



## Performance, heamatological and serum biochemical Indices of broiler finisher Chickens fed toasted *Faidherbia albida* pods and seeds meal supplemented with multi- enzymes

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### ABSTRACT

Ninety six (96) Anak-2000 white strain broiler finisher chickens were used to evaluate performance, haematological and biochemical indices. The birds were randomly allocated to four (4) dietary treatments of twenty four (24) birds per treatment, replicated three (3) times with eight (8) birds per replicate in a complete randomized design (CRD), the experimental diet were formulated with *faidherbia albida* pods meal included in the feed across at the level of 0.0%, 2.0%, 4.0% and 6.0% representing T1, T2, T3 and T4 respectively, data on performance was collected to include feed intake, weight gain, and feed conversion ratio (FCR) was later calculated. The study lasted for twenty eight (28) days and the data generated were analyzed using one way analysis of variance (ANOVA). The chemical composition of the diet were analyzed to determine the CP, EE, CF, Ash, moisture and NFE calculated by the methods of (AOAC). The crude protein ranges from 14.15 – 20.05 and the performance results shows the initial weight ranged 1450 – 1825kg and was significantly different ( $P < 0.05$ ). Body weight gain ranges from 893.75 – 1017.92kg. Average body weight gain 31.32 – 45.61kg. Total feed intake 105.21 – 125.15kg. After the experimental period, the birds were starved and blood samples collected from 3 birds across the treatment groups through the jugular vein, 5mls of blood was collected into anti-coagulant free bottle for biochemical analysis which includes glucose, cholesterol, urea, creatinine, albumin, globulin and total protein. The result showed non-significant different ( $P > 0.05$ ) for all parameters except globulin with ranges of 18.69 – 30.25. The haematological analysis showed mean corpuscular volume (MCV), mean corpuscular haemoglobin concentration (MCHC), Red blood cells (RBC), white blood cells (WBC), haemoglobin (HB), packed cell volume (PCV) and mean corpuscular haemoglobin (MCH) were not ( $P > 0.05$ ) significantly different across all treatment groups. The proximate analysis of the test diet revealed CP 31.20%, EE 7.60%, CF 16.20%, NFE 30.15% and ME (kcal/kg) 2784.01. It is therefore concluded that the test diet *Faidherbia albida* pods meal can be included into the diet of broiler finisher chickens up to 6% without adverse effect on performance and

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*blood profile/indices. Further research into including higher levels of the test diet should be undertaken.*

## INTRODUCTION

Poultry has been identified as a fastest means of bridging the protein deficiency gap prevailing in most tropical like Nigeria (FAO, 2006). Poultry production is unique because it offers the highest turnover rate and quickest returns to investment outlay, livestock enterprise finds invested in poultry production are recovered faster than any other livestock enterprise. The rate of growth in population of poultry is higher when compared with ruminants and other monogastric animals and could be the cheapest, common and the best source of animal protein (Sobamiwa, 2000)

The aim of every farmer is to reduce cost of production and maximize profits, the ever increasing cost of conventional feed resources for livestock production has remain a serious impediment to meeting the demand for animal production. The cost of feeding has been estimated to account for up to 70% of the cost of broiler production (Adejinme *et al.*, 2000).

Efforts to increase crop production to a level that can satisfy both human and animals need to look elsewhere for an alternative, the poultry producer will then ask "what is the way out" the production of low priced high quality safe feed may be seen to be a way out (Abu, 2013). Thus

improvement and sustainable growth of poultry production entails alternative feed resources which must be cheap, abundant and not in competition with other demands. Hence the need to exploit plant products such as *faidherbia albida* pod meal.

## MATERIALS AND METHODS

The study was conducted at the College of Agriculture, livestock and research farm Jalingo, Taraba state. Jalingo is located between latitude 8°53N and longitude 11°23E. The area has an annual rain fall ranging from 1000 – 1500mm and temperature of 30 – 38°C (Encarta, 2009).

