HAEMATOLOGY AND SERUM BIOCHEMICAL INDICES OF GRASSCUTTERS FED WITH SUGARCANE PEEL MEAL PARTIALLY REPLACED WITH CASSAVA PEEL MEAL

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ABSTRACT
Blood study on grasscutters was carried out when they were fed sugarcane peel partially replaced with cassava peel meal. Twenty grasscutters with average initial weight 556g were used. Four grasscutters per treatment in a Completely Randomized Design. Five diets were formulated to contain 100, 75, 50, 25 and 0.0% of sugarcane meal and 0.0, 25, 50, 75 and 100% of cassava peel meal. Proximate analysis on the test ingredients and experimental diets were carried out. The results showed that, Haematocrit ranged from 32.33-36.68%, Haemoglobin values that ranged from 11.17-12.52g/L, lymphocytes ranged from 39.38-54% and neutrophils 46.03-61.01 % were significantly (P<0.05) affected. White blood cell (5.83-6.38 x10^6/L), Red blood cell ranged (4.31-4.89 x10^9/L) and erythrocyte indices namely; MCV, MCH and MCHC revealed no significant (p>0.05) differences. The results of serum biochemical variables showed that, the total protein ranged from 66.32-68.00gd/l, albumin 45.26-47.26gd/L, Globulin 21.32-22.1%, urea 3.67-5.34mmol/L, cholesterol 3.62-5.73 mg/dL and Glutamic Pyruvic Transaminase with values 9.21-10.80 µl did not differ (P>0.05) while Glutamic Oxaloacetic Transaminase (41.16-57.10µl/L), glucose 58.12-86.72mg/dL and creatinine 1.00-1.11mg/dL had significant (P<0.05) differences. It was observed that, none of the haematological and serum biochemistry values evaluated showed any threat to the health of the grasscutters because they had normal values, an indication of nutritional adequacy and safety level of the different feeding trials. Based on these observations, it was therefore concluded that, replacing sugarcane peel with cassava peel feed can be used to feed grasscutters without any adverse effect on their health or physiological activities.
Keywords: cassava peel meal, sugar cane peel meal, grasscutters, haematology, serum Biochemistry.

INTRODUCTION

Blood study provides valuable information about the health of human and animals. According to Afolabi *et al.* (2010), changes in haematological parameters are often used to determine health status of the body and to know the degree of environmental, nutritional and/or pathological stresses. Factors that affect blood like drugs, pathogenic organism or nutrition will certainly affect the entire body adversely or moderately in terms of health, growth, maintenance and reproduction (Oke *et al.,* 2007). A readily available and fast means of assessing clinical and nutritional health status of animals on feeding trials may be the use of blood analysis, because ingestion of dietary components has measurable effects on blood composition.

Serum parameters are important in the proper maintenance of the osmotic pressure between the circulating pH and the fluid in the tissue spaces so that exchange of materials between the blood and the cells could be facilitated.

Nutrition and other factors are known to affect haematological and biochemical values and thought to play major roles in the differences in haematological and biochemical parameters (Afolabi *et al.,* 2010). Gboshe *et al*. (2020) determine the haematological traits and serum biochemical variables of grasscutters. They reported that, experimental feeding regime had effects on some parameters.

Grasscutters have the potentials of reducing the wide animal protein demand gap and its production is becoming more popular in some part of Africa, there is need to improve on their level of feeding since that is a major challenge in animal production. Therefore, they is need for Animal Nutritionists to work towards the utilization of alternative cheap feed sources in grasscutters through their blood study. The findings will provide the baseline information for safe and effective usage of cassava peel

meal and sugarcane peel meal needed by Grasscutter researchers, managers and Farmers. It was therefore the aim of the study to evaluate the haematological and biochemical variables of grasscutters fed sugarcane peel meal partially replaced by cassava peel meal.

