

## **Hematological Characteristics of Cattle Fed Graded Levels of Locust Bean Pulp in Semi Arid Zone of Nigeria**

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**Abstract:** *The experiment was conducted at the teaching and research farm Ramat Polytechnic Maiduguri, Borno, State Nigeria. The experiment was carried out to assess the effect of feeding diets containing graded levels of locust bean pulp on the hematological and differential blood profiles of feedlot Rahaji bulls. Twelve Rahaji bulls, aged two years and weighing averagely 142 Kg was allotted to four dietary treatments (T1, T2, T3 and T4) in which locust bean pulp was included at 0, 5, 10 and 15% respectively in a Completely Randomized experimental Design. Other feed inputs that was used in formulating the diets include cotton seed cake, brewer dried grain, rice milling waste, cowpea husk, bone ash and table salt. The experimental diets was fed to the bulls for 90 days. The haematological indices that were assessed include White Blood Cells (WBC), Red Blood Cells (RBC), Haemoglobin (HB), Packed Cell Volume (PCV), Mean Corpuscular Volume (MCV), Mean Corpuscular Haemoglobin (MCH), Mean Corpuscular Haemoglobin Concentration (MCHC), Neutrophils, Lymphocytes, Eosinophils, Monocytes, and Basophils. The result obtained revealed the White Blood Cell (WBC) showed significant difference ( $P < 0.05$ ) between the treatment means. However, all the haematological parameters were within the normal range values. In conclusion, inclusion of locust bean pulp into the diet of cattle up to 15% did not exert any deleterious effects on the haematological profiles and by implication the health of the Rahaji bulls used in this study.*

**Keywords:** *Haematology, Rahaji bulls, Locust bean pulp*

### **INTRODUCTION**

In most developing countries, inadequate protein intake, especially that of animal origin has been identified as one of the most important nutritional problems (Feilding, 1991). Animal protein is considered as superior to plant protein as it contains the essential amino acids which are more balanced and readily available to meet human nutritional needs than the plant protein. Although Nigeria is endowed with abundant animal resources and has great potentials to be self-sufficient in livestock production, but remains a net importer of livestock products (Adedipe *et al.*, 1997). The average Nigerian consumes only 3.245g of animal protein per person per-day which is far below recommended value of 34g (FAO 2002).

This low protein intake has been attributed to low level of animal production which led to high cost of animal products. The consequences of this low protein intake are retarded growth, high incidence of kwashiorkor, high rate of child mortality, short life-span and wide spread protein-energy malnutrition. Due to the acute shortage of animal protein in the diet of average Nigerian, there is a pressing need to increase the production of livestock resources (Shaib *et al.*, 1997).

Nutrition has been an indispensable aspect of livestock production. Meeting the nutritional needs as well as the requirements of livestock, conventional and established feedstuffs have been implicitly utilized in feeding livestock. Although plethora of research findings on the excellent performance of these conventional feedstuffs fed to livestock have been extensively documented but competition between man and livestock for cereals and cereal product has made these ingredients uneconomical for continuous use as livestock feed. In order to reduce cost of feed which constitutes a significant fraction of total cost of production, focus has been on the search for cheaper and readily available feedstuffs with little or no competition with man's dietary demands (FAO 1999)

The cost of feed ingredients has increased tremendously over the years and this has been a source of worry for livestock producers. The contemporary issue in livestock management is the exorbitant cost of feeding stuffs. This is obviously a matter of concern because of the fact that feeds account for about 60-80% of the recurrent expenditure of intensive animal production system (Adisa and Badmos 2009). Astronomical increase in population of Nigeria (140, 431, 790 million) (NLPD 1992) is not backed by a commensurate increase in the production of grains and other crops that are also consumed by man. In view of the fact that feeding problems constitute the single largest problem of ruminant animal production in Nigeria, it is important to consider the use of alternative feed ingredients in order to reduce cost of production and optimize profit for improved livestock performance enterprise (Abubakar and Garba, 2004).

The available feed resources cannot meet the nutritional requirement of animals throughout the year in many parts of the country either due to inadequate supply or quality of the feed. This problem is even more aggravated in arid and semiarid areas giving the erratic and unreliable rainfall pattern. (Benard *et al.*, 2010).