### Experimental Design, Diets and Management

Ninety six (96) five weeks old broiler chickens were used for the study. The birds were randomly allotted to four treatments of 24 birds with each replication having 8 birds respectively in a completely randomized design (CRD). The birds were managed on deep litter throughout the experimental period. Daily management practices as described by (Oluyemi and Roberts, 2004). Four experimental diets were formulated containing 0%, 2%, 4% and 6% *Faidherbia albida* pods meals respectively.

**Table 1:** Composition of the Experimental diet

Ingredients	T1	T2	T3	T4
Maize	50.10	48.40	42.90	38.90
Maize offal	17.00	19.00	20.00	21.00
*FAD	0.00	2.00	4.00	6.00
GNC	20.00	19.00	14.00	12.00
Fish meal	8.00	8.00	8.00	8.00
Palm oil	0.80	0.80	0.80	0.80
Borne meal	3.00	3.00	3.00	3.00
Salt	0.30	0.30	0.30	0.30
**Premix	0.30	0.30	0.30	0.30
Lysine	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25
*** Full enzyme®	0.00	0.00	0.00	0.00
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

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Calculated	chemical composition					
Crude protein	20.27	20.07	20.12	20.20		
Crude fibre	3.67	4.50	4.72	4.93		
Calcium	0.93	1.25	1.29	1.31		
Phosphorus	0.89	0.93	0.95	0.98		
ME/Kcal/kg	2899.72	2876.23	2893.23	2890.48		

\*\* Mineral premix provides per kg the following: Vit A 1500µ, Vit D<sub>3</sub> 3000 µ, Vit E 30 µ, Vit K<sub>2</sub> 5 µ; Thiamine B<sub>1</sub> 3mg; Riboflavin B<sub>2</sub> 6mg; Pyrodoxine B<sub>6</sub> 4mg; Niacin 40mg; Vit B<sub>12</sub> 0.02mg; Pantothenic acid 10mg; Folic acid 1mg; Biotin 0.08g; Chloride 0.125g; Mn 0.096g; Antioxidane 0.125g; Zn 0.06g; Fe 0.024g; Cu 0.006g; Selenium 0.24g; Co 0.240g; Iodine 0.0014g.

\*\*\* ME (kcal/kg) 37 X CP (%) + 81 X EE(%) + 35.5 X NFE (%) (Pauzenga, 1985)

\*\*\*\* Full enzyme® provides the following cellulose 10000 µ, Beta glucanase 200 µ, Xylanase 10000 µ, Pytase 2500 µ (Polchen Hygiene Laboratories PVT Ltd. India).

### Data Collection

Feed intake was determined as the difference between the left over and the quantity of feed offered. Similarly, weight gain was determined as the difference between the final weight and initial weight. Feed conversion ratio was measured as an index of feed utilization for each treatment group and calculated as the ratio of feed intake to weight gain.

### Haematological and Biochemical Analysis

At the end of the experiment, three birds were selected at random from each replicate, 5mls of blood was collected from the wing vein of each bird into sterilized bottles containing Ethylene-

diaminetetra-acetic acid (EDTA) for haematological parameters determination as described by (Schrews, 2000). The data generated from the blood analysis was used to calculate the erythrocytic parameters which include the mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC) as described (Sirois, 1995). Similarly, 5mls of blood samples were also collected into sterilized bottles without (EDTA) for biochemical analysis. Parameters determined were total protein, serum, albumin, creatinine, glucose, urea, cholesterol and globulin.

**Table 2:** Proximate analysis of experimental diets and *Faidherbia albida*

Parameters	T1	T2	T3	T4	FAP	
Crude protein	14.15	16.33	18.42	20.05	31.20	
Ether extract	6.80	7.00	7.85	8.50	7.60	
Crude fibre	7.85	8.20	9.00	9.65	16.20	
Ash	7.50	7.50	7.40	7.00	5.85	
Moisture	7.80	7.83	8.00	8.00	9.00	
Nitrogen free extract	55.90	53.14	49.33	46.80	30.15	
ME (kcal/kg)	3037	3030	3038	3058	2784	
Mineral and antinutrient composition of <i>Faidherbia albida</i>						
FAP	Ca	P	Tannins	Saponins	Oxalate	Alkaloids
	625.15	429.42	7.33	2.15	6.22	3.85
	625.16	429.44	7.35	2.16	6.24	3.86