MATERIALS AND METHODS

The study was carried out at the Teaching and researched units of the Department of Animal Science, Faculty of Agriculture and Forestry, University of Cross River state, Obubra Campus. Obubra has a latitude 6^0 5'8.47"$_N$ and longitude 8^0. 19'40.83"^0_E of the equator (GPS Coordinates of Obubra), with a warm weather and ambient temperature of about 21 – 30^0c and an annual rainfall of 500 – 1070 mm (Google Map).

Twenty (20) grasscutters with similar live body weights were randomly assigned to five dietary treatments with four replicates in a Completely Randomized Design and used for the study. The animals were fed their dietary formulated concentrate *ad libitum*. The experimental ingredients cassava peel (CP) and sugarcane peel (SCP) were sourced within the premises of the campus's environs. These were sun dried intensively on a concrete slap separately for a period of 3 days and finally processed into meals.

Experimental Diets

Five diets were formulated to contain 100, 75, 50, 25 and 0.0% of sugarcane meal and 0.0, 25, 50, 75 and 100% of cassava peel meal with crude protein of 14.35-14.38% and metabolizable energy range of 2691.09-2814.29 kcal/kg.

DATA COLLECTION

HAEMATOLOGICAL INDICES

At the end of the 90th day of the study, blood was collected from the animals through the veins between 6-8 am in the morning. Ten (10 mL) each was collected from the animal. Five (5 ml) of the blood was put in blood sample bottles containing 1 mg ethylene-diamine-tetra acetic acid (EDTA), an anti-coagulant for haematological assay. Another 5 mL of the blood was put in sterilized blood sample bottles, without anticoagulant, for serum biochemical assay.

Statistical analysis

All data obtained were subjected to one way Analysis of variance (ANOVA) using mini-tab statistical software. Where significant differences occurred, means were separated using Fisher's least significant difference (LSD) as contained in the statistical package.

RESULTS AND DISCUSSION

Haematological Parameters of Grasscutters Fed Different Levels of sugarcane peel partially replaced by cassava peel

The results on haematological profile of experimental grasscutters is presented in Table 1. The values of the parameters evaluated had values that fell within the normal range (Byanet *et al.,* 2008; Bleyere *et al*., 2013) for grasscutters. This implies that, the nutritional adequacy of the diets were maintained despite the different inclusion levels of the test diets, an indication that, it did not adversely affect the blood parameters studied. This suggests that the replacement did not impair nutrient availability so as to cause anaemic conditions and the protein intake was adequate. WBC in all the treatments may be attributed to be caused by the dietary treatments to confer similar body immunity against diseases and this was not affected.

Lindsay (1977) reported that, reduction or abnormal values of Hb, PCV, RBC, MCH, MCV and MCHC may indicate a low protein intake or liver damage, anaemia, or parasitological infection. This however, did not occur to the grasscutters in this study which may invariably mean that, the diets were balanced and well-fortified to supply adequate nutrients with minerals and vitamins supplement.

For serum chemistry, the results shows that, the total protein, albumin, and other parameters evaluated were normal. This probably implies that, the grasscutters were not under thermal stress, thus there was adequate total protein level in the serum. This agrees with report by Kaneko (1989).

The two enzymes (enzymes, alanine- amino transaminase and aspartate- amino transaminase) are found in the tissues and mostly the liver. Their elevation above normal levels shows some pathological disorders in the liver and since both visual appearance and sizes of the livers were normal, it therefore suggested that, the values obtained in this study had no any adverse effect on the grasscutter livers since they are biomarkers of liver health which implies that the feeding trials did not

affect the grasscutters adversely.

