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Effect of *Moringa oleifera* Leaf as an Additive on the Haematology of Weaner Rabbits

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ABSTRACT

The purpose of this study was to evaluate the effect of *Moringa oleifera* leaf meal (MOLM) on the Haematological indices of weaner rabbits. Twenty-four (24) New Zealand White male weaner Rabbits were used for this experiment, and were allocated to four treatments (T1 (0g), T2 (10g), T3 (20g) and T4 (30g) respectively with three replicates, and two rabbits per replicate. The investigation lasted for 8 weeks, and the effects of *Moringa oleifera* as an additive, were determined after obtaining data from Blood samples collected and haematologically analyzed. The addition of *Moringa oleifera* at different levels had a significant effect ($p<0.05$) on Hemoglobin, Red blood cells, Mean Volume and White blood cells. It is concluded that, *Moringa oleifera* leaf meal (MOLM) can be incorporated up to 30g/kg of feed inclusion level in the diets of growing rabbits, since it did not have any deleterious effects, but rather had beneficial effects on the haematological status of the Rabbits.

INTRODUCTION

Some feed products are fed to animals usually without recourse to their health and physiological implications on the animals. The commonest parameter for measuring these implications is through the haematology of the animals (Aro *et al.,* 2013). The physiology of farm animals is affected by several factors, one of which is nutrition (Ajao *et al.,* 2013). Addass *et al.(*2012) posited that nutrition affects blood values of animals. Increase in meat production can be achieved through proper nutrition, inclusion of feed ingredients at normal or required levels (Etim and Oguike, 2010).

In many tropical and subtropical countries, various parts of Moringa (leaves, fruits, immature pods, flowers and seeds) are incorporated into the traditional food of humans (Siddhuraju and Becker, 2003 and Anhwange *et al.,* 2004). Leaves can also be eaten fresh, cooked, or stored as dried powder for many months without refrigeration, and reportedly without loss of nutritional value. (Jed, 2005). Recently, there has been interest in the utilization of (*Moringa oleifera*) commonly called horse radish tree or drum stick tree, as potential

inexpensive protein source for livestock feeding. The economization of feed cost using cheaper and unconventional feed resources (Bhatt and Sharma, 2001; Muriu *et al.,* 2002) is an important aspect of commercial rabbit production.

Isaac *et al*., (2013) stated that Haematological components, which consists of Red blood cells, White blood cells or Leucocytes, and Mean Corpuscular Haemoglobin are valuable in monitoring feed toxicity, especially, with feed constituents that affect the blood as well as the health status of farm animals.

Moreover, the comparison of blood profile with nutrient intake might indicate the need for adjustment of certain nutrients upward or downward for rabbits (Rafiu *et al.,* 2013). This present study is therefore carried out to determine the effects of different inclusion levels of *Moringa olifera* leaf in the diets of weaner rabbits on their Haematological indices.

Anti-nutritional Factors

Anti-nutritional factors are defined as naturally generated substances in feed stuffs which exert effects contrary to optimum nutrition**.** (Kumar, 1992,). The presence of high amounts of antinutritional factors can affect the digestibility of proteins, carbohydrates‟ digestion and may inactivate vitamins. Therefore, it is important to evaluate a plant anti-nutritional factor to access potential inhibitors. Several anti-nutritional factors in *Moringa oleifera* leaves includes tannins, trypsin inhibitors, lectins, saponins, phytates, cyanogenic glucosides, alpha-amylase inhibitors, glucosinolates and alkaloids.

Table 1: Anti nutritional Factors Present in Moringa Leaves

Total phenols (g/kg)	Tannin (g/kg)	Saponin (g/kg)	Phytate (g/kg)	Lectin (g/kg)	Cyanogenic glucoside (mg/kg)	Glucosinolate (µmol/g)
44.3	12.0	81.0	21.0	Not detectable	Not detectable	Not detectable

Source: Adapted from: (Makkar and Becker 1996, 318)

The results illustrate that only saponins are found in considerable amounts, 81g per kg. Saponins are steroids or triterpenoid glycosides attached to a carbohydrate. (Kumar, 1992). They are characterized by their bitter taste, foaming properties and affect membrane integrity. It is estimated that in Europe the daily amount of saponins is around 15mg, however in traditional African or Asian cuisine, the value increases to 110 to 240mg depending on the number of legumes eaten. (Watzl, 2001,). Nonetheless, saponins are poorly absorbed and are mostly excreted unchanged. Using Makkar and Becker's study, it can be concluded that Moringa leaves‟ anti-nutritional factors are not significant and protein-inhibitors like tannins or phytates, which can affect the protein value were found in very low amounts, thus irrelevant for the analysis.

MATERIALS AND METHODS

The study was conducted at the Rabbit unit, Teaching and Research Farm of Animal Science, Rivers State University, Nkporlu, Port Harcourt, Rivers State, Nigeria. The land surface of this region is generally less than 20m above sea level and falls within latitude 40 43‟ N and longitude 7º 18‟E.

A total of twenty-four New Zealand white weaner rabbits, were used for this experiment. The male rabbits were fed with an experimental diet consisting of *Moringa oleifera* leaf meal, commercial feeds and guinea grass in a Completely Randomized Design (CRD). *Moringa oleifera* leaf meal was administered at three different levels and was replicated thrice with two rabbits per replicate. The rabbits were housed in wire cages and were fed *ad-libitum* with the treatment diet. Water was also given to the rabbits without restriction. The duration of the experiment was 8 weeks.