ME: Metabolized energy (kcal/kg) estimate using the methods of Pauzenga (1985)

37 X CP + 81 X EE + 35.5 X NFE. FAP *Faidherbia albida* pods

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### Chemical Analysis

The chemical analysis of the experimental diets, and toasted *Faidherbia albida* pods meal, mineral and anti-nutritive components were carried out according to the methods described by (AOAC, 2000).

Data collected were subjected to analysis of variance (Steel and Torrie, 1980) and significant differences between means were compared using Duncan's multiple range test (Duncan, 1955).

### RESULTS AND DISCUSSION

The nutrient contents of the experimental diets and *Faidherbia albida* is shown in table 3. The crude protein contents of the experimental diets range from 14.15 – 20.06 which was adequate for broiler finishers. Aduku and Olukosi, (1990) recommended 20% protein levels for broilers reared in tropical area. The quantity and quality of protein are critical factors to be considered in poultry industry, this is because voluntary feed intake (VFI) has been found to increase with improvement of protein quality.

The metabolizable energy (2784.05 – 3035.94). The energy levels in the diets were higher than 3000kcal energy requirement of broilers in T1 and T3 while T2 and T4 were lower than that recommended for broiler finishers (Aduku and Olukosi, 1990). From the results therefore, it is apparent that, all the diet met the minimum requirement levels for ME, CP, CF and EE.

The result for performance of broilers fed *Faidherbia albida* pods meal as shown in table 3 revealed initial weights which ranges from 495.83 – 556.25 which was slightly higher than initial body weight recommended by (McDonald *et al.*, 2002).

Final weight average means obtained in this study ranged from 1450.00 – 1825.00kg. There was significant ( $P < 0.05$ ) difference among treatment groups. The values were higher than reported by (McDonald *et al.*, 2002) who reported that broiler should attain 1.3kg live weight at 9 – 10 weeks of age.

Daily weight gain was significant ( $P < 0.05$ ) across the treatment groups. Birds on

T2 had higher daily weight gain of 45.61g compared to 35.87, 36.35 and 31.92 for T4, T1 and T3 respectively. The result was similar to that obtained by (Soniya *et al.*, 1986).

The result obtained for average daily feed intake indicates that there was no significant ( $P > 0.05$ ) difference in the mean feed intake value among treatment groups.

The value for T3 and T2 were higher than 115.12g for daily feed intake reported by (Oluyemi and Robert, 2002). This variation may be due to the environmental differences in which the birds were raised despite the fact that birds were in the same growing stage.

The feed conversion ratio did not differ ( $P > 0.05$ ) significantly. The feed conversion ratio ranges from 2.71 – 3.44 in the present study compared to 2.65 – 2.85 reported by Soniya *et al.*, (1986) when broiler finisher were fed diet fortified with *Faidherbia albida* pods meals alone.

Table: 3 show the record of the haematological parameters obtained during the study, the result indicate that there was no significant ( $P > 0.05$ ) different in the treatment means in all the parameters evaluated. The range 26.00 – 30.00, 8.34 – 9.67, 27.67 – 32.21% for PCV, Hb and MCHC respectively were similar to what was reported by (Agvikee *et al.*, 2012). The non-significant in the aforementioned parameters, despite level of *Faidherbia albida* pods meals across the treatment suggested that the protein in diet is of good quality. The RBC values range from  $3.68 - 3.99 \times 10^{12/L}$  which is higher than the value recorded by Yakubu and Alfred, (2014) and similar to that of Danladi *et al.*, (2016). The value of WBC range from  $18.89 - 19.94 \times 10^9/L$  and showed no significant ( $P > 0.05$ ) difference across treatments. It shows therefore that there was no pathological effect induced by the inclusion of the test diet.

