Nig. J. Anim. Prod. 2020, 47(6): 135 - 140
Nigerian Journal of Animal Production
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Influence of feeding some common browse trees leaves hay on blood parameters of Yankasa lambs

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Abstract

The study was conducted to investigate the influence of feeding some of the common browse trees leaves in Bauchi state on haematological and biochemical parameters of Yankasa lambs. Fourty lambs were allotted to eight different browse trees namely: Maje (Daniella oliver), Madaci (Khaya senegalensis), Marke (Anogesisessus leicarpus), Baure (Ficus syncomorus), Kuka (Adansonia gigitata), Magarya (Zizaphus Mauritania), Taura (Detarium macrocarpum) and Baushe (Terminalia glaucescens), as treatments with five replications in each case. The feeding trial lasted for seventy days. Ten milligrams (10mls) of Blood sample was collected from each animal at the end of the feeding trial. The samples were collected via Jugular vein early in the morning. About 3mls of each blood sample was placed in EDTA (anticoagulant) bottle for haematological studies. The haematological values obtained from lab were subjected to statistical analysis. The remaining 7mls was placed in universal bottle and allowed to stand at room temperature and centrifuged for 15 minutes. The serum was separated and store in a freezer for chemical analysis. The hematological values obtained from lab were subjected to statistical analysis. Results indicated Taura had significantly higher ($p<0.05$) PCV (40.70 %) and MCV (64.60 pl), Magarya Hb (13.66 g/dl) and RBC (8.48 $X10^{12}$) Maje MCH (19.24 pg) values. Baure and Maje were higher ($p<0.05$) with statistically the same values of 7.22, respectively in RBC. WBC was highest in Marke leaves (10.5 $X10^{9}$) while Maje recorded significantly highest ($p<0.05$) MCHC value of 37.74 g/dl. Blood serum showed that there was no significant difference ($p>0.05$) in Urea concentration across all the treatments. Animals fed Madaci recorded the highest Total protein value of 7.4 g/l. Conclusively, Madaci had the highest PCV, Hb and MCH and total protein but, no significant difference in urea across the treatments.

Keywords: Browse trees, feeding trial, blood chemistry

L'influence de l'alimentation de certaines feuilles de arbres de 'browse' sur les paramètres hématologiques des agneaux *Yankasa*

Résumé

L'étude a été menée pour étudier l'influence de l'alimentation de certaines des feuilles d'arbres de 'browse' dans l'état de Bauchi sur les paramètres hématologiques et biochimiques des agneaux Yankasa. Quarante agneaux ont été attribués à huit arbres de browse différents, à savoir : Maje (Daniella oliver), Madaci (Khaya senegalensis), Marke (Anogesisessus leicarpus), Baure (Ficus syncomorus), Kuka (Adansoni agigitata), Magarya (Zizaphus Mauritania), Taura (Detarium macrocarpum) et Baushe (Terminalia glaucescens), en tant que traitements avec cinq répétitions dans chaque cas. L'essai d'alimentation a duré soixante-dix jours. Dix milligrammes (10 ml) d'échantillon de sang ont été prélevés sur chaque animal à la fin de l'essai d'alimentation. Les échantillons ont été

prélevés par veine jugulaire tôt le matin. Environ 3 ml de chaque échantillon de sang ont été placés dans un flacon 'EDTA' (anticoagulant) pour les études hématologiques. Les valeurs hématologiques obtenues en laboratoire ont été soumises à une analyse statistique. Les 7 ml restants ont été placés dans une bouteille universelle et laissés au repos à température ambiante et centrifugés pendant 15 minutes. Le sérum a été séparé et stocké dans un congélateur pour l'analyse chimique. Les valeurs hématologiques obtenues en laboratoire ont été soumises à une analyse statistique. Les résultats ont indiqué que Taura avait des valeurs significativement plus élevées (p <0,05) le 'PCV' (40,70%) et le'MCV' (64,60 pl), Magarya Hb (13,66 g / dl) et le 'RBC' (8,48 X1012) Maje MCH (19,24 pg). Baure et Maje étaient plus élevées (p <0,05) avec statistiquement les mêmes valeurs de 7,22, respectivement en RBC. Le WBC était le plus élevé dans les feuilles de Marke (10,5 X109) tandis que Maje a enregistré la valeur "MCHC significativement la plus élevée (p <0,05) de 37,74 g / dl. Le sérum sanguin a montré qu'il n'y avait pas de différence significative (p> 0,05) dans la concentration d'urée dans tous les traitements. Les animaux nourris au Madaci ont enregistré la valeur protéique totale la plus élevée de 7,4 g / l. En conclusion, Madaci avait les plus hauts 'PCV', 'Hb', 'MCH' et protéines totales, mais aucune différence significative d'urée entre les traitements.

