



## EVALUATION OF GROUNDNUT HAULMS ON GROWTH PERFORMANCE AND HEMATOLOGICAL INDICES OF BROILER FINISHER IN SEMI-ARID ZONE OF BORNO STATE

A. Mustapha<sup>1</sup>, A. A. Makinta<sup>1</sup>, A.A. Muhammad<sup>2</sup>, B. Adamu<sup>3</sup>, I. Sani<sup>4</sup>  
and A.A. Benisheikh<sup>1</sup>

<sup>1</sup>Department of Agricultural Science and Technology, Ramat Polytechnic, Maiduguri, Borno State, Nigeria

<sup>2</sup>Department of Animal Science, University of Maiduguri, Borno State, Nigeria.

<sup>3</sup>Department of Agricultural Technology, Adamawa State Polytechnic, Yola, Adamawa State. Nigeria

<sup>4</sup>Department of Animal Health and Husbandry, Audu Bako College of Agriculture, Dambatta Kano State

### ABSTRACT

An experiment was conducted to evaluate growth performance and haematological profiles of broiler chickens fed varying levels of groundnut haulm as a source of protein. A total 100 day old chicks from Amo Hatchery were used for the study. The chicks were randomly allocated to four dietary treatments replicated three times in a Completely Randomized Design. The groundnut haulms was fed to the birds at 2 %, 4 % and 6 %. Blood samples were collected through the wing vein. Haematological parameters such as PCV, Hb, RBC, WBC, MCV, MCH and MCHC were determined. Results on growth performance showed that there were significant ( $P < 0.05$ ) difference among the growth parameters measured, except the initial weight, daily feed intake and feed conversion ratio. All the haematological parameters differed significantly ( $P < 0.05$ ) across the treatments, except mean corpuscular haemoglobin concentration (MCHC). Furthermore, the replacement of Groundnut meal for the groundnut haulm at 6% favoured normal growth and physiological function without adverse effects on the haematological profile of the broilers. However, differences observed in the treatments do not pose any adverse effect on the health status of the animals. Groundnut haulm can favorably replace groundnut meal up to 6 % level of inclusion in the diet of finishing broiler.

**Keywords:** Amo; Groundnut haulms; Haematological indices; Broiler finisher

### INTRODUCTION

Feed supply is the major limiting factor in poultry production in developing countries like Nigeria (Nwagu, 2005). Feed alone account for 65-80 of total cost of poultry production (Yegany *et al.*, 2002). For this reason, animal nutritionist resorted to replacing the

conventional feed ingredient with non-conventional that are cheaper alternative to energy and protein sources (Ezieshi, and Olomu 2004; Okeudo *et al.*, 2005, Okon and Ogunode, 2006). Groundnut haulm is one of the most commonly available non-conventional feed ingredients used to replace groundnut meal in poultry ration. However, very high fibre level limits its utilization by broiler birds. Groundnut haulm contains appreciable protein content (15-80%) that could serve as a protein source in broiler diets (Leeson, 2009). This study evaluated groundnut haulms as a protein source in the diet of broilers.

## **MATERIALS AND METHODS**

### **Experimental Site**

The study was carried out at livestock unit of Teaching and Research Farm, Department of Animal Production Technology, Ramat Polytechnic, Maiduguri, Borno State, Nigeria. Borno State is located between Latitudes 11<sup>0</sup>5' and 12<sup>0</sup> N and Longitudes 13<sup>0</sup> 05' and 14<sup>0</sup> E at an altitude of 354m above sea level (DNMA, 2013). The area falls within Sahel region of West Africa which is noted for its climatic and seasonal variations. The rainfall duration is very short (3-4 months) with an average of 645.9 mm/annum with a long dry season of about 8-9 months (Encarta, 2007). The ambient temperature could be as low as 20<sup>0</sup>C during the cold season and as high as 40<sup>0</sup>C during the hot season. Relative humidity is 30-40% in August which usually lowers to 5% in December and January. Day length varies from 11-12 hours

### **Experimental Design and Management of Experimental Animals**

A total of 100 day old chicks from Amo Hatchery were used for the study. The chicks were brooded together using black charcoal with kerosene for heat production. An electric bulb was used at night to illuminate the house and lantern is provided in case of power failure. A commercial broiler starter was provided and water was given *ad libitum* throughout brooding period. At the end of two weeks brooding phase, the chicks were divided into four groups Treatment 1 (T1) is the control, Treatment 2 (T2), Treatment 3 (T3) and Treatment 4 (T4) were fed groundnut haulm at 2 %, 4 % and 6 % respectively. The chickens were kept on deep litter system. Vaccination schedule for Newcastle and Gumboro diseases were strictly observed.

### **Experimental Diets**

The feed ingredients used for this experiment were groundnut haulms, groundnut cake, wheat offal, maize, common salt, lysine, premix and methionine. The feed ingredients were ground and mixed together before feeding to the birds.

