
ASSESSMENT OF PERFORMANCE INDICES OF BROILER CHICKENS FED GRADED LEVELS OF *TETRAPLEURA TETRAPTERA* EXTRACTS

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ABSTRACT

The poultry industry constantly seeks alternative and sustainable feed additives to improve broiler chicken growth performance. Tetraptera tetrapleura, a West African plant, possesses bioactive compounds with potential growth promoting properties. The growth response of broiler chickens to diet containing the ethanolic extract of Tetrapleura tetrapleura at varying levels of 0%, 0.2% and 0.3% was assessed. Ninety six (96) unsexed Abor Acre broilers were randomly distributed to the three treatment groups (32 chicks per group) with four replicates in a completely randomized design (CRD). Each treatment group received a control diet with the respective levels of Tetrapleura tetrapleura up to six weeks. The results revealed that all parameters showed no significant ($p > 0.05$) differences in the starter phase. However, the results obtained for final weight and weight gain showed significant differences ($p < 0.05$) in the finisher phase. The highest average weight gain value (1.61kg) was recorded for birds fed the control group diet, this was followed by D2 (1.33kg) and D3 (1.32kg). The broiler chickens fed control diet (D1) performed better in both phases. Hence it could be concluded that Tetrapleura tetrapleura extract inclusion did not significantly affect the growth performance of broiler chicken at the tested levels in the current study, this highlights the need for further research with lesser dosage application to fully understand the plants potential.

Keywords: Broilers, extracts, feed conversion ratio, medicinal plants, weight gain

INTRODUCTION

Tetrapleura tetrapleura is a deciduous plant in West Africa that grows up to 20-25 meters in height. The pod measures 15-2cm and contains tiny seeds that measure up to 8mm in length (Orwa *et al.*, 2009). It is of the Fabaceae family and its fruits are used in food, cosmetics and therapy. It has been traditionally used in various medicinal applications, and also as a feed additive in animal production to enhance growth and improve feed efficiency (Akintola, 2015). Investigation on the phytochemical constituent of the plant reveals that it contains alkaloids, steroids, flavonoids, saponin and phenolic compounds. These bioactive components contribute to the many varied biological and pharmacological activities in the plant (Adewunmi, 2004). Phytogetic feed additive has been reported to improve performance in broilers by stimulating the secretion of digestive enzymes leading to effective digestion and absorption of nutrients in feed (Esmail, 2012). Broiler chicken production is a vital component of the poultry industry, with a primary focus on efficiently achieving optimal growth rates and feed conversion ratios. Broiler chickens are specifically bred for meat production and they are characterized by their fast growth rate and high feed conversion efficiency (Havenstein *et al.*, 2003). They are the most widely consumed poultry meat globally, accounting for approximately 90% of total poultry production (FAO, 2021). Synthetic feed additives such as antibiotic growth promoters (AGP) have been used extensively in broiler production. Birds raised with antibiotics have been reported to produce meat with residual effect which is detrimental to the health of consumers (Al-Harhi, 2002). As a result, many countries of the world have placed a ban on the usage of these products (Cardozo *et al.*, 2011), thus leading to a search for a natural and readily available alternative. Broiler production is characterized by its high economic return due to its short production cycle, therefore this study looked into the effect of the *Tetrapleura tetrapleura* extract on the growth performance parameters of Abor Acre Broiler and its overall productive efficiency.

