

**NSAP****47th Annual
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**SECURING ANIMAL
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GLOBAL CHALLENGES****HAEMATOLOGICAL INDICES OF RABBIT FED GRADED LEVELS OF MORINGA
OLEIFERA LEAF MEAL****Bello B¹., Bitrus G²., Abdulkarim B³ and Abba A. Y³**¹Department of Agricultural Education, College of Education, Waka-Biu, Borno State²Department of Agricultural Education, Federal College of Education Technical, Gombe, Gombe Statebellobabangida50@gmail.com**ABSTRACT**

Abstract: A total of forty-five (45) cross-bred rabbits (New Zealand x Dutch) were fed for ten weeks with graded levels of Moringa oleifera Leaf Meal (MOLM) to determine their haematological indices. The rabbits were between six and seven weeks of age with initial body weights of 51 1.1 lg. They were caged individually and allotted to five different dietary treatments in a Randomized Complete Block Design (RCBD) in groups of nine rabbits per treatment. Each treatment had three replicates having three rabbits each. The treatments consisted diets 1 (control), 2, 3, 4 and 5 having graded levels of MOLM at 0, 5, 10, 15 and 20% respectively. Results obtained showed that, there were no significant ($P>0.05$) differences in initial body weight and daily weight gain, but significant differences ($P<0.05$) were observed in final body weight, daily feed intake and feed conversion ratio. Similarly, Haematological indices showed no significant ($P>0.05$) differences for most of the parameters measured. It can be concluded that feeding MOLM up to 20% had positive effect on the performance of rabbits, especially feed intake and final live weight. The haematological Indices parameters indicated that there were no significant differences among the treatment groups in all the parameters.

Keywords: Haematological Indices, Rabbits, graded levels and Moringa leaves**INTRODUCTION**

There is global awareness of the shortage of animal protein supply in the tropics (1). There has been rising awareness on the virtues of rabbit production in developing countries as a means of all eviating the world's animal protein shortage and (2) attributed this to several advantages of rabbits over other livestock species and advocated its increased production in Nigeria. However, (3) showed that feed accounted for 65 to 75% of the total cost of rabbit production and recommended research into alternative and cheaper feeds for rabbits in Nigeria. There is the need therefore, to explore the use of non-conventional feed resources in rabbit production. One of such feed resource is the moringa leaf. *Moringa oleifera* leaf are good sources of proteins, vitamins A, B and C and minerals such as calcium and iron.

Rabbit grow rapid and their growth rate is comparable to that of the broiler chicken (5). Rabbits are highly prolific and have short generation intervals and the meat has high biological value and contains crude protein (21 %), fat (10%), low cholesterol, low sodium (0.25mg/g) and high proportion of linoleic and linolenic fatty acids.

MATERIALS AND METHODS

The study was conducted at the Livestock Teaching and Research Farm, Department of Agricultural Education, College of Education Waka-Biu, Borno Nigeria. Biu is located between latitude 100 and 40` North and longitude 120 42` East. The minimum relative humidity is 15% in March and the maximum is 74% in August (DNMA, 2013). A total of 45 cross-bred rabbits (Dutch and New Zealand) of mix sex age between six to seven weeks were purchased and used for the experiment. They were randomly allotted to

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five experimental diets in groups of nine per treatment and three rabbits per replicate in a Completely Randomize Design (CRD). The experimental diets and clean drinking water were provided *ad libitum* throughout the experimental period. The experimental diets had diets 1 (control 10%) 2 (5%) and 5 (20%) levels of moringa leaves inclusion. The experiment lasted for 10 weeks. The ingredient composition and calculated analysis of the experimental diets is presented in Table 1.

The data collected, were initial body weight, final body weight, daily feed intake, daily weight gain and feed conversion ration. Carcass parameters were also measured. All feed samples collected were analyzed for proximate analysis using the procedure described by (AOAC, 2000). All means were separated by Least Significant Difference (LSD) (Statistix, 2003).

Processing of Moringa Leaves : Harvested moringa leaves were air dried under shade until they were crispy to touch while retaining their green coloration. The leaves were milled in a hammer mill to a size of 3 mm to obtain a product herein referred to as Moringa Leaf Meal (MOLM) which was stored in the container until needed.

Experimental Stock and Management : A total of 45 cross-bred rabbits (Dutch X and New Zealand white) of mix sex and age ranging from six to seven weeks purchased from rabbit keepers in Biu Local Government Area of Borno State, were used for the Experiment. They were randomly allocated to five (5) treatment levels in groups of three rabbits per treatment and 15 rabbits per replicate. The rabbits were housed individually in cages measuring 35 m x 40cm x 45 cm (width x length x height). The experiment diets and clean drinking water were provided *ad libitum* throughout the experimental period of 10 weeks.

