



RESEARCH ARTICLE

Comparison of Haematological Parameters and Weight Changes of Broiler Chicks Fed Different Levels of *Moringa Oleifera* Diet

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ARTICLE INFO

Received: October 26, 2012
Revised: October 29, 2012
Accepted: November 27, 2012

Key words:

Broiler chicks
Haematological parameters
Moringa oleifera

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ABSTRACT

The effect of inclusion of *Moringa oleifera* leaf meal at two different levels on the performance and haematological parameters of broiler chicks were compared in this study. One hundred and eight two weeks old broilers were used in the study. The chicks were randomly assigned to the three dietary treatments, such that each treatment had three replicates of 12 chicks per replicate and 36 chicks per treatments. The dietary treatments comprise of T₁ which had no *Moringa oleifera* leaf meal (0 %) and therefore served as the control, T₂ contained 10 % *Moringa oleifera* leaf meal, while T₃ had 15 % *Moringa oleifera* leaf meal. The experiment lasted for five weeks during which time the effect of *Moringa oleifera* on the weight and hematological parameters were monitored as indices of performance. The result of the final weight of the birds appeared in the order T₂ > T₃ > T₁ (1910.25 > 1863.30 > 1705.62 g), the daily weight gain also followed the same trend, T₂ recorded 44.81 g/d > T₃ (43.96 g/d) > T₁ (38.98 g/d): Birds on T₂ also had the highest PCV value of 47.45 % while birds on control diet had the least PCV value of 23.7 %. Similarly birds on T₂ had the highest RBC value of $2.73 \pm 1.13 \times 10^6/m$. and highest HB value of 17.32 ± 0.70 was recorded for birds on T₂ and the least is for those on T₃. The WBC however decreased in numeric values for birds on *Moringa* based diet, while the WBC count was highest for the birds under the control diet (T₁) ($2.73 \pm 0.03 \times 10^3/mm^3$), followed by T₂ ($1.47 \pm 0.06 \times 10^3/mm^3$) and least for birds on T₃ ($1.28 \pm 0.04 \times 10^3/mm^3$). Inclusion of *Moringa oleifera* in broiler ndiet should not exceed 10 % level of inclusion.

Cite This Article as: Ebenebe CI, CO Umegechi, Aniebo and BO Nweze, 2012. Comparison of haematological parameters and weight changes of broiler chicks fed different levels of *Moringa oleifera* diet. Inter J Agri Biosci, 1(1): 23-25. www.ijagbio.com

INTRODUCTION

Poultry production is one of the fastest means of correcting shortage of animal protein supply and consumption in Africa. This is because of their short generation interval, high rate of reproduction and efficiency of nutrient transformation into high quality protein (Akinfela *et al.*, 1999). However, the cost of this transformation is high (Onyimonyi and Oni, 2009), as 80 % of the cost of production is spent on feed. Poultry feeding therefore need to be manipulated to ensure production at most economic rates. Leaf meal protein is one of the protein sources being investigated in recent times (Opara, 1996; Onyimonyi and Oni, 2009). According to Opara (1996), Leaf meal proteins do not only serve as a source of protein but also provides some

necessary vitamins and minerals as well as some oxycarotenoids, though its high content of fibre limits its use for monogastrics (Onu and Otuma, 2008). The leaves of horseradish tree *Moringa oleifera* are potentially inexpensive protein for livestock feeding (Sarwatt *et al.*, 2004), containing 80% DM, 29.7 % CP, 22.5 % CF, 4.38 % EE, 27.8 % Ca and 0.26 % phosphorus (Kakengi *et al.*, 2003). Besides, *Moringa oleifera* leaf meal (MOLM) has been reported to have hypocholesterolemic properties (Fahey *et al.*, 2001), antimicrobial properties (Greg, 2008), natural digestive enzymes (Greg, 2008), blood boosting properties (Fuglie, 1999) and medicinal properties.

One important index of nutritional value of feeds is the hematological analysis as there is a positive correlation between protein quality and levels of

hematological variables of the blood (Adeyemi *et al.*, 2000). The effects of several plant proteins on the hematological parameters of poultry species have been investigated (Jain 1986; Maxwell *et al.*, 1990 and Sjaastad *et al.*, 2000). The growing popularity of the use of *Moringa oleifera* as a feed additive in human and animal nutrition necessitates thorough investigation into its nutritional value, as well its impact on hematological parameters as a measure of both nutritional and medicinal benefits of the leaves in broiler chicks.

MATERIALS AND METHODS

Study Area

The study was carried out in the Biological Conservation Unit of the Department of Zoology, Nnamdi Azikiwe University, Awka, Anambra State. Awka lies in the south eastern Nigeria at latitude 06^o12' 25'N and longitude 07^o 04' and 30^o east.

Experimental Animals

One hundred and eight two weeks old chicks purchased from Bonalux Farms Obosi, Idemili South Local Government Area of Anambra State were used for the study after being left on the experimental site for a period of one week to acclimatize, within the period they were fed with conventional feed. Thereafter, the birds were randomly assigned to three dietary treatments for a period of five weeks, during which time body weight changes were monitored by use of precision weighing balance and the weights recorded to the nearest 0.01 g, feed intake was also monitored and recorded as the difference between the feed given daily and the left over. The chicks were subjected to similar conditions of management and sanitary conditions throughout the period of the experiment.

Experimental Diets

The *Moringa* leaves used in the preparation of the experimental diets were collected from Awkuzu in Oyi Local Government area. The leaves were spread to dry under shade for two weeks thereafter; the leaves were dried under at constant temperature of 30°C for 30 minutes in an oven to make them crispy for easy blending. The leaves were later milled with a hammer mill and sieved with 3 mm mesh to obtain the *Moringa* leaf meal which was incorporated into the diet at 0 % for T₁ chicks, 10 % for T₂ chicks and 15 % level of inclusion for T₃ chicks (Table 1).

