

## Effect of Turmeric (*Curcuma longa*) Root Meal on Haematological Parameters of Adult Rabbits

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### ABSTRACT

A ten weeks feeding trial was carried out to determine the effect of Turmeric (*Curcuma longa*) root meal on the haematological parameters of twenty-four (24) growing rabbits fed with graded level of Turmeric root meal as an additive in their diets. The rabbits were randomly allotted into four treatment groups (T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub> and T<sub>4</sub>) which were further divided into three replicates, with each replicate having two rabbits per replicate. Treatment groups 1, 2, 3 and 4 were fed 0g, 0.50g, 0.70g, and 0.90g of Turmeric root meal per kg of feed, respectively as an additive in their diets. All the results of haematological indices were significant except Neutrophils which was not significantly affected by Turmeric root meal. PCV, RBC, WBC, Platelets, Leucocytes, Monocytes and Eosinophils were significantly different ( $p < 0.05$ ) amongst treatment groups as there was increment in the HB, PCV, RBC and Platelets. While in WBC, and white blood differentials like Leucocytes, Eosinophils and Monocytes decrease as the values of the graded levels of turmeric root meal increases. The inclusion levels of turmeric meal as feed additive in this study did not alter the haematological parameters except in white blood cell and differentials count which did not adversely affect the haematology of the rabbit.

**Keywords:** Turmeric, Blood parameters and rabbits

### INTRODUCTION

The undeniable need to harness the potentials of the numerous nonconventional feed additives to replace or promote efficient utilization of the expensive conventional ones may be achieved with feed additives such as turmeric meal. Turmeric meal is used as feed additives due to its active ingredient *curcumin* (Osawa *et al.*, 1995). More suitable composition of feed mixture or administration of natural feed additives as

a concentrate might be beneficial in livestock farming without negative effect on the environment and the animal as an individual (Githioriet *al.*, 2003, Amber *et al.*, 2004, Namkunget *al.*, 2004).

Rabbit production is a veritable way of alleviating animal protein deficiency in Nigeria (Ajala and Balogun, 2004). Amongst many livestock species that can serve as a source of this protein, rabbit is outstanding specie because of the low cholesterol content of the meat (Owen *et*

al., 2008). In the last year, rabbit production on the commercial level acquired increasing interest due to their prolificacy, rapid growth rate and meat yields (Saviotto et al., 2015, Minguez, 2014). In order to maximize food production and to meet protein requirements in Nigeria, viable options need to be explored and evaluated (Owen et al., 2008). This intensive approach to rabbit production triggered an explosion of interest in the use of herbs, spices and their products as feed additives and their products which serve as alternative feedstuffs such as with low human food preference and low industrial usage.

Hematological studies are useful in the diagnosis of many diseases as well as investigation of the extent of damage to blood (Onyeyili, et al., 1992, Togun, et al., 2007). Hematological studies are of ecological and physiological interest in helping to understand the relationship of blood characteristics to the environment (Ovuru and Ekweozor, 2004) and so could be useful in the selection of animals that are genetically resistant to certain diseases and environmental conditions.

The phytochemicals in turmeric are known to be natural, less toxic, residue free and is ideal as feed additives in animal diets which will help sustain rabbit production and solve the problem of using chemical antibiotics that can result to allergic reactions in human as residual effects or toxic side effects (Diarra et al., 2011).

The study evaluates the effect of turmeric meal on haematological indices in adult rabbits.

## **MATERIALS AND METHODS**

### **Experimental Location and Duration**

The experiment was carried out at the rabbit unit of the University of Port-Harcourt Research and Demonstration Farm Choba, Port-Harcourt, Rivers State and lasted for a period of 10 weeks.

### **Experimental Animals, Housing and Management**

A total number of twenty-four (24) rabbits were sourced from the rabbitry unit of the University of Port Harcourt Research and Demonstration Farm Choba and used for this experiment. Before the experiment was carried out, one-week pre-experimental procedures were first observed to get the rabbits acclimatized with the experimental procedures. The test animals in each treatment were identified on individual basis using labelled tags and the initial weight of the animals were recorded. The rabbits were subjected to the same management condition with a good house in a well wired merged cage for easy collection, feeding and cleaning of their hutches. Feeders and drinkers were cleaned daily before fresh feed and clean water were added.

