HAEMATOLOGICAL AND BIOCHEMICAL INDICES OF WEANER RABBITS FED WITH VARYING LEVELS OF SUN-DRIED SHEEP RUMEN CONTENTS AS A REPLACEMENT FOR MAIZE OFFAL

[1]*Saidu, I., [2]Mbap, S. T., [2]Abubakar, M. M., [2]Bello, K. M., [1]Sa'id, M. [1]Yakubu, N., and [1]Muazu, S. M.
[1]Bauchi State College of Agriculture, Bauchi, Department of Animal Production
[2]Abubakar Tafawa Balewa University, Bauchi, Department of Animal Production
*Corresponding author: Idrissaidu1967@gmail.com

ABSTRACT
The research was conducted to investigate haematological and biochemical indices of weaner rabbits fed with varying levels of sun-dried sheep rumen contents (SDSRC) as replacement of maize offal (MO). Fifty weaner mongrel rabbits between 5 and 7 weeks of age were allotted to five dietary treatments replicated five times with two rabbits per replicate in a completely randomized design with SDSRC replacing MO at 0, 25, 50, 75 and 100% designated as treatment 1, 2, 3, 4 and 5 respectively. Parameters measured for haematology and serum biochemical indices recorded non-significance differences ($p>0.05$) in most of the parameters except, red blood cell (5.46 -8.77x10^6/ul), albumin (3.23-4.00g/dl) and total cholesterol (mol/L) (1.23-3.83g/dl) $p<0.05$. Based on the results obtained it was concluded that, most of the values obtained for haemotology as well as serum biochemical indices falls within the normal literature values for rabbits, therefore, Sun-dried sheep rumen content can replace maize offal resulting into advantage of reduced feed cost without affecting their health status.
Keywords: Weaner rabbits, Maize offal, Rumen content, Haematology, Serum biochemistry

INTRODUCTION

Many feed products are fed to rabbits usually without re-course to their health and physiological implications on the animals; the commonest parameters for measuring these implications are through the haematology and surrogate markers of the kidney and liver functions of the Animals (Aro *et al*., 2013). Moreover, the comparison of blood profile with nutrient intake indicates the need for adjustment of certain nutrients upward or downward for rabbits (Rafiu *et al*., 2012). Isaac *et al*. (2013) stated that the haematological components, which consist of red blood cells, white blood cells or leucocytes, means corpuscular haemoglobin and mean corpuscular haemoglobin concentration are valuable in monitoring feed toxicity, especially, with feed constituents that effect the blood as surrogate markers well as the health status of farm animals, Aro and Akinmoegun (2012) and Aro *et al.* (2013) reported haemotological parameters like haemotocrit value, haemoglobin concentration, white blood cells count, red blood cell count among others are used in routine screening for the health and physiological status of livestock and even humans. Adejumo (2004) reported haemotological traits especially packed cell volume (PCV), haemoglobin (Hb) was correlated with nutritional status of the animal. Isaac *et al*. (2013) stated that PCV is involved in transport of oxygen and absorbed nutrients. The examination of blood and serum provides the opportunity to clinically investigate the presence of several metabolites and other constituents in the body and it plays a vital role in the physiological, nutritional and pathological status of the animal (Aderemi, 2004). Therefore, the objective of the study is to determine haemotological value and serum biochemical indices of weaner rabbits fed with varying levels of SDSRC.