Mots-clés : les arbres de 'browse', test d'alimentation, Chimie du sang

Introduction

Poor nutrition remains the most widespread technical constraint to good ruminant animal performance in the sub-Saharan Africa. This becomes more critical during the dry season when feeds availability is not only inadequate, but the quality becomes extremely poor. Various options have been advocated as possible solutions to these perennial problems (Musa, 2016). The use of multipurpose trees (MPTs) has been advocated in the tropics for several reasons. These include: supply of fodder to livestock; wind breaks; providing protection and supplying nutrients to the soil and therefore to plants; supplying fuel for cooking and heating; acting as live fences; and providing shade to both man and livestock (Mtenga *et al*., 1992). Low quality of feed is associated with the fibrous and lignified nature of pastures which limits the intake, digestibility and utilization. Browses have been reportedly fed to sheep and goats with improved animal performance as they form a good substitute for grass during prolonged period of drought (Garba and Jinjiri, 2013). Haematological studies are of ecological and physiological importance in helping to understand the relationship between blood characteristics and the environment and in the selection of animals that are genetically resistant to certain diseases and environmental conditions. Hematological parameters are good indicators of physiological status of animals and those parameters that are related to the blood and blood forming organs (Ibrahim *et al*., 206). Animals with good blood composition are likely to show good performance. The examination of blood gives the opportunity to investigate the presence of several metabolites and other constituents in the body of animals and it plays a vital role in the physiological, nutrition and pathological status of an organism (Aderemi, 2004). The present study investigated the haematology and blood chemistry of Yankasa rams fed eight common browse trees available in Bauchi State.

Materials and methods

The study was conducted at the livestock teaching and research farm of Federal Polytechnic Bauchi. Fourty lambs were

allotted to eight different browse trees namely: Maje (*Daniella oliver*), Madaci (*Khaya senegalensis)*, Marke (*Anogesisessus leicarpus*), Baure (*Ficus syncomorus*), Kuka (*Adansonia digitata*), Magarya (*Zizaphus Mauritania*), Taura (*Detarium macrocarpum*) and Baushe (*Terminalia glaucescens*), as treatments with five replications in each case.

Haematological assay

At the end of the feeding trial, 10ml respective blood samples were collected from each of the animals for haematology, serum chemistry and electrolyte evaluation. Each blood sample was collected via the jugular vein into an ethylene-diamine tetra acetic acid (EDTA) coated bottle which serve as anti-coagulant and a plain tube. Each sample was allowed to stand at room temperature and then covered, centrifuged, the serum decanted and deep-frozen for serum biochemistry. Labeled samples (5ml each) of the whole blood were taken to the ATBU Teaching Hospital Bauchi, Chemical pathology and haematology laboratory for analysis.

Haematological indices

Packed cell volume (PCV) and haemoglobin concentration were determined by the microhematocrit and cyanmethaemaglobin methods respectively as described by Akpa *et al*. (2002). Erythrocyte count was determined by the haematocytometry method as described by Bush (1991). Total white blood cells (WBC) and differential counts were determined. Erythrocyte indices including Mean corpuscular volume (MCV), Mean corpuscular heamoglobin (MCH) and Mean corpuscular haemoglobin concentration (MCHC) were derived from the values obtained from red blood cells (RBC) count, haemoglobin concentration and packed cell volume (PCV) values (Jain 1993 and Schalm 1975) derived as follows;

$$MCV = \frac{PCV}{RBC\ Count\ in\ 10^6/mm3} \times \frac{10}{1}$$

$$MCH = \frac{Hb\ (g/dl)}{RBC\ (in\ 10^6/mm3)} \times \frac{10}{1}$$

$$MCHC = \frac{Hb\ (g/dl)}{PCV\ (\%)} \times \frac{100}{1}$$

Serum chemistry

The plasma total protein was measured using biuret reaction while albumin was measured by colorimetric estimation using Sigma® diagnostic kit according to the method described by Baker (2007).