MATERIALS AND METHODS

The study was carried out at the Poultry Unit, Teaching and Research Farm, Federal University of Technology, Akure, Ondo State. Akure is located between longitude 4.944055°E and 5.82864°E, and

latitude 7.491780°N with annual rainfall ranging between 1300 and 1650 mm and annual daily temperature ranging between 27 and 38 °C (Daniel, 2015). *Tetrapleura tetraptera* fruits used in the study were purchased from Ijare market, Akure north local government area in Ondo state. The peels were removed, air dried, and blended to fine powder. The blended sample was stored in an air tight container until further analysis. The aqueous and ethanolic extracts of pulp, seeds and whole fruit of *T. tetraptera* were prepared using cold maceration method of extraction. Exactly 50 g each of the coarsely powdered pulp, seeds and whole fruit were kept in contact with 250 ml of the solvents (distilled water and ethanol) in stoppered containers. They were then allowed to stand at room temperature for 72 h with frequent agitation until the soluble matter got dissolved. The mixtures were then strained, the marc (the damp solid material) pressed and the combined liquids clarified by filtration through whatman No.1 filter paper (125 mm) to get filtrate as extracts. The aqueous and ethanolic extracts were concentrated at 100 °C and 78 °C respectively to one-quarter of the original volume using rotary evaporator. The dried extracts were then stored in desiccators until required for use where they were dissolved in appropriate volume of solvents to the desired concentration. Chemical analyses of the ethanolic extracted *Tetrapleura tetraptera* and other feed ingredients was done at the Central Research Laboratory of the Federal University of Technology, Akure. Ninety six day old chicks of Abor Acre breed were purchased from Chi Farm, kilometer 20, Lagos-Ibadan expressway, Ajanla village, Ibadan, Oyo State, Nigeria. Three treatment diets was formulated and replicated four times, ethanolic extracted *Tetrapleura tetraptera* fruit meal was be added at 0%, 0.20% and 0.30% subsequently. The three diets were labelled as D₁, D₂ and D₃ respectively, in which D₁ served as the control diet. The birds was fed with their appropriate diets throughout 6 weeks comprising both starter (1-21days) and finisher (1-42 days) phase. Feed intake was calculated by subtracting the quantity of the left over feed from quantity of feed fed the previous day. Feed conversion ratio calculated by dividing the daily feed intake by daily weight gain.

Table 1: Gross composition of 100kg of the *Tetrapleura tetraptera* extract based diet

Ingredients % of TT	T ₁ (kg) 0.00	T ₂ (kg) 0.20	T ₃ (kg) 0.30
Maize	51.00	51.00	51.00
Soyabean Meal	35.00	35.00	35.00
Fish meal	3.00	3.00	3.00
Wheat offal	6.00	6.00	6.00
Bone meal	2.20	2.20	2.20
Limestone	1.00	1.00	1.0
Premix	0.25	0.25	0.25
Methionine	0.20	0.20	0.20
Lysine	0.10	0.10	0.10
Common salt	0.25	0.25	0.25
Vegetable Oil	1.00	1.00	1.00
Total	100.00	100.00	100.00

T₁ = Diet control and 0.00% TT Inclusion; T₂ = Diet with 0.20% inclusion; T₃= Diet with 0.30% TT inclusion; TT= *Tetrapleura tetraptera*

Results and Discussion

Table 2 shows the performance of broiler chickens fed *Tetrapleura tetraptera* inclusion diet for 1 to 21 days. The result showed that there were no significant differences ($P > 0.05$) in all the parameters measured. However, those fed control diet had numerically higher final weight, weight gain, feed intake and better feed conversion ratio. The control diet performance accede with the findings of Essien (2021) who reported highest weight gain in the control diet compared to diets with *Tetrapleura tetraptera* powder inclusion, this variation can be due to the higher concentration of bioactive compound present in the extract used compared to powder. There is complex activity of phytochemicals in the 0.2 % *Tetrapleura tetraptera* inclusion level (Adedokun *et al.*, 2020). Tannins, for instance, bind with digestive enzymes, slowing down digestion and nutrient absorption (Akintola *et al.*, 2015). The findings of (Nweze *et al.*, 2011) stated that *Tetrapleura tetraptera* fruit meal

inclusion at more than 2.0% will slightly reduce the voluntary feed intake of broilers, this reduction in feed intake could be due to the tolerable level of anti-nutritional factors and the pungent insect-repellant aroma of *Tetrapleura tetraptera* (Aladesanmi, 2006). The feed conversion ratio (FCR) in the dietary treatment group indicates that D1 (1.75) is the best at the starter phase, this means there is efficient utilization of the control diet by the starter broilers in the group.