### **Test chemical**

The fresh turmeric (*Curcuma longa*) was purchased from University of Port Harcourt Teaching and Research Farm, and the turmeric was washed, cleaned and sun dried for 5 hours for 3 – 4 days and then grind into powdered form. The turmeric meal was stored in an air tight, clean and protected containers to avoid contamination. The turmeric meal was incorporated as additive with an inclusion rate of 0g, 50g, 70g and 90g dietary levels for T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub>, and T<sub>4</sub> respectively per kg of feed and then fed to the rabbits.

### **Experimental procedures/ Design**

The twenty-four (24) growing rabbits were randomly selected and divided into four (4) treatment groups (T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub>, T<sub>4</sub>). There were 2 rabbits per treatment and 3 replicates and each replicate consist of 2 rabbits in a completely random design (CRD). The dietary treatment consists of four levels of Turmeric (*Curcuma longa*) meal. The treatment T<sub>1</sub> (control) had 0g turmeric meal and treatments (T<sub>2</sub>, T<sub>3</sub>, T<sub>4</sub>) had 0g, 50g, 70g and 100g in the

formulated feed respectively was given to the animal.

### Parameter measured

#### Blood collection

At the end of the (10<sup>th</sup> week) of feeding the experimental diet, two rabbits was selected from each treatment and blood samples were collected from the marginal ear veins of the rabbits. The blood samples were gradually expelled into graduated tube containing K<sub>3</sub>-EDTA (ethylene diaminetetracetic acid) as anticoagulant for hematological analysis which includes packed cell volume, Red blood cells, White blood cells, hemoglobin concentration, blood platelets, Neutrophils, Leucocytes, Monocytes and Eosinophils.

#### Statistical Data Analysis

All data obtained were subjected to the Analysis of Variance (ANOVA) according to Steel and Torrie (1980) and the mean value were separated using Duncan Multiple Range Test (DMRT) according to Duncan (1955) using the statistical package for Social Science (SPSS) software.

### RESULTS

The Analysis of Variance (ANOVA) shows the effect of Turmeric meal on HB, PCV, RBC, Platelet, WBC, Leucocytes, Eosinophils and Monocytes revealed a significant variation ( $p < 0.05$ ) amongst the treatment groups. The result also revealed that Neutrophils were not significantly affected by turmeric meal between the treatment groups.

The Haemoglobin Profile was significantly highest in treatment 4 (16.50g/dL) than treatment 3 (15.85g/dL) and followed by

treatment 2 with (15.35g/dL) which are significantly higher than the control group (11.50g/dL) that recorded the least HB mean value.

A progressive increment ( $p < 0.05$ ) in Packed Cell Volume was observed in treatment 3 and 4 having 47.50% and 49.50% respectively than in treatment 2 (46.00%) and 1 (34.50%).

The Red Blood Cell (RBC) values in treatment 4 ( $6.95 \times 10^{12}/L$ ) was significantly ( $p < 0.05$ ) higher than the other treatments. White Blood Cell values in treatment 1 ( $5.00 \times 10^9/L$ ) was significantly ( $p < 0.05$ ) higher over treatments 2 ( $3.75 \times 10^9/L$ ), 3 ( $3.65 \times 10^9/L$ ) and 4 ( $2.85 \times 10^9/L$ ) respectively.

Platelet values were significantly ( $p < 0.05$ ) higher in treatment 2 (290%), 3 (300%) and 4 (315%) over treatment 1 (160%). The mean Leucocytic profile is significantly higher in treatment 1 (57.50%) than in treatment 2 (50%), 3 (50%) and 4 (48%). No significant ( $p > 0.05$ ) variation was observed with treatment 2 (114.16%) having the highest Neutrophils values over treatment 4 (52%) and the least values were recorded in treatment 1 (40%) and treatment 3 (34%) respectively.

A progressive increment ( $p < 0.05$ ) in Eosinophils values was observed in treatment 1 (1%) having the highest over treatment 2 (0.50%), 3 (0%) and 4 (0%). The monocytes values in treatment 1 and 2 (1.50%) was significantly ( $p < 0.05$ ) higher than the other treatments.