Statistical analysis

The data generated from the experiment were subjected to analysis of variance (ANOVA) at 5% level of significance using completely randomized design using Statview Statistical Package [23]. Least significant difference (LSD) was used to separate the means.

Results and discussion

Table 1 shows the hematological parameters across the treatment. Taura recorded the highest PCV value of 40.70±0.33% followed by Kuka with 37.00±0.48 % while Maje had the lowest PCV value of 28.30%. The PCV values obtained in the present study (28.30 to 40.70 %) as shown in Table 1, were within the normal range of 24 to 45% as reported by Etim *et al*. (2013). The result was similar to the range of 28 to 32% as recorded by Ibrahim *et al*., (2016). This indicated that the leaves fed to the rams had no adverse effect on the pack cell volume. The highest PCV value of Taura, among the leaves indicated either more number of Red Blood Cells (RBCs) in the rams of that treatment or decrease in circulating plasma volume than the remaining treatments. For HB values, Magarya had the highest Hb 13.66±0.09g/dL followed by Maje, Marke and Baure with 10.68, 10.00 and 9.90g/dL, respectively.

The Hb values recorded in this study (12.40 to 9.70 g/dL) were within the normal range of 8 to 16g/dL for sheep as reported Etim *et al*. (2013) and higher than 8.42g/dL for

West African dwarf sheep as reported by Oroye (2012). The significant difference in Madaci feed (11.82±0.16g/dL) indicated higher possibility for transporting oxygen into and carbon dioxide out of the animal tissues for effective metabolism. The RBC value in the present study indicated that Magarya had highest value of 13.66±0.09 X 10^{12} while 5.55 X 10^{12} as the lowest value was recorded for Maje. The RBC range values in the present study were below the range of 12.73 X 10^{12} to 13.66 X 10^{12} as recorded by Ibrahim *et al.* (2016) for Yankasa sheep fed graded level of *Zigiber officinale.* The variation could be due to difference in feed and age. WBC value of 10.5 X 10^{9} was recorded in Marke as the highest value while 5.50 X 10^{9} obtained in Baure as the lowest value. The WBC values obtained in the present study were within the normal range of 4 – 12 ($X10^{3}$) for healthy sheep as reported by Etim *et al*. (2013). The significant difference in Marke leaves 10.50 x10^{9} indicated high capability of the treatment in generating antibodies in the process of phagocytosis and have high degree of resistance to diseases than the remaining treatments. The MCV values obtained in this result showed significant difference of ($p>0.05$) across the treatment with the highest value of 64.60±0.32pl obtained from Taura, while the lowest (41.75±0.32pl) value was obtained from Magarya. MCH values were significantly different across the treatment with the highest value of 19.24pg in Maje for the Ram fed Maje followed by 18.35pg for animal fed Madaci while 6.28pg and 14.08pg were obtained in treatment fed Baure and Marke respectively. The MCHC parameter showed significant difference ($p>0.05$) with the highest value in
Magarya (38.57±0.01g/dL) and the least value was obtained in Taura 24.82±0.01. The WBC obtained in this was within the normal range of 4-13 x10^{12} as reported by Oni *et al. (*2013) for West African dwarf goat. The MCV of the present study was lower than the range of 93.00 to 95.50 as reported by Ikhmioya and Imasuen (2007) when fed West African dwarf goat with *Panicum maximum*. The variation may be as a result of differences in the animal species and feed offered. The MCH obtained in this study is similar 17- 23pg for sheep as reported by Etim *et al*. (2013). The PCV and Hb of the present study are within the normal range of 24-45% and 8 – 16g/dl for sheep respectively as reported by Etim *et al*. (2013).

