

## HAEMATOLOGICAL AND SERUM BIOCHEMICAL INDICES OF WEANER RABBITS FED GRADED LEVELS OF *MORINGA OLEIFERA* LEAF MEAL

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### Abstract

A total of forty eight (48) weaner rabbits of mixed breeds, with initial average live weight of 760g were randomly allocated into four (4) experimental dietary treatments and replicated three (3) times with four (4) rabbits per replicate. The rabbits were fed diets containing 0%, 15%, 30%, and 45% *Moringa oleifera* leaf meal in diets. The experimental diets and clean drinking water were supplied ad libitum throughout the experimental periods of 10 weeks. All data generated were subjected to one-way analysis of variance. The result of this experiment showed no significant ( $p > 0.05$ ) difference among the treatments for all the haematological parameters except on white blood cell concentration whose value ( $4.27-7.33 \times 10^3/l$ ) was however within the normal range for healthy rabbits, while alkaline phosphatase, aspartate aminotransferase and Glucose were significantly ( $p < 0.05$ ) influenced among the serum indices. Therefore, it could be concluded that inclusion of *Moringa oleifera* leaf meal in the diets of weaner rabbits up to 45% has no adverse effect on blood profile of rabbits.

**Key Words:** Weaner rabbits, moringa leaf meal, haematology, serum biochemical indices

### Introduction

Rabbit production is a means of bridging the supply demand gap of animal protein in developing countries due to its short gestation period, high fecundity and ability to utilize forages (Aduku and Olukosi, 1990). *Moringa oleifera* leaf meal has been used as an alternative feed source in rabbit diet as partial substitution for soybean meal and fish meal because of its high value protein content and also due to the high cost of soybean meal coupled with competition between human and animal for this major protein component of a feed (Nuhu, 2010). The overall deficiency of a feed can be determined by examining the haematological component of the blood and this would provide a way to prevent nutrient deficient feed to farm animals. Isaac *et al.* (2013) stated that haematological components are valuable in monitoring feed toxicity, especially with feed constituents that affect the blood as well as the health status of the animal. Serum protein had been used as an indirect measure of protein utilization. Terzungwe *et al.* (2013) reported that moringa leaf meal can be included in weaner rabbits diets up to 15% dietary level without adverse effect on the haematological and serum biochemical indices Hence, this study was carried out with the aim of evaluating the effect of *Moringa oleifera* leaf meal (MOLM) at higher inclusion levels on the haematological and biochemical indices of weaner rabbits.

### Materials and Methods

**Experimental site:** The experiment was carried out at the rabbitary unit of the Directorate of University Farm (DUFARMS) of the Federal University of Agriculture, Abeokuta in Odeda Local Government Area of Ogun State, Nigeria.

**Experimental animals and management:** The experiment was carried out using 48 weaner rabbits. These were divided into 4 dietary treatments having 12 rabbits per treatment. Each treatment was replicated thrice containing 4 rabbits per replicate. The experiment was carried out for a period of 10 weeks. Weaner rabbits, weighing between 710-780 grams were sourced from a reliable farm in Abeokuta metropolis. The rabbits were fed experimental diet after a week of adaptation supplemented with forages. Fresh water was provided for them in the morning and late in the evening. All other routine management such as disinfection of the hutches and stable, cleaning of feeders and drinkers, etc. were observed and medication was administered when needed.

**Experimental diets:** *Moringa oleifera* leaves were harvested by hand-plucking the leaves from the trees within Abeokuta metropolis. The leaves were air-dried and milled to form leaf meal while other feed ingredients were sourced from a reputable feed mill. After this, experimental diets were formulated such that *Moringa oleifera* leaf meal

were included at 0% (control), 15%, 30% and 45% levels as a replacement of soybean for diets T1, T2, T3 and T4 respectively as shown in Table 1.

**Blood Analyses:** At the 10<sup>th</sup> week of the experiment, 2.5ml of blood sample each was collected from 3 rabbits per treatment into ethylene diamine tetra acetic acid (EDTA) bottle for haematological parameters while for serum biochemical parameter, plain bottle was used for the blood sample collection to determine serum metabolites (total serum protein, glucose and cholesterol), alkaline phosphate (ALP), aspartate transferase (AST), Albumin and Globulin.

**Statistical Analyses:** Data generated were subjected to one-way analysis of variance using the statistical package (SAS, 2007) while the significant means among treatments were separated using Duncan Multiple Range Test of the statistical package at 5% significant level.

### Results and Discussion

The effect of *Moringa oleifera* leaf meal (MOLM) on the haematological parameters of weaner rabbits was presented in Table 2. Some of the haematological parameters measured in the present experiment were within the normal physiological ranges reported for rabbits most especially haemoglobin, MCH, MCV, MCHC, neutrophils, lymphocytes and eosinophils. The lower ( $p < 0.05$ ) value of WBC observed in 15% MOLM ( $4.27 \times 10^3/l$ ) shows that these animals were predisposed to high risk of disease infection but still fell within the recommended normal range reported by Mitruka and Rawnsley (1977) and is an indication that the immunity levels of the rabbits were not challenged. This is however contrary to the report of Terzungwe *et al.* (2013) who reported no significant mean value in WBC of rabbits fed 15% moringa leaf meal diet.