Experimental Diets: The five (5) experimental diets (Table 1) were compounded using the following ingredients: maize, soya beans, wheat offal, groundnut haulms, fish meal, *Moringa oleifera* leaf meal (MOLM), bone meal, salt, mineral vitamin and premix. Diet 1 (control) contained 0% of MOLM, MOLM was included at 5,10,15 and 20% levels in diets 2, 3,4 and 5, respectively.

Experimental Design and duration : The five experimental diets were assigned to the five experimental group in a Completely Randomized Design (CRD). Each treatment was replicated three times with three rabbits per replicate.

Haematological indices determination: When the rabbits were nine weeks of age three rabbits were randomly selected from each treatment. The rabbits were fasted overnight (12h) and bled in the morning (7:00-8:00am) to avoid excessive bleeding. The fasting of rabbits was to avoid the temporary elevation of many blood metabolites by feeding (Jain 1986) Blood samples were collected from the ear veins of the rabbits using sterilized disposable 5 ml syringe and 23- gauge needle. The samples from each replicate of the treatment were collected in bottles and tube containing ethylene diamine tetra –acetic acid (EDTA). The blood samples in the EDTA bottles were processed for haematological parameters.

Statistical Analysis : All data were subjected Analysis Of Variance (ANOVA). Significance differences among the treatment means were compared using Least Significance Differences (LSD). A computer package (staristix9.0) was used for the analysis.

RESULTS AND DISCUSSION

Results of the haematological analysis is presented in Table 2. There was no significant ($P > 0.05$) difference in any of the haematological parameters measured. This implies that plane of nutrition were adequate to meet the requirement of all the groups. The packed cell volume (PCV) (33.73 - 42.16%) and haemoglobin concentration (10.56 to 13.53 g/dl) values obtained in this study were similar to the values of 34.63 - 45.25% and 12.18 - 14.25 g/dl for PCV and Hb respectively (Nuhu, 2010) in growing rabbits fed *Moringa oleifera* leaf meal. Similarly, the RBC and WBC values were within the normal range for growing rabbits reported by (Oyedele *et al.* (2010) who fed MOLM as a replacement for *Centrosema pubescens* in the diet of growing rabbits. The values of mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC) are



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64.66 to 72.73 20 83 to 23.03 pg and 28.73 to 32.63%, respectively. They were all within the normal range reported by Wikivet(2013) The values observed for differential counts (neutrophils, eosinophils and lymphocytes) were 42.50-48.01%, 1.00-1.30% and 50.06-54.66%, respectively. The normal ranges reported for the haematological parameters suggest nutritional adequacy of the diets since nutrients in the diets are the raw materials needed for the synthesis of blood components.

Table 1: Ingredient composition and calculated analysis of the experimental diets

Ingredient (%)	T1 (0)	T2 (5)	T3 (10)	T4 (15)	T5 (20)
Maize	40.00	37.00	31.72	27.35	23.72
Soyabean	23.00	21.25	21.28	20.65	19.28
MOLM	0.00	5.00	10.00	15.00	20.00
Groundnut haulms	15.95	15.95	15.95	15.95	15.95
Fish meal	3.00	3.00	3.00	3.00	3.00
Wheat bran	15.00	15.00	15.00	15.00	15.00
Salt (NaCl)	0.30	0.30	0.30	0.30	0.30
Bone meal	2.50	2.50	2.50	2.50	2.50
Premix	0.25	0.25	0.25	0.25	0.25
Total	100.00	100.00	100.00	100.00	100.00
Calculated Analysis					
Crude Protein (%)	18.81	18.82	18.80	18.89	18.81
Crude Fibre (%)	9.15	9.37		9.78	9.98
Ash (%)	3.98	4.20	4.51	4.81	5.10
ME (kcal/kg)	2763.00	2700.00	2576.00	2481.00	2392.00

MOLM = *Moringa oleifera* leaf meal

ME = Metabolizable energy, calculated according to the formula of (8) as $ME = 37 \times \% CP + 81 \times \% EE + 35.5 \times \% NFE$

Premix Supplied the following = Vit. A = 5000iu, Vit D3= 800,000iu, Vit. E = -12,000mg, Vit, K 1,500mg, Vit, m -1000 mg, Vit. B2 2000mg, Wit, B6 = 1,500mg, niacin = 12000mg, Panthotenbic acid = 20,00mg, biotin = Vit. B12 = 300.00mg, folic acid = 150,000mg choline = 60,000mg, manganese iron = 15,000, zinc = 800.00, Copper = 400.00mg, Iodine = 80.00mg, selenium = 8,000mg,

Table 2: Hacmatological Indices of Rabbits Fed Graded levels of *Moringa oleifera* Leaf Meal (MOLM)