Table 1: Haematological indices of Grasscutters fed sugarcane peel partially replaced with cassava peel meal

Parameters Grasscutter	T1 100% SPM 0%CPM	T2 75%SPM 25%CPM	T3 50%SPM 50% CPM	T4 25%SPM 75%CPM	T5 0%SPM 100%CPM	SEM
Packed cell volume (%)	33.67 ^{ab}	35.69 ^{ab}	32.33^{b}	36.68^{a}	35.58 ^{ab}	0.78
Haemoglobin (g/L)	11.17^{ab}	11. 67^{ab}	10.68^{b}	12.34^{a}	12.52^{a}	0.35
White blood cell (x10^{6}/L)	6.12	5.83	6.36	6.34	6.38	0.11
Red blood cell (x10^{9}/L)	4.89	4.60	4.31	4.67	4.64	0.09
MCV (*fl*)	77.34	76.31	77.33	75.69	76.86	0.32
MCH (*pg*)	19.03	19.18	17.64	18.46	18.47	0.27
MCHC(g/L)	32.93	33.23	32.93	33.66	32.83	0.15
Lymphocytes (%)	50.67^{a}	46.00^{ab}	54.00^{a}	39.33^{b}	46.67^{ab}	2.47
Neutrophils (%)	49.33^{b}	54.00^{ab}	46.03^{b}	60.67^{a}	61.01^{a}	2.99

a,b,c Means having the same letter(s) in a row are not significantly ($p<0.05$) different, SEM =standard error of means, SPM= Sugarcane peel meal, CPM=Cassava peel meal , MCV= Mean Corpuscular Volume, MCH= Mean Corpuscular Haemoglobin, MCHC= Mean Corpuscular Haemoglobin Concentration

Generally, the Serum biochemical variables in this study revealed that all the parameters studied appears to be normal. Since the values obtained were normal when compared to other researchers which confirms that the results of this experiment were within the normal values for grasscutters. It is a common practice in feeding trials to use weights of the visceral organs like liver, kidney etc. as an indicator of toxicity. Bone (1979) reported that, if there is any toxic element in the feed, abnormalities in weight of liver and kidney would be observed and this is related to the blood

The abnormalities will arise because of increased metabolic rate of the organs in attempt to reduce those toxic elements or anti-nutritional factors to non-toxic metabolites. Since these abnormalities did not occur, it implies that these feeding trials used supplied adequate nutrients to meet the nutritional requirements of grasscutters for tissue accretion.

Table 2: Effect of sugarcane peel meal replaced by cassava peel meal on the serum biochemical indices of grasscutters

Parameters	T1 100% SPM 0% CPM	T2 75% SPM 25% CPM	T3 50% SPM 50% CPM	T4 25% SPM 75% CPM	T5 0% SPM 100% CPM	SEM
Total Protein (gd/L)	66.82	68.00	69.33	66.67	67.42	0.30
Albumin (gd/L)	45. 28	45. 48	47. 26	45.27	45. 55	0.38
Globulin (%)	21.32	21.87	22.05	21.37	22.10	6.47
Urea (mmol/L)	5.33	4.33	3.67	4.33	5.34	1.31
Cholesterol (mg/dL)	3.62	5.73	4.56	4.77	4.67	1.37
Glucose (mg/dL)	74.76^{b}	68.34^{b}	58.12^{c}	72.90^{b}	86.72^{a}	
Creatinine (mg/dL)	1.08^{b}	1.17^{a}	1. 00^{c}	1. 10^{b}	1.11^{b}	0.275
SGPT (µL)	9.85	9. 51	9.21	10.70	10.80	0.09
SGOT (µL)	41. 16^{c}	47. 68^{bc}	50.51^{ab}	56. 97^{a}	57. 10^{a}	3.598

a, b, c; means within rows with similar superscripts are not significantly different ($p>0.05$), SEM= Standard Error of mean, SPM= Sugarcane peel meal, CPM=Cassava peel meal, SGPT= Glutamic Pyruvic Transaminase or Alanine Aminotransferase (ALT), SGOT= Glutamic Oxaloacetic Transaminase or Aspartate Aminotransferase (AST)

CONCLUSION AND RECOMMENDATION

It was observed that, none of the haematological and serum biochemistry values measured showed any threat to the health of the grasscutters, an indication of nutritional adequacy and safety level of the

different feeding trials. Based on these observations, it was therefore concluded that, replacing sugarcane peel with cassava peel feed can be used to feed grasscutters without any adverse effect on their health or physiological activities and it is therefore recommended.

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