### **Data Collection**

### **Hematological Parameters**

At the end of the experiment, blood samples were collected from the wing web. The blood samples were collected in sample bottles containing dipotassium salt of ethylene

diamine–tetra acetic acid (EDTA–K<sup>2+</sup>) which served as an anticoagulant. The hematological analysis of blood samples was carried out using the routinely available clinical methods (Bush, 1975). The hematological indices determined were packed cell volume (PCV), hemoglobin concentration (Hb), red blood cell (RBC) counts and white blood cell (WBC) counts and differential counts. Mean corpuscular hemoglobin (MCH), mean corpuscular volume (MCV) and mean corpuscular hemoglobin concentration (MCHC) were obtained from calculation according to standard formulae (Jain, 1986).

### Chemical and Statistical Analysis

The samples of the experimental diets were analyzed for proximate analysis according to AOAC (2002) procedure. Data generated from the hematological indices were subjected to one-way analysis of variance (ANOVA) using Steel and Torrie (1980). Means were separated using the Duncan’s multiple range test (Duncan, 1955).

Table 1: Composition of the experimental diets (%)

Ingredients	Treatments			
	T1 (0%)	T2 (2%)	T3 (4%)	T4 (6%)
Maize	50.00	50.00	50.00	50.00
Groundnut cake	19.00	17.00	15.0	13.00
Groundnut haulms	--	2.00	4.00	6.00
Wheat offal	11.00	11.00	11.00	11.00
Wheat offal	11.00	11.00	11.00	11.00
Fish meal	5.00	5.00	5.00	5.00
Methionine	0.20	0.20	0.20	0.20
Lysine	0.20	0.20	0.20	0.20
Common salt	0.30	0.30	0.30	0.30
Bone meal	3.00	3.00	3.00	3.00
Premix	0.30	0.30	0.30	0.30
Total	100.00	100.00	100.00	100.00

## RESULTS AND DISCUSSION

### Proximate Composition of the Experimental Diets

The Proximate composition of the experimental diets is presented in Table 2. The dry matter content was similar among the treatments, which ranges between 96.81 in T1 and 96.91% in T4. The crude protein values were adequate as recommended by Olomu (2011) for broiler finisher in Nigeria. The values recorded for crude fiber were within the normal ranged of 12 to 15% (CF) as reported by Murthy *et al.* (2006) for broilers. Muhammad and Oloyede (2004) also reported dietary fibre content in the range of 8 to 10% (CF) and as the ideal level for broilers. The ether extract of the diets ranged from 5.00 to 5.66% among the treatments. The values for ether extract (EE) in all the treatments are within the recommended level. The optimum levels in all dietary treatment were within the required levels.

Table 2: Proximate composition of the experimental diets

Ingredients (%)	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	SEM
Dry matter	96.81	96.82	96.58	96.91	0.22 <sup>NS</sup>
Moisture content	3.18	3.17	3.41	3.08	0.057 <sup>NS</sup>
Crude protein	21.67 <sup>a</sup>	20.33 <sup>ab</sup>	19.33 <sup>bc</sup>	18.00 <sup>c</sup>	0.47*
Crude fibre	5.00 <sup>b</sup>	6.33 <sup>ab</sup>	7.00 <sup>ab</sup>	7.67 <sup>a</sup>	0.399*
Either extract	5.66 <sup>a</sup>	5.66 <sup>a</sup>	5.00 <sup>a</sup>	5.66 <sup>a</sup>	0.500 <sup>NS</sup>
Ash	3.66 <sup>a</sup>	3.00 <sup>a</sup>	3.66 <sup>a</sup>	4.00 <sup>a</sup>	0.47 <sup>NS</sup>

a,b means within the same row bearing different super script differs significantly (P>0.05)  
NS = not significant. SEM= Standard Error Mean. \* = significant

### Growth Performance of Broiler Chickens Fed Different Level of Groundnut Haulms

The growth performance of Broiler chicken fed different levels of groundnut haulms are presented in Table 3. The result showed that there were no significant (P>0.05) difference among the treatments in the initial weight, daily feed intake and feed conversion ratio. Treatments 1 recorded lower (P >0.05) daily weight gain, which is similar to Treatment 2, compared to Treatment 4. It appeared that the daily weight gain increased with increasing level of ground nut haulm. However, the final weight gain also increased with the increasing level of groundnut haulm. The level of groundnut haulm favors reasonably feed intake which corresponded with the final weigh gain (NRC, 1994).