Low and erratic rainfall severally affects the growth of crop residue available for livestock feeding. Livestock feed resources in Nigeria are mainly natural grazing and crop residues, which are low in energy and protein leading to significant limitation in the production of livestock (Okoli *et al.*, 20012).

Some of the factors contributing to the increasing cost of feed are under-production of various ingredients used in feed formulation, high inflation rates and competition in consumption of these ingredients by other animal species including man. There is also increase in human population which further worsens the situation because of the pressure placed on the available land for grazing, grains and other crops that are consumed by man. And without a commensurate increase with that of human population and inappropriate employment of technology for improved production (Dayo *et al.*, 2009). These problems have resulted to poor nutrition of animals leading to loss of weight, lower resistance to disease, reduced fertility of adult animal, retarded growth of young animals and death among others, which together bring about the low level of performance by the ruminant animals, especially in the semi-arid zone of Nigeria. It has therefore become necessary to look for alternative sources of feed ingredients in order to optimize the animal performance in the northern part of the Country (Maigandi, 2001). The objective of the study was to assess the hematological characteristics of Rahaji cattle fed graded levels of locust bean pulp in semi-arid zone of Nigeria.

## **MATERIALS METHODS**

### **Experimental Site**

This study was conducted at the Teaching and Research Farm of the Department of Animal Production Technology Ramat Polytechnic, Maiduguri, Nigeria. Maiduguri the capital city of Borno State is located on latitude 11<sup>0</sup>51'N, longitude 13<sup>0</sup>09'E and at an altitude of 354m above sea level. Maiduguri has very short rainy season (3-4 months) with about 645.9 mm/annum and a long dry

season of about 8-9 months (Jaekel, 1984). The ambient temperature could be as low as 20°C during the dry cold period and as high as 44°C during the dry hot period. Relative humidity is 30-45% in August which usually lower to about 5% in December and January. Day length varies from 11-12 hours (Lekan, 1991).

#### **Treatment and Experimental Design**

Four complete experimental diets A, B, C, and D will be formulated; containing 0 (control), 5, 10 and 15% locust bean pulp was used for this research. All the ingredients used except locust bean pulp was purchased from the Maiduguri livestock market. The twelve bulls were allotted randomly to the three treatment diets in a completely randomized design (CRD) with four replicates each.

#### **Experimental Animals and their Management**

Twelve (12) Rahaji bulls with average age of 24 months and weighing 150kg were obtained from the Maiduguri livestock Market. The Animals were quarantined for a period of two weeks in the Teaching and Research Farm of Ramat Polytechnic, Maiduguri. The Animals were dewormed against endo-parasite with Albendazole suspension at 25mg/kg which was administered orally. The animals were also sprayed against ecto-parasite with the application of cypermethrin. Also Oxytetracycline (a broad-spectrum antibiotic) long acting base at 1ml/10kg body weight and multivitamin injection was given at 1ml/10kg body weight for three days to reduce stress.

#### **Experimental Feed Sources**

Feed Ingredients that were used in the experiment include; locust bean pulp, cotton seed cake, Rice milling waste, cowpea husk, wheat offal, groundnut haulms, salt and bone meal. All the ingredients were purchased from Maiduguri Livestock Market.

#### **Management of Feeding Pens**

Experimental Animals were housed individually in feeding pen and managed intensively for the period of 12 weeks. The feeding pens were cleaned and disinfected a week before the arrival of the animals and commencement of the experiment. The feed and water trough were cleaned every morning before feeding. The experimental animals were fed with experimental diets and watered *ad libitum* daily for 12 weeks.

#### **Blood Sample Collection**

At the end of the feeding trial, blood samples were collected from the Jugular vein of three randomly selected animals from each of the treatments (Coles, 1986). Blood sample collection was done early in the morning before feeding and 3ml of the blood sample were collected from each animal. The blood sample were placed in ethylene diamine tetra-acetic acid (EDTA) (anti-coagulant) bottle to prevent coagulation for haematological studies. The collected samples were labelled and taken to the Laboratory for the evaluation of haematological characteristics.