MATERIALS AND METHODS

The research was carried out at Bauchi State College of Agriculture, Bauchi Rabbitry Unit. The rumen contents were collected at Bauchi main abattoir from certified healthy sheep slaughtered, immediately after the rumen was incised, the collection of the rumen contents was done in the early hours of morning. The rumen contents were spread on concrete floor and sun dried for seven days by constant raking to ensure complete drying. Fifty mongrel weaner rabbits between 5 and 7 weeks of age were purchased within Bauchi town and its environs. The weaner rabbits were allowed one-week acclimatization period, during which commercial growers mash (vital feed), groundnut haulms and water were supplied *ad libitum*. After the first week of acclimatization the rabbits were randomly allotted to five dietary treatments replicated five times with two rabbits per replicate in a completely randomized design. Five diets were formulated in which sun-dried sheep rumen contents replaced Maize offal at 0, 25, 50, 75 and 100% levels coded as diet 1, 2, 3, 4 and 5 respectively (Table 1). At the end of the experiment three rabbits from each treatment were randomly selected and 10mls of blood was collected from the ear vein 5mls was placed in labelled sterile vacuum tube containing Ethylene Diamine Tetra Acetic Acid (EDTA) an anti-coagulant which was used for haematological analysis while the remaining 5mls was placed into labelled sterile sample bottles without anti-coagulant and used for the serum biochemical analysis.Parameters determined for the haematology were packed cell volume (PCV), white blood cell (WBC), red blood cell (RBC), haemoglobin (Hb),

means corpuscular haemoglobin (MChb) means corpuscular haemoglobin concentration (MCHC) and platelets, while for the serum biochemistry the parameters measured were total protein (TP), albumin, total cholesterol and globulins. All haematological parameters were analysed by sysmex XP-300 automated 3-part differential analyser which is design to be reliable, accurate and simple, where it can be analysed twenty parameters at the push of a button. Serum biochemical indices were determined by methods described by Ochei and kolhathar (2007). Data collected were subjected to one-way analysis of variance (ANOVA) as completely randomized design using Statistical Package for Social Sciences (IBM^R SPSS version 21 (2011).

Table 1: Composition of Experimental Diets Containing Sun-dried Sheep Rumen Contents (SDSRC) as a Replacement for Maize Offal

Ingredients	Diets				
	1(0%)	2(25%)	3(50%)	4(75%)	5(100%)
Maize	32.0	32.8	33.8	34.6	35.4
Soybean meal	15.3	14.5	13.5	12.7	11.9
Maize offal	30.0	22.5	15.0	7.5	0
SDSRC	0	7.5	15.0	22.5	30.0
Bone meal	2.0	2.0	2.0	2.0	2.0
G/nut haulms	20.0	20.0	20.0	20.0	20.0
Premix	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25
Lysine	0.1	0.1	0.1	0.1	0.1
Methionine	0.1	0.1	0.1	0.1	0.1
TOTAL	**100**	**100**	**100**	**100**	**100**

RESULTS AND DISCUSSION

Table 2 shows the haematological responses of experimental rabbits fed the treatment diets. White blood cell was numerically ($p>0.05$) higher for diet 4($10.75x10^3$dl) compared to other treatment groups. Significantly ($p<0.05$) higher values of red blood cells were obtained in 5(100% SDSRC) ($8.77x10^6$/ul) compared to the remaining diets. Haemoglobin values observed were statistically ($p>0.05$) not significant, with higher numerical value observed in diet 1(19.97g/dl) and the least diet 4(12.00g/dl). Packed cell volume across the treatments were statistically similar ($p>0.05$) with range of 42.05 to 60.50% for treatment 4(75% SDSRC) and 5(100% SDSRC) respectively. The values for means corpuscular volume decreases with an increased in SDSRC level in the diets, the treatment with highest value was diet 2(85.83%) and the least diet 5(77.00%). Means corpuscular haemoglobin, observed were also similar ($p>0.05$) across the diets. Means corpuscular haemoglobin concentration (pg) and platelets follow the same trend of non-significant difference ($p>0.05$) among the diets and the lowest value were observed in treatment 3($192.23x10^3$dl) and 4($505.50\ x10^3$dl) had the highest value. Result for serum biochemistry indices depicts non-significant ($p>0.05$) differences in total protein and globulin, treatment with highest value is treatment 4(6.80g/dl) and 2(2.90g/dl) and the lowest values were treatments, 1, 2 and 5(5.97g/dl) and 1(2.60g/dl) respectively. Albumin and total cholesterol were significantly ($p<0.05$) different across the diets, with treatments 3 and 4 with similar albumin values (3.80g/dl and 4.00g/dl) and diets diet 1 and 5 with the same values of 3.43 and 3.23g/dl.