**Table 1:** Effects of Turmeric Meal on Haematological parameters of Adult Rabbits

Haematological parameters	T <sub>1</sub> (0g of turmeric meal/kg of feed)	T <sub>2</sub> (50g of turmeric meal/kg of feed)	T <sub>3</sub> (70g of turmeric meal/kg of feed)	T <sub>4</sub> (90g of turmeric meal/kg of feed)
HB (g/dL)	11.50±0.992 <sup>b</sup>	15.35± 0.593 <sup>a</sup>	15.85± 0.864 <sup>a</sup>	16.50±0.370 <sup>a</sup>
PCV (%)	34.50± 2.141 <sup>b</sup>	46.00±1.461 <sup>a</sup>	47.50 ±1.784 <sup>a</sup>	49.50±1.455 <sup>a</sup>
RBC (x10 <sup>12</sup> /L)	5.25± 0.629 <sup>b</sup>	6.65 ± 0.154 <sup>a</sup>	6.75± 0.531 <sup>a</sup>	6.95± 0.134 <sup>a</sup>
WBC (x10 <sup>9</sup> /L)	5.00± 0.115 <sup>a</sup>	3.75± 0.283 <sup>b</sup>	3.65± 0.396 <sup>b</sup>	2.85± 0.209 <sup>c</sup>
Platelet (%)	160.00±4.619 <sup>c</sup>	290.00± 19.500 <sup>b</sup>	300.00± 14.385 <sup>ab</sup>	315.00±15.725 <sup>a</sup>
Neutrophils (%)	40.00± 2.309	114.167±64.836	34.00± 2.070	52.00± 1.461
Leucocytes (%)	57.50± 1.784 <sup>a</sup>	50.00± 4.619 <sup>b</sup>	50.00± 9.019 <sup>b</sup>	48.00± 1.155 <sup>b</sup>
Eosinophils (%)	1.00± 0.516 <sup>a</sup>	0.50±0.258 <sup>b</sup>	0± 0 <sup>b</sup>	0± 0 <sup>b</sup>
Monocytes (%)s	1.50± 0.683 <sup>a</sup>	1.50±0719 <sup>a</sup>	1.00±0.465 <sup>a</sup>	0±0 <sup>b</sup>

a,b,c, means along the same column with different superscripts differs significantly ( $p < 0.05$ ) while means with the same superscripts are not significantly different.. HB= Haemoglobin, PVC= Packed cell volume, WBC= White blood cells, RBC= Red blood cells.

## DISCUSSION

Haematology values could serve as baseline information for comparison in condition of nutrient deficiency, physiology and health status of farm animals (Daramola et al, 2005).

The result of the haematological analysis of the rabbit reveals that the haemoglobin (Hb), Packed Cell Volume and Red Blood cell were significantly ( $P < 0.05$ ) increased as the levels of Turmeric (*Curcuma longa*) root meal increase. The significant increase in the haemoglobin and the Red Blood Cell of rabbit may be an indication of the ability of the Turmeric (*Curcuma longa*) root meal to enhance feed utilization. Red Blood Cell serve as a carrier of haemoglobin. Haemoglobin has the physiological function of transporting oxygen to tissues of the animal for the oxidation of ingested food so as to release energy for the other body functions (Ugwuene, 2011).

The increase in the Packed Cell Volume is as a result of the increase in the number of Red Blood cell. It shows a better transportation and thus results in an increased primary and secondary polycythemia.

The results of the White Blood Cell and differential WBC count (Eosinophils, Leucocytes, Monocytes) were significantly ( $P < 0.05$ ) influenced by the treatment effect except Neutrophils that were not significantly ( $P > 0.05$ ). The decrease in Blood Cell and differential WBC count (Eosinophils, Leucocytes, Monocytes) could be due to the presence of flavonoid in Turmeric (*Curcuma longa*). This compound exhibits a range of biological activities, one of which is the ability to scavenge for biological radicals and superoxide anions radicals and thus health promoting in action (Gill, 1992).

The result of the Neutrophils indicates that the Turmeric (*Curcuma longa*) root meal did not affect the immune system.

## CONCLUSION AND RECOMMENDATION

The results of the present study revealed that supplementing Turmeric meal as additive in the diets of adult rabbits up to 90g led to the improvement on health status. The inclusion levels of turmeric meal as feed additive in this study did not alter the haematological parameters except in white blood cell and differentials count which did not adversely affect the haematology of the rabbits so we recommend the use of turmeric meal, due to its high fibre contents which aid digestibility. Further investigation to determine lethal dose of turmeric meal is recommended in order to maximize commercial rabbit production and help supplement protein requirement in Nigeria.

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