Table 3 shows the result observed in broilers raised to 42 days. There were significant differences ($P < 0.05$) in the final weight and weight gain of broiler chicken fed *Tetrapleura tetraptera* inclusion diet at 0.2% and 0.3% respectively. Adedokun *et al.* (2020) observed in his study that broiler chickens fed diets with 0.2% *Tetrapleura tetraptera* powder exhibited accelerated weight gain and enhanced feed utilization. Solomon *et al.* (2022) and Okon *et al.* (2022) also reported significant ($P < 0.05$) differences in final weight and average weight gain of broilers and rabbits fed *Xylopiya aethiopica* respectively. There were no significant differences ($p > 0.05$) in feed intake and feed conversion ratio. The feed intake and conversion ratio of the birds in both starter and finisher appeared to be better in broilers fed control diet compared to those fed *Tetrapleura tetraptera* supplemented diets although there were no significant differences ($p > 0.05$). Spices have been reported in a study by Rajalakshmi (2013) to have stimulating effect on appetite and enhanced the secretion of endogenous digestive enzymes which could result in improved growth performance. *Tetrapleura tetraptera* shows promise as a feed additive for improving broiler chicken performance and feed efficiency. Studies suggest that incorporating *Tetrapleura tetraptera* into diets at tolerable levels can positively impact feed conversion ratio (FCR), the measure of feed consumed per unit of weight gained. Studies have also shown that incorporating Aidan fruit powder or leaf extract into broiler diets can significantly improve feed conversion ratio, meaning birds achieve greater weight gain with less feed consumption. This translates to reduced feed costs and improved production efficiency for farmers (Ingweye *et al.*, 2019; Okorie *et al.*, 2020). Thus accounting for the reduced feed intake of *Tetrapleura tetraptera* supplemented diets in the various group of broilers.

Table 2: Performance of broiler fed *Tetrapleura tetraptera* based diet for 1 – 21 days

Parameters	D1	D2	D3	SEM	P-VALUE
Average initial weight(g)	37.5	37.5	37.5	0.001	0.610
Average Final weight(g)	432.5	400.0	402.5	7.580	0.145
Weight gain(g)	395.0	362.5	365.0	7.580	0.145
Average Feed consumed(g)	691.7	675.8	682.5	6.601	0.679
Feed conversion ratio	1.75	1.87	1.87	0.38	0.74

Values are means of duplicates, D1= Diet 1, D2= Diet 2, D3= Diet 3 and SEM = Standard Error of Mean

(Significant level= $p < 0.005$)

Table 3: Performance of broiler fed *Tetrapleura tetraptera* based diet for 1-42 days

Parameters	D1	D2	D3	SEM	P-VALUE
Average initial weight(g)	37.5	37.5	37.5	0.001	0.610
Average Final weight(kg)	1.65 ^a	1.38 ^b	1.36 ^b	0.060	0.040
Weight gain(kg)	1.61 ^a	1.33 ^b	1.32 ^b	0.060	0.040
Average Feed consumed(kg)	3.16	2.97	2.95	0.046	0.118
Feed conversion ratio	1.97	2.25	2.24	0.067	0.139

Values are means of duplicates, D1= Diet 1, D2= Diet 2, D3= Diet 3 and SEM = Standard Error of Mean

(Significant level= $p < 0.005$)

CONCLUSION

This study showed that ethanolic extract of *Tetrapleura tetraptera* inclusion did not significantly affect the growth performance of broiler chicken at the tested levels in the current study, this highlights the need for further research with lesser dosage application to fully understand the plants potential. Its

inclusion should be at reduced levels to ensure the availability of beneficial compounds like tannin and flavonoid responsible for accelerated weight gain in broilers fed with the *Tetrapleura tetraptera* inclusion diets.

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