The highest total cholesterol value was depicted in treatment 1, 2 and 5 of 3.27, 3.83 and 3.27mol/L respectively, while diet 4(1.23mol/L) was the least. Haematological studies are important because, the blood is the major transport system of the body, and evaluation of the haematological profile usually furnishes vital information on the body's response to injury of all forms, including toxic injury (Ihedioha *et al*., 2004). The examination of blood provides the opportunity to clinically investigate the physiological, nutritional and pathological status of an animal. There were no statistical differences in most of the parameters with the exception of red blood cell (5.46-$8.77x10^6$/ul), albumin (3.23-4.00 g/dl) and total cholesterol (1.23-2.40mol/L), the values for RBC and total cholesterol are higher than range values reported by Amao *et al*. (2020) of $6.33\text{-}6.64x10^{12}$/l and 64.18-78.39 mg/dl respectively, however, very closely similar values was obtained for albumin (3.14-3.89g/l) and the values were within the standard reference (Medirabbit, 2011). The PCV (42.05-60.50%) observed in this study is relatively higher than range reported by Yahya *et al*. (2020) these values were within the range reported by Ozkan *et al.* (2012) (41.70-57.00%). PCV value fewer than 30% and the decrease in PCV parallel to haemoglobin are evaluated as anaemia (Jenkins, 2008). Furthermore, it has been denoted that WBC count rise in rabbits rarely indicates an infection, it generally varies due to various stress factor and blood collection methods (Melillo, 2007). The analysis of serum biochemical parameters provides important information about visceral organ damage in rabbits, particularly for the liver and the kidney (Melillo, 2007; Jenkins, 2008). It was observed that most of the

haematological and serum biochemical indices were within the normal range for rabbits and would be helpful for both clinicians and researchers.

Table 2: Haematology and Serum Biochemistry of Weaner Rabbits Fed Diets Containing Graded Levels of SDSRC as Replacement for Maize Offal

Parameters	Diets					SEM
	1(0%)	2(25%)	3(50%)	4(75%)	5(100%)	
White blood cell (x10^{3}dl)	6.80	7.57	10.17	10.75	9.20	10.94^{NS}
Red blood cell (x10^6/ul)	5.58^b	5.46^b	5.76^b	5.68^b	8.77^a	0.28*
Haemoglobin (g/dl)	19.97	19.87	14.50	12.00	17.40	0.77^{NS}
Packed cell volume (%)	46.03	47.03	42.83	42.05	60.50	2.33^{NS}
Means corpuscular volume (fl)	83.87	85.83	77.50	78.50	77.00	10.79^{NS}
Mean corp. haemoglobin (pg)	23.17	22.37	86.30	22.85	22.10	0.31^{NS}
Mean corp. haem. Conc.(g/dl)	27.83	25.70	28.86	23.40	25.70	0.35^{NS}
Platelets (x10^{3}dl)	310.67	407.33	192.33	505.50	234.50	37.85^{NS}
Total Protein (g/dl)	5.97	5.97	6.10	6.80	5.97	0.09^{NS}
Albumin (g/dl)	3.43^c	3.67^b	3.80^{ab}	4.00^a	3.23^c	0.03*
Total Cholesterol (mol/L)	3.27^a	3.83^a	2.40^b	1.23^c	3.27^a	0.19*
Globulin (g/dl)	2.60	2.90	2.90	2.80	2.73	0.04^{NS}

^{abc} -Means bearing different superscripts within a row are significantly different (*=p<0.05) SEM -Standard error of means NS-Not significant (p>0.05)

CONCLUSION

It can be inferred from this study that, sun-dried sheep rumen content can replace maize offal in weaner rabbits' diet without compromising their health status, because most of the parameters measured were within the normal range for healthy rabbits.

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