

## HAEMATOLOGY PARAMETERS OF SAVANNAH BROWN GOATS FED MAXIGRAIN ENZYME TREATED RICE HUSK SUPPLEMENTED WITH SHEA BUTTER LEAVES

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This study was conducted to determine the haematology parameters of savannah brown goats fed Maxigrain® enzyme treated rice husk supplemented with shea butter leaves. A total number of 36 He- Savannah Brown Goats aged between 2-3 months with an average body weight of 5.5 kg were assigned to four dietary treatments in a completely randomized design. Treatments consisted of varied inclusion (0, 25, 50 and 75%) of Maxigrain® enzyme treated rice husk for eight (8) weeks experimental period. The different level of Maxigrain® enzyme treated rice husk had significant differences ( $P < 0.05$ ) on White Blood Cell (WBC), Absolute Lymphocyte (LY#), Lymphocyte % (LY), Absolute Granulocyte (GRAN #) and Haemoglobin (HB). While Mid cell (MID), Granulocyte (GRAN), Absolute Mid cell (MID#), Red Blood Cell (RBC), Haematocrit (HCT) reveal no significant ( $P > 0.05$ ) difference among the treatment mean. Haemoglobin (HB), Red Blood Cell (RBC), Haematocrit (HCT) and Granulocyte (GRAN) fell within range value of the goat's blood showing that Maxigrain enzymes treated rice husk has no detrimental effect on the haematology.

**Keywords:** Maxigrain® Haematology, Rice Husk.

Maxigrain® enzymes are natural product of fermentation and therefore pose no threat to animal or the consumer (Aguihe *et al.*, 2016). It is a bacterial xylanase enzyme. It is a product which helps to optimize the use of non-conventional feed ingredients and help improve feed conversion efficiency (Wikipedia, 2014). It helps to reduce levels of di-calcium phosphate absorption in the feed substantially (Polchem Innovative

Solution, 2013). Rice husk is a byproduct of rice obtained from the outer layer of the rice kernel during milling. It is rich in fibre, minerals, B vitamins, antioxidants and phytic acids (Holland *et al.*, 1991). Hence, rice husk together with forages can serve as a vital source of nutrient requirements for ruminant Animals (Young, 2000). Goat meat contributed about 24% to Nigeria meat supply (Oni, 2002). The high preference for goat meat consumption is due to its attributes such as tenderness and juiciness of the meat (Babiker *et al.*, 1990). Goats are well adapted to different environmental conditions and utilize feed efficiently to produce high protein product (Kadim *et al.*, 2003). Haematological studies are very vital in the diagnosis of many diseases as well as the extent to which blood is damaged (Onyeyili *et al.*, 1992; Togun *et al.*, 2007). Also, investigation of blood can be used to determine the presence of several metabolites and other constituents which may affect the physiological, nutrition and pathological states of an Animal (Aderemi, 2004; Doyle, 2006). As reported by Olafedehan *et al.*, (2010), there are millions tonnes of unconventional Animal feed resource that are accessible but not fully utilized for ruminant Animal production. Hence, there is need to search for alternative quality but low cost feed for feeding these animals especially during the dry season. Emphasis by Animal nutritionist is usually on nutrient digestibility, feed utilization and farm Animal performance (Uko and Ataja, 1998). However, it is important to consider the health status of the Animals used in various feeding trials. The objective of this study was to use haematological parameters to determine the effect of feeding

Maxigrain® enzyme treated rice husk supplemented with shea butter leaves on Savannah brown Goats.

## MATERIALS AND METHODS

The entire experiment was conducted at the livestock unit of the Teaching and Research Farm in the Department of Animal Production, Federal University of Technology Minna, Niger State.

### Management of experimental animal

Thirty six (36) savannah brown male goats of 2-3 months of age and of comparable sizes were purchased from Beji market in Minna Niger State. The goats were housed in wooden slatted floor pens (1.20 m × 0.80 m × 0.70 m) equipped with feeding and drinking facilities. Thereafter, routine management and vaccination followed. The animals were allowed ad libitum access to water throughout the trial. The goats were weighed and randomly allotted to four dietary treatments of three goats per replicate using a completely randomized design (CRD). The animals were allowed 7 days of acclimatization period to the experimental diets, during which they were observed for any symptoms of disease(s).

