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Effect of Feeding Sugarcane (*S. officinarum*) Peels Meal Based Diets on Haematological Profile and Serum Biochemistry of Fattening Yankasa Sheep

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ABSTRACT
Sheep are important in many regions because they provide people with valuable food and or income. This study was conducted to evaluate the effect of feeding sugarcane peels meal (SCPM) based diets on haematological and biochemistry of fattening Yankasa sheep. Fifteen (15) Yankasa sheep of about 18 – 24 months, with initial weight of 31 – 31.33 kg fed five different diets containing SCPM to replace wheat offal at 0, 25, 50, 75 and 100 %. The animals were randomly distributed to 5 groups of 3 animals each. Each animal (ram) served as a replicate and an adjustment period of a week was allowed for the animals before data collection commences. The feeding trial was commenced in the Month of February and lasted for a period of 70 days. Completely randomized design was used (CRD). Data obtained were subjected to Analysis of variance (ANOVA) and means that were significantly different were separated using Least Significant Difference (LSD), both contained in SPSS for window 32, version 24. Results of this experiment indicate that, PVC, and WBC were not significant ($P>0.05$), while lymphocytes and neutrophils the other parameters were significantly affected ($P<0.05$) by the level of inclusion of SCPM in the diets. All the biochemical parameters reported in this study were significantly ($P<0.05$) affected by SCPM based diets inclusion, this result indicated that incorporation of SCPM up to 100% as replacement level for wheat offal did not constitute health hazards to the rams. Therefore, it can be concluded that the haematological and biochemical parameters of fattening rams in this study fall within normal range. Moreover, this study recommends that SCPM could be incorporated into the fattening rams' diet up to 100% as replacement level for wheat offal.
Keywords: sugarcane peels meal (SCPM), wheat offal, fattening Yankasa sheep, haematological, and biochemical.

INTRODUCTION

Sheep and goats are important in many regions of the world because they provide people with valuable food and or income. They supply animal protein in the form of milk and meat for consumption or sale. This is particularly important for families of low-income farmers and the landless that do not have the resources to keep a cow and cannot afford to purchase meat and milk (CTA, 2015). Sheep are found throughout Nigeria, but the highest population is found in the Northern part especially in states like Kano, Jigawa, Katsina, Zamfara, Kebbi, Sokoto, Yobe, Borno and Kaduna States. The major breeds of Nigerian sheep are Uda, Balami, Yankasa and West African Dwarf (WAD). National agricultural sample survey of 2011 indicated that Nigeria estimated the population of 41.3 million sheep in the country (Premium Times News Paper, 2017).

Efficient, intensive production of meat, milk and other foods requires blended and balanced feeds. Safe feed products enable farms to ensure food safety, reduce production costs, maintain or increase food quality and consistency and enhance animal health and welfare by providing adequate nutrition at every stage of growth and production FAO (2010). Unfortunately, there is shortage of forage supply in the north-western region of Nigeria where the population of sheep is very high. This is associated with rainfall distribution pattern of the area. Saleh (2017) indicated that feeds constitute about 80% of the cost of livestock production in Nigeria and the feed is generally inadequate to meet growth and production requirements. This problem is more critical during the dry season period and affects all categories of livestock.

A justification for carrying out haematological and biochemical evaluation is the fact that sugarcane peels contains some antinutritional factors like tannin, phytate, oxalate, saponin and hydrogen cyanide (HCN) which can possibly precipitate anaemia and compromise the health status of the animals (Saleh and Kaankuka, 2016). Haematological and blood biochemical variables are key elements for routine assessment of animal health status (Vugrovečki, et al, 2017). Ochepo et al (2012) recommended the inclusion of sugarcane peels in the diets of goats up to 40% without any significant effect. Also, Saleh and Maigandi (2014) reported availability of sugarcane peels in Kano, Nigeria but have not yet been put to better use such as for feeding livestock.

The aim of this study was to investigate effect of feeding sugarcane (*S. officinarum*) peels meal (SCPM) based diets on haematological profile and serum biochemistry of fattening Yankasa sheep to replace wheat offal.