The values of all parameters fall within the normal range reported by Aduku and Olukosi (1980). These values recorded in this study implies that up to 6% *Faidherbia albida* pods meal could be included in broiler diet without compromising their health status. Deviation of erythrocytes values from the normal may be an indication of anaemia (Antyev *et al.*, 2013).

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The result of the biochemical indices showed that glucose range from 8.15 – 8.99 (mmol/L), Cholesterol 2.80 – 3.07 (mmol/L), Urea 0.09 – 0.65 (mmol/L), Creatinine was 44. 25 (mmol/L) across all dietary treatments, Albumin 11.68 – 14.18 (g/l), Globulin 18.68 – 36.25 (g/l) and Total protein 31.83 – 45.41 (g/l), cholesterol values were low, but could be attributed to the presence of saponins and tannins in the *Faidherbia albida* seed pods meal which might have interfere with the absorption of cholesterol lowering effect. Antyev *et al*, (2017a) reported that saponin and tannin in diets have been known to reduce the uptake of certain nutrients like glucose and cholesterol and help in reducing the metabolic burden that have been placed on the liver. Antyev

*et al*, (2017a) reported that the protein and albumin are indicators of the total protein reserve in an animal body. The values of creatinin were not influenced by the dietary treatments and this indicates the adequacy of protein content in all the diets. The values of urea were not influenced by the dietary treatments, this result agrees with Banerjee (1998) who reported on the study with *sesame* seed meal in poultry.

The glucose values obtained in this study agrees with the values of Antyev *et al*, (2017a) who worked on processing methods of *jatropha curcas* on the blood profile of broiler finisher chickens.

The result of biochemical indices is seen as presented in table 5.

**Table 3:** Haematological indices of broiler finisher fed graded levels of toasted *Faidherbia albida* pods meal supplemented with enzyme

Parameters	Treatments				SEM
	T1	T2	T3	T4	
MCV(v)	75.00	75.00	70.45	74.36	1.31NS
MCHC(g/dl)	32.20	32.21	32.05	27.67	1.17NS
RBC(X10 <sup>12</sup> /L)	3.93	3.99	3.68	3.90	0.09NS
WBC(X10 <sup>09</sup> /L)	18.89	19.03	19.94	19.05	0.27NS
HB(g/dl)	9.50	9.67	8.34	9.30	0.38NS
PCV (%)	29.50	30.00	26.00	29.00	0.17NS
MCH (pg)	24.17	24.17	22.59	23.92	0.43NS

**Table 4:** performance of broiler finisher fed graded levels of toasted *Faidherbia albida* pods meal supplemented with enzyme

Parameters	Treatments				SEM	
	T1	T2	T3	T4		
Initial weight(g)	556.25a	547.92a	542.08a	495.83b	1.47*	
Finial weight(g)	1450.00c	1825a		1560b	1500b	2.36*
Body weight gain(g)	893.75c	1277.08a	1017.92b	1004.17b	2.40*	
Average daily WG(g)	31.92c	45.61a	36.35b	35.87b	0.18*	
Average feed intake(g)	105.21	123.71	125.15	109.77	8.48NS	
Feed conversion ratio	3.30	2.71	3.44	3.06	0.41NS	
Mortality	2.33	2.00	1.67	1.33	0.55NS	

**Table 5:** Biochemical indices of broiler finisher fed graded levels of toasted *Faidherbia albida* pods meal supplemented with enzyme

Parameters	Treatments				SEM
	T1	T2	T3	T4	
Glucose(mmol/L)	8.72	8.15	8.40	8.99	1.03NS
Cholesterol(mmol/L)	3.03	2.80	2.78	3.07	0.15NS

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Urea (mmol/L)	0.09	0.65	0.57	0.63	0.06NS
Creatinine(mmol/L)	44.25	44.25	44.25	44.25	33.49NS
Albumin(g/l)	9.17	14.18	11.68	12.93	1.26NS
Globulin (g/l)	36.25a	18.68b	19.32ab	19.99ab	3.30*
Total protein (g/l)	45.41	32.87	31.83	35.34	4.40NS

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