Biochemical indices in this study (Table 2) indicated that significant difference was observed across some of the treatments. Blood Urea concentration showed that Baushe and Kuka (6.) had highest urea content followed by magarya treatments. The blood urea range values obtained in the present study (4.42 to 4.48 mmol/l) were related to the range of 3.33 to 3.80mmol/l obtained for yankasa sheep as reported by Ibrahim *et al*. (2016). They reported that the values obtained for blood urea are similar for a normal and healthy sheep. This is an indication that the diets are balanced in nitrogen and are thus safe for ruminant consumption. Total protein of experimental animals showed Ram fed Madaci and Baure recorded highest TP value of 70.40g/L and 70.00g/L and Maje 65.60g/L while Marke recorded the lowest TP of 63.60g/L. the monocyte count showed significant difference within the treatment with the highest value of 10.84% for maje followed by 10.14 % for Marke while 8.66% was obtained from animal fed Madaci as the lowest value. Albumin concentration was highest in Marke and Maje as 3.36 g/L each while Baure had the least value 3.90g/L. The albumin values obtained in the present study (2.90 g/dl to 3.36g/dL) were similar to the values (3.05 to 3.28g/dL) recorded by Ikhimioya and Imasuen (2007) for West African dwarf goat.

Table 1. Haematological parameters of rams fed different browse trees leaves

Treatment	PCV (%)	HB g/dl	RBC ($x10^{12}$)	WBC ($x10^{9}$)	MCV (pl)	MCH(pg)	MCHC (g/dl)
Maje	28.30±0.40^{f}	10.68±0.24^{d}	5.55±0.05^{e}	5.60±0.09^{e}	50.98±0.32^{d}	19.24±0.21^{b}	37.74±0.01^{b}
Madaci	37.70±0.77^{b}	11.82±0.16^{c}	6.44±0.05^{c}	7.40±0.28^{d}	58.54±0.32^{c}	18.35±0.21^{c}	31.36±0.01^{e}
Marke	30.60±0.30^{e}	10.00±0.17^{e}	7.10±0.12^{b}	10.50±0.07^{a}	43.07±0.32^{g}	14.08±0.21d^{g}	32.67±0.01^{d}
Baure	33.98±0.31^{d}	9.90±0.11^{e}	7.22±0.07^{b}	5.50±0.11^{e}	47.06±0.32^{e}	16.28±0.21^{d}	29.13±0.01^{f}
Kuka	37.00±0.48^{b}	12.40±0.14^{b}	6.08±0.08^{d}	5.50±0.14^{e}	60.86±0.32^{b}	20.40±0.21^{a}	33.51±0.01^{c}
Magarya	35.40±0.34^{c}	13.66±0.09^{a}	8.48±0.12a	8.20±0.19^{c}	41.75±0.32^{h}	16.11±0.21^{e}	38.57±0.01^{a}
Taura	40.70±0.33^{a}	10.10±0.24^{e}	6.30±0.15^{cd}	9.90±0.18^{b}	64.60±0.32^{a}	16.03±0.21^{f}	24.82±0.01^{g}
Baushe	29.70±0.53^{e}	9.70±0.12^{e}	6.60±0.14^{c}	8.50±0.19^{c}	45.00±0.32^{f}	14.07±0.21^{h}	32.66±0.01^{d}

Means within the same column with different subscripts are significantly different (p<0.05).

The blood urea range values (Table 2) obtained in the present study (4.42 to 6.04 mmol/l) were related to the range of 3.33 to 3.80mmol/l obtained for yankasa sheep (Ibrahim *et al*. 2016). He reported that the values obtained for blood urea are similar for normal healthy sheep. This is an indication that the diets are balanced in nitrogen and are thus safe for ruminant consumption. The Total protein obtained in the present study 62.20 to 70.40 g/l were similar to 61.33 to 68.3 g/l obtained by Ibrahim *et al*. (2016}. The albumin values obtained in the present study (2.84 g/dl to 3.446g/dL) were similar to the values (3.05 to 3.28g/dL) recorded by Ikhimioya and Imasuen (2007) for West African dwarf goat. Also similar to 32.67 to 37.33 for yankasa sheep as reported by Ibrahima *et al*. (2016). The range for the monocyte recorded in the present study (8.00 to 10.48%) were higher the normal range for sheep (0-6%) and within the range for swine (2-10%) as reported by Etim *et al.* (2013).