MATERIALS AND METHODS

Experimental location

The feeding trial was conducted at the Federal College of Education Kano, Department of Agricultural Education, Teaching and Research Farm, in Kano city, Kano State. Kano is situated in the Sahelian geographic region, South of the Sahara in the north-western Nigeria, 481 metres (1,578 feet) above sea level within longitude: 8°31′00″ E and latitude: 12°00′00″ N (Wikipedia, 2018; Dateandtime.info, 2018).

Experimental rams and their management

Fifteen (15) Yankasa sheep (rams) were used in the experiment and were purchased from Badume market, Dawakin Tofa local government area of Kano State. The animals were randomly distributed to 5 groups of 3 animals each. Each animal (ram) served as a replicate and an adjustment period of a week was allowed for the animals before data collection commenced. The feeding trial lasted for a period of 90 days. Water and salt lick were also offered *ad libitum.* The animals were quarantine in the College Farm, for two weeks, and given prophylactic treatment with Avomec® against *endo* and *exto* parasites and also treated with oxytetracycline HCl (a broad spectrum antibiotic). Prior to the experiment, the animals were managed intensively and group-fed with groundnut haulm and wheat offal.

Experimental feeds preparation

Sugarcane peels

The principal ingredient for the experimental feed was sugarcane peels which was collected from the selling points within the metropolitan area of Kano State. The peels were sun dried on a floor for a period of 3 – 4 days depending on sunlight intensity and finally milled with a hammer mill to produce sugarcane peels meals (SCPM). Other feed ingredients for the preparation of the feed include the following: groundnut haulm, cowpea husk, sorghum stover, rice bran, wheat offal, cotton seed cake, bone meal and salt, which were purchased from Kano metropolitan market.

Five complete experimental feeds were formulated using varying levels of sugarcane peel meals to replace wheat offal at 0(control), 25, 50, 75 and 100% inclusion levels (Table 1.). The five experimental diets were used to feed the fifteen (15) fattening rams. The diets were designated as diets 1, 2, 3, 4 and 5 representing experimental treatments.

Experimental Design and Statistical Analysis

Completely randomized design (CRD) was used. Data collected was analyzed using Analysis of Variance (ANOVA) by General Linear Model (GLM) Procedure. The treatment means were separated and compared using standard error of the mean (SEM), and Duncan's Multiple Range Test (DNMRT) as contained in SPSS (2013) for window 32, version 24.

Blood Sample Collection

Blood samples were collected from 3 replicates per treatment at the end of the study for haematological and serum biochemical analysis. The sheep were bled through jugular vein and 10ml of blood collected. 3ml of the blood samples were collected into plastic tube containing Ethylene Tetra acetic Acid (EDTA) for haematological studies to prevent blood clotting. The remaining 7ml of blood samples were deposited in anti-coagulant free plastic tube and allowed to clot at room temperature within 3hrs of collection so as to harvest the serum separately. The serum samples were stored at -20^0C for biochemical studies.

Lymphocyte, neutrphils, eosinophils and basophils were determined according to the method described by Baker and Silverton (1985) using Abascus Junior Haematology Analyser 2.75 (Diatro Count 3 Haematology EC Diatron. MJ PCC Hungary). Serum total protein concentration was determined by Biuret colorimetric reaction, according to the method described by Burtis *et al.* (1999), serum albumin concentration was determined by bromocresol green calometric reaction, according to Douman (1971) creatine by method described by Bartel and Bohmer (1972). The activity of aspartate aminotrasferase (AST) and Alanine Aminotrasferase (ALT) were measured by the method of Reitman and Frankel (1957) using Randox kit cat No AS101 and AL100, respectively, while Alkaline Phosphate (ALP) was determined by Rec (1972).