#### **Haematological Assay**

Whole blood samples in EDTA bottles were analyzed for hemoglobin (Hb) content and Packed cell volume (PCV) using cyanmethaemoglobin and microhematocrit methods respectively (Coles, 1989). Erythrocyte and leucocytes counts were determined by haematocytometry as described by Jain (1986). Total white blood cell (WBC) count were determined by using the count made in a haemocytometer using the WBC diluting fluid. Differential leucocytes count were made by counting the different types of WBC from Geimsa stained slides (Coles, 1989). Calculation of the Erythrocyte indices including Mean Corpuscular Volume (MCV), Mean Corpuscular Heamoglobin (MCH) and Mean Corpuscular Heamoglobin Concentration (MCHC) were derived from the values obtained from

Red Blood Cells (RBC), Hemoglobin Concentration and PCV values according to the procedures described by Jain (1986)

**Data Collection**

Data were collected on haematology and differential blood count of Rahaji cattle fed graded levels of locust bean pulp.

**Data Analysis**

The data generated were subjected to Analysis of Variance (ANOVA) using general linear model with Statistix-10. Least significant difference (LSD) at 5% probability level were used to separate means that showed significance difference between treatments.

**RESULTS AND DISCUSSIONS**

**Haematological Profile and differential Blood Counts for Rahaji Cattle Fed Graded Levels of Locust bean pulp**

Parameters	Treatments			
	A	B	C	SEM
<b>Haematology</b>				
Packed cell volume (PCV %)	30.60	30.30	29.50	1.39
Haemoglobin (Hb g/dl)	12.05	11.80	11.32	0.70
Red blood cell (RBC X10 <sup>12</sup> )	8.60	8.25	8.45	0.36
White blood cell (WBC X10 <sup>9</sup> /L)	14.20 <sup>a</sup>	13.00 <sup>a</sup>	12.00 <sup>b</sup>	0.32
Mean corpuscular haemoglobin (MCH pg)	12.50	12.95	13.00	0.65
Mean corpuscular volume (MCV fi)	36.00	34.50	35.00	1.36
Mean corpuscular haemoglobin concentration (MCHC g/dl).	35.35	37.00	36.70	0.45
<b>Differential blood counts (%)</b>				
Neutrophils	48.07	46.03	47.50	0.63
Eosinophil	6.90	6.93	6.83	0.12
Lymphocytes	41.07	42.57	43.43	0.47
Monocytes	1.43	1.36	1.27	0.16
Basophils	0	0	0	0

a, b, mean values with different superscripts denote significant (P<0.05) differences between means within the same rows.

### **Haematological characteristics of Rahaji bulls fed diets containing graded levels of locust bean pulp**

The haematological characteristics of the Rahajii bulls are shown in table 1. The result revealed that the white blood cells showed significant difference ( $P < 0.05$ ) between the treatments means; the other parameters were statistically similar ( $P > 0.05$ ). All the haematological parameters fell within the reference range values (RAR, 2009). The values of lymphocytes showed numerical increase as the level of inclusion of locust bean pulp in the diets increased while the white blood cells, haemoglobin, packed cell volume, mean corpuscular volume, eosinophils, monocytes and basophils showed the reverse.

Significant difference in WBC count was explained as possible presence of foreign organisms introduced into the bodies of the animals that would have necessitated increase in WBC count so as to fight the invasion. This effect could not however be attributed to the locust bean pulp introduction since the high WBC levels were also noticed in T1 that had no locust bean pulp inclusion. The non-significance in the haemoglobin and PCV values show that inclusion of locust bean pulp aided production of enough red blood cells and transport of oxygen to tissues of the bulls for oxidation of food for energy release necessary for preventing anaemia and aiding absorption of nutrients (Isaac *et al.*, 2013; Kubkomawa *et al.*, 2015). The normal lymphocytes count showed that inclusion of locust bean pulp in the diets did not encourage introduction of any infection while the low neutrophils count portrayed absence of any potential inflammatory process (Isaac *et al.*, 2013). The level of eosinophils also showed that locust bean pulp as a feed input did not introduce any allergic substances that the body would have reacted to. Similarity in monocytes count showed that locust bean pulp inclusion did not introduce harmful organisms in the body or increased dead body cells that needed to be removed. Similarity in leucocytes showed absence of any negative effect on immune system of the bulls. In general it can be summarized that the varying levels of locust bean pulp inclusion in the diets in this study did not have any detrimental effect on the haematological parameters of the bulls. (Mbanasor *et al.*, 2003).

### **Conclusion**

In conclusion, the dietary inclusion of locust bean pulp did not exert any deleterious effects on the haematological profiles and by implication the health of the beef Rahaji bulls used in this study.

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