Table 3: Effects of groundnut haulms on growth performance of finishing broiler chicks

Parameters	Diets (Treatment)				SEM
	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	
Initial weight (g)	866.25	860.94	865.83	869.20	2.88 <sup>NS</sup>
Daily weight gain (g)	46.89 <sup>c</sup>	48.43 <sup>bc</sup>	49.00 <sup>b</sup>	53.24 <sup>a</sup>	0.59*
Final weight gain (g)	2438.90 <sup>c</sup>	2500.40 <sup>c</sup>	2618.80 <sup>b</sup>	2776.90 <sup>a</sup>	23.48*
Daily feed intake (g)	113.78	126.57	132.57	132.67	2.37 <sup>NS</sup>
Feed conversion Ratio	2.25	2.58	2.71	2.46	0.123 <sup>NS</sup>

a,b means within the same row bearing different super script differs significantly (P>0.05)  
NS = not significant SEM= Standard Error Mean \* = significant

Table 4: Haematological profile of finishing broiler fed experimental diets

Blood Constituents	Treatments				SEM
	T1	T2	T3	T4	
Packed cell volume (%)	24.000 <sup>b</sup>	28.333 <sup>a</sup>	29.333 <sup>a</sup>	24.000 <sup>b</sup>	1.5333*
Hemoglobin concentration (g/100ml)	8.0667 <sup>b</sup>	9.4333 <sup>a</sup>	9.7333 <sup>a</sup>	7.9667 <sup>b</sup>	0.5333*
Red blood cell count (x10 <sup>6</sup> mm <sup>3</sup> )	17.067 <sup>b</sup>	18.123 <sup>b</sup>	20.067 <sup>a</sup>	18.333 <sup>b</sup>	1.0541*
White blood cell (x10 <sup>6</sup> mm <sup>3</sup> )	13.367 <sup>c</sup>	14.733 <sup>b</sup>	15.333 <sup>a</sup>	13.533 <sup>c</sup>	0.7618*
Mean corpuscular volume (fl)	14.099 <sup>b</sup>	15.581 <sup>a</sup>	14.594 <sup>b</sup>	13.385 <sup>c</sup>	0.8057*
Mean corpuscular hemoglobin (pg)	4.74427 <sup>b</sup>	5.1876 <sup>a</sup>	4.8426 <sup>b</sup>	4.4095 <sup>b</sup>	0.2767*
Mean corpuscular hemoglobin Concentration (%)	33.611 <sup>a</sup>	33.294	33.182	33.194	0.0082 <sup>NS</sup>

bc= means within the same row bearing different super script differ significantly (P>0.05).  
NS = not significant (P>0.05), SEM = standard error of mean, \* = significant

## Hematological Indices

All haematological parameters were significantly ( $P < 0.05$ ) different among the treatments except mean corpuscular haemoglobin concentration (MCHC) which was not affected ( $P > 0.05$ ) by the inclusion of level of groundnut haulms. The packed cell volume (PCV) and haemoglobin concentration (Hb) values in treatment 2 and treatment 3 were significantly ( $P < 0.05$ ) higher than those from treatment T1 and treatment T4. However, lower values were recorded in Treatments 1 and 4. The PCV values (24.00 – 29.333%) and Hb values (7.9667 – 9.7333%) fall slightly lower than normal range as reported by Anon (1980). The values obtained were within the range of 7 – 13g/dl as reported by Asiquo and Ubosi (1989). Haemoglobin parameter is good indicators of physiological status of animals and its changes of values in assessing the response of animal to various physiological situations (Teway, 2002).

The RBC ranged from 17.067 to 20.067 for diet T<sub>1</sub> and T<sub>3</sub> respectively. The broiler chickens fed diet T<sub>3</sub> had the highest RBC values compared to other treatments. The red blood cell (RBC) values obtained is slightly lower than normal range of 25-32  $10^6/\text{mm}^3$  reported by Anon (1980). The function of the RBC is to transport hemoglobin, which in turn carries oxygen from the lungs to the tissues (Bush, 1991). The values for WBC were ranged from 13.367 to 15.333 for T<sub>1</sub> and T<sub>3</sub> respectively. The white blood cell values of this study fell within the normal range (9 to 31  $10^6/\text{mm}^3$ ) for healthy chicken as reported by Anon (1980). Bush, (1991) reported that high level of white blood cell (WBC) indicates that the body is fighting infection while lower value shows problems with the bone marrow production which was not seen in the animals of the present study. The animals fed diet T<sub>4</sub> recorded lowest value of mean corpuscular volume (MCV) compared to other treatments. The MCV values which is between 13.38 and 15.58fl is comparable to other reports (Anon, 1980) for normal healthy chickens. Bush (1991) explained that the MCV values aid in assessing the anemia conditions of an animal and the capacity of the bone marrow to produce red blood cells of normal size and metabolic capacity. This observation was supported by Anon (1980) who reported that hemoglobin reflects the responsiveness of the animal to its internal and external environment which include nutritional status. The mean corpuscular hemoglobin values obtained from the present study was in-line with the values reported by Anon (1980). The mean corpuscular hemoglobin concentration values (which ranged from 33.182 to 33.611%) were within the range of 32 to 42% recommended by Gambo *et al.* (2011). The differential counts (%) parameters are associated with body defense mechanism. All the parameters were not significantly ( $P > 0.05$ ) different among the treatment groups. The values are within the reference values for healthy chickens as recommended by Gambo *et al.* (2011).

## CONCLUSION

The utilization of the groundnut haulms for broiler finisher had no deleterious effect on the performance and health conditions of the animals. Groundnut haulm could be included up to 6% in diet of Amo Broilers.

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