### Diets

All diets were formulated to meet the nutritional requirements of growing goats based on (NRC, 2007) recommendations and animals were fed twice daily with ad libitum access to clean water. The proximate composition of the diets was determined following the method of (AOAC, 2007). Rice husk treated with Maxigrain® enzyme at 0, 25, 50, and 75 % was used in composing the diet. The table for composition of experimental diet is shown in Table 1. Shea butter leaves were supplemented alongside their experimented diet and were given to the goats in the evening.

### Blood sampling and analysis

Blood samples were collected from the goat per replicate at the 4<sup>th</sup> and 8<sup>th</sup> of the experiment. 3ml of blood was collected into a bottle containing Ethylene Diamine Tetra Acetic Acid (EDTA), from each animal through the jugular venipuncture using 21-gauge needle while observing all aseptic

precautions. The samples were kept in ice packed container processed and subjected to haematological parameter analysis. Haemoglobin concentration was determined by Sahl's (acid haematin) method (Benjamin 1978). MCHC values were calculated from Hb and RBC values (Jain 1986).

### Statistical analysis

All data collected were subjected to one way analysis of variance (ANOVA). Significantly means were separated using Duncan multiple range test (1999). All the data collected were analyzed using statistical package for social sciences (SPSS, 2006).

## RESULTS

Table 2 showed the proximate composition of the experimental diets and shear butter leaves fed to Savannah Brown goats. The dry matter was higher in T4 (92.67%) and lowest in T2 (85.33%). Nitrogen free extract was higher in T3 (55.74%) and lowest in T2 (46.49%). T4 recorded the highest value in Ash (12.00%) and T3 has the lowest value (7.00%). Ether extract in T1 was higher in value (9.50%) and T4 has the lowest value (4.00%). T4 recorded the highest value in crude fibre (11.33%) and the lowest in T1 (8.33%). Crude protein in T4 recorded the highest value of (14.13%) and the lowest value in T2 (12.06%). The result of haematological parameter of savannah brown goat fed maxigrain enzymes treated rice husk shown on Table 3, revealed that WBC, LY, LY#, GRAN and HB were significantly different ( $P < 0.05$ ) among treatment means. However, MD, GRAN, MID#, RBC and HCT were not significantly different ( $P > 0.05$ ). WBC, LY# and HB were significantly higher in the control, compare to all other treatments which were similar. LY% differ significantly ( $P < 0.05$ ) in T4 (54.15%) compare to the other treatments and the least was recorded in T3 (24.45%). The mean values of haematological indices of Mean Corpuscular Haemoglobin (MCH), Mean Corpuscular Haemoglobin Concentration (MCHC) and Mean Corpuscular Volume (MCV) as shown on Table 4 revealed no significant differences ( $P > 0.05$ ) among the treatment means.

Table 1: Composition of the diet fed to the goats

INGREDIENTS	TREATMENTS			
	T1	T2	T3	T4
Maize	71.50	53.55	35.70	17.97
Rice husk	0.00	17.85	35.70	53.93
Groundnut cake	8.0	7.50	7.50	6.50
Maize bran	19.50	19.50	20.00	20.50
*Premix	0.50	0.60	0.60	0.60
Salt	0.50	0.80	0.60	0.60
Total	100.00	100.00	100.00	100.00
Calculated				
Metabolizable Energy (Kcal/kg)	3581.8	3074.6	3349.8	2973.6
Crude Protein (%)	14.12	12.06	13.38	14.13

T1 - Control (0% Maxigrain<sup>®</sup> enzyme treated rice husk diet)

T2 - 25% Maxigrain<sup>®</sup> enzyme treated rice husk

T3 - 50% Maxigrain<sup>®</sup> enzyme treated rice husk

T4 - 75% Maxigrain<sup>®</sup> enzyme treated rice husk

Table 2: Proximate Composition of Experimental Diets and Shea Butter Leaves

Proximate Composition (%)	T1	T2	T3	T4	SBL
Dry Matter	91.00	85.33	92.00	92.67	93.87
Crude Protein	14.12	12.06	13.38	14.13	7.00
Crude Fibre	8.33	11.14	9.38	11.33	30.00
Ether Extract	9.50	8.14	6.50	4.00	3.50
Ash Content	8.00	7.50	7.00	12.00	6.00
Nitrogen Free Extract	54.05	46.49	55.74	51.21	47.37