The result obtained on the effect of MOLM on the serum biochemical indices of rabbit is shown on Table 3. Significant effect of diet was not observed on all the parameters studied except serum glucose, aspartate aminotransferase (AST) and alkaline phosphatase (ALP). The total protein values obtained fall within the normal range (6.00 - 8.30g/dl) recommended by Mitruka and Rawnsley, (1977). Since total protein, albumin and globulin are generally influenced by the quality and quantity of protein intake (Onifade and Tewe 1993), the values obtained in the study indicates nutritional adequacy of the dietary protein. Rabbits fed the control diet had higher ( $p < 0.05$ ) mean serum glucose level than those on the test diets. The reduced serum glucose

values in the test diets gave an indication that the control will supply more energy for the animals than the test diets. The serum ALP value of the rabbits fed T2 was significantly ( $p < 0.05$ ) lower than the mean serum ALP of those fed the control diet (T1), which was significantly ( $p > 0.05$ ) similar to the serum ALP of those on T3 and T4, while the serum AST activities of the rabbits fed the T1 and T3 were significantly ( $p < 0.05$ ) lower than those on T4 but significantly higher than those on T2. Champe *et al.* (2007) stated that aminotransferases are normally intracellular enzymes, with low levels found in the plasma representing the release of cellular contents during normal cell turnover. The serum ALT and AST levels, according to Champe *et al.* (2007) are elevated in nearly all liver diseases and are particularly high in conditions that cause extensive cell necrosis, including severe viral hepatitis or toxic liver injury.

### Conclusion

Inclusion of MOLM in rabbit diet had no adverse effect on the health status of the animals since the values of white blood cell, alanine amino transferase, Aspartate amino transferase and glucose were still within the normal range of rabbit blood profile.

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**Table 1: Percentage Composition of Experimental Diets**

Ingredients	T1	T2	T3	T4
	Level of Inclusion of MOLM (%)			
	0	15	30	45
Maize	39.00	39.00	39.00	39.00
Rice bran	20.00	20.00	20.00	20.00
MOLM	0.00	1.50	3.00	4.50
Soya bean meal	10.0	8.50	7.00	5.50
GNC	10.0	10.00	10.00	10.00
PKC	10.0	10.00	10.00	10.00
Wheat offal	4.80	4.80	4.80	4.80
Bone meal	3.00	3.00	3.00	3.00
Oyster shell	2.00	2.00	2.00	2.00
Salt	0.30	0.30	0.30	0.30
Vit. Prix	0.30	0.30	0.30	0.30
Lysine	0.30	0.30	0.30	0.30
Methionine	0.30	0.30	0.30	0.30
Total	100.00	100.00	100.00	100.00
<b>Calculated Analysis</b>				
ME (MJ/kg)	2507	2533	2559	2585
Crude protein (%)	17.60	17.35	17.10	16.86
Fibre (%)	12.19	12.36	12.54	12.72

MOLM: *Moringa oleifera* leaf meal

GNC: Groundnut cake

PKC: Palm kernel cake

**Table 2: Haematological Parameters of Weaner Rabbits Fed *Moringa oleifera* Leaf Meal Diets**

Parameter	0%	15%	30%	45%	SEM
Pack Cell Volume (%)	40.33	36.00	40.00	31.33	3.09
Haemoglobin (g/dl)	13.43	12.00	13.33	10.43	1.03
Red Blood Cell (x10 <sup>12</sup> /L)	3.63	3.16	3.60	2.82	0.26
MCH (pg)	37.03	37.16	37.01	36.99	0.10
MCHC(g/dl)	33.30	33.32	33.34	33.30	0.41
MCV (fl)	11.12	11.35	11.10	11.11	0.09
White Blood Cell (x10 <sup>3</sup> /l)	7.33 <sup>a</sup>	4.27 <sup>b</sup>	6.53 <sup>a</sup>	5.40 <sup>ab</sup>	0.65
Neutrophil (%)	41.33	42.00	38.67	43.00	5.19
Lymphocyte (%)	55.00	54.33	58.00	53.67	5.47
Eosinophil (%)	3.33	3.00	3.00	2.67	0.24
Monocytes (%)	0.67	0.67	1.00	0.67	0.29
Basophil (%)	0.00	0.00	0.00	0.00	0.00

<sup>a,b</sup> Means with different superscripts along the same row are significantly (p<0.05) different.

MCH- Mean corpuscular haemoglobin, MCHC -Mean corpuscular haemoglobin concentration, M CV- Mean corpuscular volume

**Table 3: Serum Biochemical Indices of Weaner Rabbits Fed *Moringa oleifera* Leaf Meal Diets**

Level of MOLM	0%	15%	30%	45%	SEM
Parameter					
Total Protein (g/dl)	6.20	6.40	6.50	6.63	0.45
Albumin (g/dl)	3.37	3.87	3.93	4.07	0.20
Globulin (g/dl)	2.83	2.53	2.67	2.67	0.35
Alakaline phosphate (U/L)	143.00 <sup>a</sup>	102.33 <sup>b</sup>	141.33 <sup>a</sup>	140.67 <sup>a</sup>	10.63
Alkaline aminotransefrase (U/L)	55.33	55.33	74.00	70.67	6.78
Aspartate aminotransferase (U/L)	41.67 <sup>b</sup>	23.00 <sup>c</sup>	43.00 <sup>b</sup>	66.67 <sup>a</sup>	4.54
Cholesterol (Mg/dl)	77.87	84.17	82.03	84.33	7.07
Glucose (Mg/dl)	129.73 <sup>a</sup>	99.17 <sup>b</sup>	78.37 <sup>b</sup>	81.20 <sup>b</sup>	6.51

<sup>aaa,b,c</sup> Means with different superscripts along the same row are significantly (p<0.05) different.