01
Feed : Gain	1.65^{c}	1.89^{b}	1.91^{b}	2.15^{a}	1.89^{b}	0.05	0.01
%Survivability	96.7	96.7	100.0	93.3	100.0	1.18	0.38

$^{a, b}$: Treatment values on the same row with different superscripts are significantly different (p<0.05). SEM = Standard Error Mean, PnSP+M= *Picralima nitida* Seed Powder + Medication, PnSP-M = *Picralima nitida* Seed Powder – Medication, PnSE+M = *Picralima nitida* Seed Extract +Medicatiion, PnSE-M = *Picralima nitida* Seed Extract – Medication

DISCUSSION

During the starter phase, an increase in live weight and weight gain were observed with the use of PnSP and PnSE with or without medication, thereby showing *P. nitida* as a growth stimulant either with or without routine medication. The increase in ADG with the use of PnSP with medication could be attributed to the synergetic effect of PnSP and synthetic drugs. These findings corroborated reports by Lala *et al*. (2017) and Haruna and Odunsi (2018) who fed broiler chickens diets supplemented with *Morinda lucida* and Crude pawpaw latex respectively. The depression in ADG and poorest FGR despite the highest value of ADFI with the combination of PnSE and medication at finisher phase could be that PnSE + synthetic antibiotics + anti-coccidiosis have a negative effect or interaction due to high alkaloid level in PnSE. Perviz *et al.* (2016) reported that toxicity of phytoadditive could be attributed to dosage, exposure time, sensitivity plus site of action and developmental stage of the animal involved. The anti-microbial activity of PnSP could enhance food digestion and assimilation consequently, improving the ADG of the birds as observed in the present study. This implies that PnSP with or without medication and PnSE-M can be used as a phytoadditive in broiler chickens. The result supported the report of Oleforuh-Okoleh *et al*. (2015) that birds fed banana leaf powder performed better than those administered banana leaf infusion. Lala *et al*. (2017) also reported that *Morinda lucida* powder should be used with medication and anti-coccidiosis to have a better performance, however, our findings disagreed with Olusola *et al.*

(2018) who reported that birds administered onion skin extract performed better than those fed diets containing onion skin powder.

CONCLUSION

Based on the results obtained from this study, it could be concluded that the use of *P. nitida* with or without medication in broiler chicken's diet and water improved ADG of broiler chickens at the starter phase; moreover, at the finisher phase, control birds and those supplemented with PnSP+M gained higher weight when compared across the treatments, however, those on control had the best FGR.

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