SBL- Shea Butter Leaves

Table 3: Haematological Parameters of Savannah Brown Goat Fed Maxigrain Enzyme Treated Rice Husk

Parameter	T1	T2	T3	T4	SEM	LS
WBC ( $10^9/L$ )	168.10 <sup>a</sup>	17.50 <sup>b</sup>	19.05 <sup>b</sup>	16.52 <sup>b</sup>	24.67	*
LY (%)	42.80 <sup>ab</sup>	36.15 <sup>ab</sup>	24.45 <sup>b</sup>	54.15 <sup>a</sup>	4.72	*
MID (%)	2.55	27.50	5.60	22.80	6.14	NS
GRAN (%)	54.60	36.35	69.95	23.05	8.71	NS
LYN ( $10^9/L$ )	72.75 <sup>a</sup>	6.27 <sup>b</sup>	4.70 <sup>b</sup>	9.16 <sup>b</sup>	11.58	*
MID # ( $10^9/L$ )	4.36	4.51	1.07	2.93	0.89	NS
GRAN # ( $10^9/L$ )	91.15 <sup>a</sup>	6.71 <sup>b</sup>	13.30 <sup>b</sup>	4.41 <sup>b</sup>	14.10	*
RBC ( $10^9/L$ )	2.75	0.07	0.09	0.00	0.67	NS
HB(g/L)	362.00 <sup>a</sup>	95.50 <sup>b</sup>	80.00 <sup>b</sup>	99.00 <sup>b</sup>	45.58	*
HCT (L/L)	0.31	0.01	0.01	0.00	0.08	NS

a, b, mean with different subscript on the same row are significantly different (P<0.05)

\*= significantly difference (P<0.05), NS= No significant difference(P>0.05), WBC- white blood cell, LY- lymphocyte, MID- mid cell, GRAN- granulocyte, RBC- red blood cell, HB- haemoglobin, GRAN#- absolute granulocyte, MID #- absolute mid cell, HCT- haematocrit.

Table 4: Differences in Red Blood Cells Indices

INDICES	T1	T2	T3	T4	SEM	LS
MCH	37.80	444.85	301.60	0.00	124.27	NS
MCHC	337.00	0.00	0.00	0.00	84.25	NS
MCV	96.50	88.50	85.00	90.00	3.45	NS

MCH- mean corpuscular haemoglobin, MCHC- mean corpuscular haemoglobin concentration, MCV- mean corpuscular volume.

## DISCUSSION

The health status of an experimental animal is normally known when blood parameters are measured. This is because blood plays a vital role in physiological, nutritional and pathological status of animal (Kakade *et al.*, 1972). Physiological parameter is a valuable means of diagnosing a disease ( Santschi *et al.*, 1988 ; Ganong 2005) and protein status in goats (Daramola *et al.*, 2005).

The total WBC count in T1 was higher than T2, T3 and T4 also more than the value obtained in Red Sokoto Goats (Tambuwal *et al.*, 2002). This differences may be as a result of the goats in T2, T3 and T4 trying to adjust to the physiological and nutritional changes in Maxigrain® enzyme supplementation in the feed.

The highest level of haemoglobin (Hb) was observed in T1. Haemoglobin value in T2, T3 and T4 fell within the range given by Research Animal Resources (RAR 2009) and within the range 7-15% and 9.15-10.75% g/L for West African Dwarf Goats (Daramola *et al.*, 2005). Savannah brown goats seem to possess relatively high Hb values, and this is an advantage in terms of the oxygen carrying capacity of the blood (Akinyemi *et al.*, 2010).

The absolute granulocyte were significantly different ( $P < 0.05$ ) in T1 due to the active infection ([www.emedicinehealth.com](http://www.emedicinehealth.com)) and lower level in T2, T3 and T4, which could be associated with the feed quality.

## CONCLUSION

The findings of this study may serve as references in which enzyme supplementation in feed, Physiological and health status can be compared both for diagnostic and therapeutic purposes in Savannah Brown Goats in this ecological zone. Also, based on the result of this study, it is therefore concluded that Maxigrain® treated rice husk supplemented in diet of Savannah Brown Goat has no harmful effect on the haematological parameters.

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