Experimental Diet

Moringa oleifera leaf meal was purchased from Songhai Rivers Development Initiative Farm, Bunu-Tai, in Tai Local Government Area of Rivers state.

The Moringa leaves were harvested from branches of Moringa trees and was kept under the sun for several days to reduce the moisture content. It was then milled into powder forms before mixing at different levels. The Powder, was then mixed with the commercial feed at different inclusion levels and then given to the rabbits.

Experimental Diet

Diet A (Control) - 0g *Moringa oleifera* leaf +1 kg commercial feed + Guinea grass.

Diet B - 10g *Moringa oleifera* leaf + 1kg commercial feed + Guinea grass.

Diet C - 20g *Moringa oleifera* leaf + 1kg commercial feed + Guinea grass.

Diet D -25g M*oringa oleifera* leaf + 1kg commercial feed+ Guinea grass.

RESULTS & DISCUSSION

Table 2 shows a significant effect ($p<0.5$) of *Moringa oleifera* was observed for Hemoglobin, Red blood cells, White Blood Cells. Treatment 4 which had 30g of *Moringa Oleifera leaf meal* inclusion gave higher values of Hemoglobin, Red Blood Cells. White Blood Cells. While the least values were observed in Treatment 1(0g) which was the control.

Hemoglobin and Red Blood Cells had a linear relationship as the Moringa inclusion levels increased. Conversely, White Blood Cells and Mean Cell Volume and Mean and Hemoglobin had no linear relationship as *Moringa oleifera* inclusion rate increased.

Table 2. Result Showing the Effects of *Moringa oleifera Leaf Meal* (MoIm) on the Haematology of Weaner Rabbits.

Treatment	1.(Control)	2.(15g of MOLM)	3.(20g of MOLM)	4.(30g of MOLM)
Hemoglobin	9.33±0.78^{b}	10.10±0.49^{ab}	10.57±0.59^{ab}	11.90±0.85^{a}
Red blood cells	4.03± 0.39^{b}	4.40±0.38^{ab}	4.67±0.35^{ab}	5.33±0.18^{a}
White blood cells	4.33±0.09^{c}	5.27±0.37^{a}	4.53±0.18^{bc}	5.13±0.07^{ab}
Mean cell volume	69.64±2.09	69.45±3.12	68.13±2.32	66.84±0.54

^{abc}, mean values with same superscripts are not significantly different ($P>0.5$).

From the results on Table 2, effects of the treatments on all the haematological parameters did not adversely affect the Rabbits, as they were all within the normal Haematology range, but rather, helped to improve the Haematological status.

The result from this study showed significant increase in the Red Blood Cell and Haemoglobin, respectively. The higher value observed in treatment 4, agreed with the findings of Odetola *et al.* (2012) who reported an increase in Red Blood Cells and Haemoglobin in a study, using *Moringa oleifera* as an additive. The increased Haemoglobin concentration also agreed with the reports of Terzungwe *et al*. (2013) where they observed that, increasing Moringa levels caused an increase in haemoglobin concentration. Haemoglobin has a physiological function of transporting oxygen to tissues of the animals for oxidation of the ingested food so as to release energy as well as transport carbon dioxide out of the body of animals. Therefore, the rabbit had an increased function of transporting oxygen to the tissues for oxidation of ingested food as the *Moringa oleifera* Leaf Meal (MOLM) inclusion levels increased. Several authors posited that Red Blood

Cell is involved in the transport of oxygen and carbon dioxide in the body. Thus, an increased Red Blood Cell count implies an increase in the level of oxygen that would be carried to the tissues as well as the level of Carbon dioxide returned to the lungs (Ugwuene, 2011; Soetan, *et al.,* 2013; Isaac *et al.*, 2013).

White Blood Cells help to fight infections, defend the body by phagocytosis against invasion by foreign organisms and to produce or at least transport and distribute antibodies in immune response. Thus, animals with low White Blood Cells are exposed to high risk of disease infection, while those with high counts are capable of generating antibodies in the process of phagocytosis and have a high degree of resistance to diseases (Soetan *et al.,* 2013) and also enhance adaptability to local environmental and disease prevalent conditions (Kabir, *et al.*, 2011; Okunlola, *et a.l,* 2012; Isaac *et al.,* 2013).

The results of this study shows the highest values of White Blood Cells in Treatment 2 and 4, although the relationship wasn"t linear, but a significant effect was recorded between the

Treatment levels of *Moringa oleifera* Leaf Meal (MOLM). According to Soetan *et al.* (2013) Kabir, *et al.,* 2011; Isaac *et al.*(2013) who variously reported similar findings in their trials, that the generation of antibodies in the process of phagocytosis results in a higher degree of disease resistance and will also enhance adaptability to local environmental and disease prevalent conditions.

CONCLUSION

The results of this experiment have shown that *Moringa oleifera* leaf meal (MOLM) can be incorporated up to 30g/1kg of feed inclusion level in the diets of growing rabbits, since it did not have any deleterious effects, but rather beneficial effects on the haematological status of the rabbits. In consideration of the fact that *Moringa oleifera* trees grow widely in this part of the country, the leaves can be easily grown and cheaply obtained at minimal cost, therefore, its utilization as an additive in rabbits' feed will help to proffer solutions to Nigeria's protein shortage problems.

The results of this study indicates that rabbits can tolerate *Moringa oleifera* leaf meal (MOLM) up to 30g/1kg feed level, if incorporated for optimal performance.

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