Parameter	Levels of MOLM (%) in the diets					SEM
	T1 0	T2 5	T3 10	T4 15	T5 20	
PCV (%)	33.73	37.90	41.60	36.10	42.10	4.73 ^{NS}
Hb (g/100)	10.56	12.06	13 20	11.76	13.53	1.50 ^{NS}
RBC (x10 ⁶ /mm ³)	5.27	5.30	6.39	5.58	6.19	0.69 ^{NS}
WBC (x10 ³ /mm ³)	5.80	8.16	8.83	10.30	10.46	2.92 ^{NS}
MCH (F1)	69.96	72.73	65.53	64.66	67.93	2.05 ^{NS}
MCHC (%)	31.27	31.43	28.73	32.65	32.03	59.28 ^{NS}



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Differential Counts

Neutrophils (%)	46.53	42.60	40.64	48.01	45.63	7.28 ^{NS}
Eosinophils (%)	1.05	0.43	1.30	1.00	0.65	0.53 ^{NS}
Lymphocytes (%)	54.34	55.02	56.04	50.06	54.66	6.17 ^{NS}

SEM = Standard error of the means

NS = Not significant (PA) 05)

PCV = Packed Cell Volume

Hb = Haemoglobin concentration

RBC = Red Blood Cell

WBC = White Blood cell

MCV = Mean corpuscular volume

MCH = Mean corpuscular haemoglobin

MCHC = Mean corpuscular haemoglobin concentration

CONCLUSION AND APPLICATION

Results obtained in this study revealed that Moringa oleifera leaf meal could be included in rabbit diets upto 20% level without deleterious effects on performance and carcass components. More research should be carried out with different classes of rabbits to perfect the feeding of moringa leaves to rabbits in the tropics.

REFERENCES

- Adekunle, O. A. and Ajani, O. (1999). Economics of beef marketing in Bodija Market in Ibadan, Oyo state, Nigeria. *Tropical Journal of Animal Science*. I: 93 — 100.
- Taiwo, A. A., Adejuyigbe, A.O., Adebawale, A. E., Oshatan. J.S. and David, O.O. (2005). Performance and nutrient digestibility of weaned rabbits feed forage supplemented with concentrates. *Nigerian Journal of Animal Production*, 32 74 - 78.
- Ayinde, I. and Aromolaran, O. (1998). Economics of rabbit production in Abeokuta South Local Government Area of Ogun State. Nigeria. *Nigerian Journal of Animal Production*, I: 100 — 105.
- Deschepper, K. (1995). Effects Of dietary protein, essential and non-essential amino acids on the performance and carcass composition of male broiler chickens. *British Journal of Poultry Science*, 36: 229 — 245.
- Rao, D.R. (1999). Comparative performance of rabbits and broiler chickens. *Nutrition Reports International*, 16: 133 - 135.
- Cheeke, P.R. (1999). Editorial: The Potential role of growing rabbits in meeting world food need. *Journal of Applied Rabbit Research*, 36:3 — 5.
- NMA (2013). Department of Nigerian Metereological Authority. Data Reported by the Weather station 62015. Retrieved 8/11/2008.
- Pauzenga, U. (1985). Feeding parent stock. *Zootech International*, pp. 22 — 25.
- A.O.A.C. (2000). Association of Official Analytical Chemists. Official methods of, 4analysis., Washington DC. Pp. 55- 101.
- Statistix (2003). Statisticsfor Window Manual. Analytical Software 9.0 version.
- Adeniji, A.A. and Lawal, M. (2012). Effects of replacing groundnut cake with Moringa oleifera leaf meal for growing rabbits. Proceedings of the 3d^h Annual Conference of the Nigerian Society for Animal Production (NSAP), march 13 — 10, 2012, University of Abuja, Nigeria. Pp. 610 — 613.
- Abubakar, M. and Yusuf, A.U. (2011). Growth performance, carcass and organ characteristics of growing rabbits fed graded levels of Moringa oleifera leaf meal. Proceedings of the 16th Annual Conference of the Animal Science Association of Nigeria (ASAN), September 12th — 15, 2011. Kogi State University, Anyigba, Nigeria pp. 365 — 368.



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Nuhu, F. (2010). Effects of Moringa oleifera leaf meal on nutrient digestibility, growth, carcass and blood indices of weaner rabbits. M.Sc. Thesis, Department of Animal Science, Faculty of Agriculture and Natural Resources, Kwame Nkrumah, University of Science and Technology, Kumasi, Ghana pp. 115 — 220.

Jain, N.C (1986) Veterinary Haematology. 4th edition Lea and Febiger Publishers, Philadelphia. Pp. 153-159

Wikivet (2013). Chicken haematological reference ranges. https://www.wikivet.net/index.php?Title=chicken_haematology&oldid=140033 retrieved 20th, June 2015

Oyedele, O.J. and Adeyinka, S.M. (2010). Haematological, biochemical and carcass characteristics of rabbits fed with Moringa Development. Pp. 44-51