Table 2: Biochemical indices of four common browse trees fed Yankasa rams

Treatment	UREA (mmol/l)	TOTAL PROTEIN (g/l)	MONOCYTE (%)	ALBUMIN (g/dl)
Maje	4.42±0.19^{c}	65.60±0.47^{c}	10.84±0.19^{a}	3.36±0.02^{b}
Madaci	4.40±0.19^{c}	70.40±0.85^{a}	8.66±0.09^{cd}	3.02±0.06^{c}
Marke	4.44±0.23^{c}	63.60±0.24d^{e}	10.14±0.11^{b}	3.36±0.03^{b}
Baure	4.84±0.15^{c}	70.00±0.71^{a}	9.96±1.17^{b}	2.90±0.03^{d}
Kuka	6.04±0.10^{a}	64.60±0.44^{cd}	8.10±1.30^{ef}	3.02±0.07^{c}
Magarya	5.50±0.16^{b}	63.00±0.42^{de}	9.00±0.05^{cd}	2.84±0.01^{d}
Taura	4.40±0.16^{c}	67.20±0.67^{b}	8.00±0.11^{f}	3.50±0.02^{a}
Baushe	6.00±0.20^{a}	62.20±0.56^{e}	8.40±0.06^{de}	3.46±0.02^{ab}

Means within the same column with different subscripts are significantly different (p<0.05).

Conclusion

Based on the result obtain in this experiment, all the haematological and blood biochemical parameters for all the treatments where within the normal range for healthy animals. This indicate that all the leaves used for the feeding trial had no health hazard and are nutritive for normal physiological functions and growth of the animals. Madaci had the highest PCV that involved in the transport of oxygen and absorbed nutrients and had the highest primary and secondary polycythemia.

References

Aderemi, F. A. 2004. Effects of replacement of wheat bran with cassava root sieviate supplemented or un-supplemented with enzyme on the haematology and serum biochemistry of pullet chicks. *Tropical Journal of Animal Science, 7,* 147-153.

Akpa, G. N., Ifut J. O, Mohammed F.

2002 Indigenous management of dystocia in Ruminant Livestock of Northern guinea savannah of Nigeria. *Journal of Animal Production*. 29: 264-270.

Baker F. J. 2007. Introduction to medical laboratory technology (6th ed.). London: Butterworth;.

Bush B. M. 1991. Interpretation of laboratory results from small animal clinician. United Kingdom: Black Well Scientific Publication.122.

Etim, N., Williams, M. E., Akpabio U., and Offiong, E. E. A. 2013. Haematological Parameters and Factors Affecting Their Values. Science and Education Centre of North America. 2(1):37-47

Garba, Y and Jinjiri, A. 2013. ***Performance of growing Yankasa rams Fed graded levels of Tamarindus indica leaves.*** *International Journal of Applied Agricultural and Apicultural Research.* **9(1&2): 196-202.**

Ibrahim, U. M., Muhammad, N., Maigandi, S. A. and Abubakar, I. A. ***2016.*** *Zingiber officinale*, a Phytogenic Feed Additive on Haematological and Serum Biochemical Indices of Yankasa Rams. *Journal of Applied Life Sciences International 5(3): 1-8*

Ikhimioya, I. and Imasuen, J. A. 2007. Blood Profile of West African Dwarf Goats Fed *Panicum maximum* Supplemented with *Afzelia africana* and *Newbouldia laevis*. *Pakistan Journal of Nutrition* **6**(1): 79-84.

Jain, N. C. 1993. Essentials of veterinary haematology (1st edt.) Philadelphia: Lea and Febiger ;356.

Musa, A. 2016. Performance of Yankasa Rams offered Cowpea Haulms as Supplements at Different Levels and Frequency to a Basal Diet of Sorghum Stover. Thesis Submitted to the School of Postgraduate Studies, Ahmadu Bello University, Zaria, In Partial Fulfilment of the Requirements for the Award of Doctor of Philosophy In Animal Science.

Mtenga, L. A. Komwihangilo D.M. and Kifaro, G.C. 1992. Selectivity in sheep and goats fed Albizia, Gliricidia, Leucaena and Tamarind multipurpose trees. Proceedings of the Second Biennial Conference of the African Small Ruminant Research Network AICC, Arusha, Tanzania 7-11 December 1992. 43.07 to 64.60

Oroye, I. A. 2012. Genetic Analysis of Growth and Some Reproductive Traits of Sheep of Northern Nigeria and Their Crosses. Department of Animal Science, Ahmadu Bello University, Zaria Nigeria

Schalm, O. W., Jain, N. C., Carrol, E. J. 1975. Veterinary haematology. USA: Lea and Febiger Publishers, Philadephia; 1975.

Received: 20th May, 2020
Accepted: 19th December, 2020