Experimental Design/ Livestock husbandry

The chicks were randomly assigned to three dietary treatments, such that there were 36 birds per treatment and each treatment replicated thrice with 12 chicks per replicate in 3 x 3 CRD design. The birds were managed on deep litter floor and were provided with appropriate experimental diets daily and allowed to feed *ad libitum*, clean water was also provided daily.

Blood Collection

At the end of the five week period of the experiment, 5 mls of blood was collected from five randomly selected birds from each treatment via the wing vein into specimen

bottles containing a pinch of Ethylene Diamine Tetra Acetic acid (EDTA) and were subjected to hematological analysis not later than three hours of collection (Jain, 1986). Packed cell volume was determined by Microhaematocrit method, haemoglobin content was determined by Cyanomethaemoglobin methods while the red and white blood cell were determined using haemocytometer of known dimension.

Statistical Analysis

Data generated were analysed using Statistical Analysis Software (SAS, 2002)

RESULTS AND DISCUSSION

Result of the effect of *Moringa oleifera* at the three treatment levels on the weight gain and hematological parameters are presented in Tables (2 and 3), while Table 1 presents the composition of the experimental diets.

Table 1: Composition of Experimental Diets per 100g

Ingredients	T ₁	T ₂	T ₃
Maize	50	50	50
Soyabean	24	22	20
Wheat offal	15	10	7.5
Fishmeal	3.0	2.5	2.0
MOLM	-	10	15
Palm Kernel	5.0	2.5	2.0
Bone meal	2.0	2.0	2.0
Vit/Min Premix	0.25	0.25	0.25
Methionine	0.25	0.25	0.25
Lysine	0.25	0.25	0.25
Salt	0.25	0.25	0.25
Calculated Analysis			
ME Kcal/Kg DM	2839.75	2687.88	2664.83
Crude Protein (%)	20.48	20.92	20.77
Crude Fibre (%)	3.87	5.56	6.33
Ether Extract (%)	3.51	3.67	3.71

MOLM = *Moringa oleifera* leaf meal

Table 2: Performance of broiler chicks on the two levels of *Moringa oleifera* containing diets and the control diet

Parameters	T ₁	T ₂	T ₃	SEM
Initial weight (g/b)	341.34	341.81	342.06	1.21
Final weight (g/b)	1705.62 ^c	1910.25 ^a	1863.30 ^b	46.52
Weight gain (g/b)	1364.25 ^c	1568.44 ^a	1521.24 ^b	42.23
Daily weight gain (g/b/38.98 ^b)	44.81 ^a	44.81 ^a	43.96 ^a	1.81
Feed Intake (g/b/d)	95.30	99.82	101.02	2.11
FCR	2.52 ^a	2.23 ^c	2.32 ^b	0.34

Means with different superscripts are significantly different; g/b = grams per bird; g/b/d= grams per bird per day

Table 3: Haematological Parameters of Broiler Chicks Fed various level of *Moringa oleifera* Leaf Meal (MOLM)

Parameters	MOLM Treatments		
	T1	T2	T3
Haemoglobin (g/dl)	15.82 ± 0.29	19.32 ± 0.34	17.13 ± 6.50
PCV (%)	23.7	47.45	38.05
RBC x 10 ⁶ /mm ³	2.13 ± 0.13	2.73 ± 0.22	2.52 ± 0.21
WBC x 10 ³ /mm ³	2.78 ± 0.03	1.47 ± 0.06	1.28 ± 0.04

PCV= Packed Cell Volume, RBC= Red Blood Cell, WBC= White Blood Cell

The result showed that chicks on T₂ and T₃ fed on *Moringa* based diet performed significantly (P < 0.05) better than the birds of the control T₁ group in terms of higher weight gain (T₂ 1568.44 g/b, T₃ 1521g/b and T₁

1363 g/b) and better feed conversion ratio (T₂-2.23, T₃-2.32, T₁-2.52). This corroborates the report of Fuglie (1999) on high performance of birds fed *Moringa* based diet. The rich content of nutrients (Sarwatt *et al.*, 2004; Kakengi *et al.*, 2003) and antimicrobial properties of *Moringa* (Fahey *et al.*, 2001) may be responsible for these findings. *Moringa* was also reported to have a natural enzyme which aid digestion of fibrous food in animals (Greg, 2008).

T₂ had the highest PCV value of (47.45 %) while birds on control diet had the least PCV value of (23.7 %). The values fall within the normal range of (23-58%) reported for healthy birds (Maxwell *et al.*, 1990). Similarly, birds on T₂ had the highest RBC value of (2.73 ± 1.13 x10⁶/m). The values are also within the range for chickens (Jain, 1986). The highest HB value of (17.32 ± 0.70) is recorded for birds in T₂ and the least is for those of T₃. These values were higher than what was reported for broilers (Sjaastad, *et al.*, 2000). The higher values may be attributed to the influence of *Moringa* on the haematological parameters. The WBC however decreased in numeric values for birds on *Moringa* based diet, while the WBC count was highest for the birds under the control diet (2.73 ± 2.63x10³/mm³) for birds on T₁, followed by (1.47 ± 0.06 x10³/mm³) for birds in T₂ and lowest for birds on T₃ (0.475 ± 0.06 x10³/mm³). The antimicrobial properties of *Moringa* may be responsible for these findings (Fahey *et al.*, 2001). Inclusion of *Moringa* in the diet of broiler chicks resulted in increase in RBC, PCV and HB values confirming the findings of (Fuhglie, 1999) who reported that *Moringa* has a blood boosting and high protein content.

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