RESULTS AND DISCUSSION

Effect of Feeding Sugarcane Peels Meal Based Diets on Haematological Profile of Fattening Yankasa sheep

The results of the effect of feeding sugarcane peels meal based diets on haematological profile of fattening Yankasa sheep are presented in Table 2. PVC, and WBC were not significant ($P>0.05$), while lymphocytes and neutrophils the other parameters were significantly affected ($P<0.05$) by the level of inclusion of sugarcane peels meal in the diets. Values for PVC which ranged from 32.33% (E) - 35.67 % (B) in this study were within the normal range of 32.33 - 36.68% reported by Banerjee, (2007). It can be inferred that these diets are reliable in maintaining good performance of fattening sheep as low PCV result in aneamia which causes reduced oxygen carrying capacity of blood, increase pulse rate and consequently heart failure (The Merck, 1998). The higher PCV values obtained in this study might likely be a sign of healthier sheep.WBC($x10^9$/l) ranged from 3.77 (E) - 16.10 (D) and the values are within the 7.50 - 8.30 reported by Abbasi *et al*. (2012) for medium and high energy feeds containing 5.43 and 15.44% sugarcane bagasse fed to goats. The higher leucocyte count (WBC) in this study especially in diet D (75% SCPM) is an indicator of immune response to infections. Values for lymphocytes in the present study (43.33- 83.33%) are more than the values of 41.33 - 42.33% reported by Ashiru (2014) on performance of Yankasa rams fed ensiled sugarcane waste treated with non protein nitrogen source and soya bean meal. The normal values could imply the animals may neither stand the risk of diseases because lymphocytes have a central role in immunological defense mechanism of the body (Eroschenko, 2000), the normal range of lymphocytes by sheep as reported by Banerjee, (2007) is between 40 – 75%. Neutrophils values of 16.67 - 56.33% in this study is higher than 33.00 - 34.00% and 29.58 - 36.82% reported by Ashiru (2014) and Abbasi *et al*. (2012) respectively. The values of neutrophils in the present study are slightly higher than normal range (Banerjee, 2007), which confirmed the efficiency of the diets. The neutrophils are very important for defense against infections.

The variations in the values haematological parameters indicated were probably due to the differences in feeds compositions, laboratory analysis, environmental temperatures, and so on.

Effect of Feeding Sugarcane Peels Meal Based Diets on Serum Biochemistry of Fattening Yankasa Sheep

The results of the effect of feeding sugarcane peels meal based diets on serum biochemistry of fattening Yankasa sheep are presented in Table 3. All the biochemical parameters reported in this study were significantly ($P<0.05$) affected by SCPM based diets inclusion. Total protein in this study (62.00 - 74.00 g/L) is within the values (67.7 – 91.0) reported by Vugrovečki, et al, (2017) for sheep. Albumen ranges from34.67 - 43.67 g/L reported in this study are within the values (35.4 – 47.5 g/L) reported by Vugrovečki, et al, (2017) for sheep. The value for total protein concentration obtained agrees with the report of Njidda, et al (2014) that plasma proteins help to transport calcium and phosphorus and other substances in the blood by attachment to the albumin. A reading of albumin less than the normal physical value of albumin usually indicates hypoalbuminemia (Altman, 1979). Serum Aspartate Aminotranmsferase (SGPT) values (6.00-11.00 uI) in this study were within the normal range reported by The Merck (1998). Glutamic Oxaloacetic Transaminase (SGOT) values for this study (8.33 -21.67 uI) are within the normal range of reported by The Merck (1998). The measurement of the SGOT (AST) levels helpful for the diagnosis and following case of myocardial infarction, hepatocellular disease and skeletal muscle disorders. Values for globulin in this study range from 26.67 - 32.67 mmol/L were lower than 53.0-58.0 reported by Njidda *et al.* (2013) who studied the haematological and biochemical parameters for Kano brown goats. The ranges of globulin in this study are within the range and indicated that the experimental animals can resist diseases since globulin are major sources of antibodies.

CONCLUSION

The result of haematological and biochemistry of fattening Yankasa rams fed SCPM containing diets indicated that incorporation of SCPM up to 100% as replacement level of wheat offal did not constitute health hazards to the rams. From the present study, it can be concluded that the haematological and biochemical parameters for fattening sheep studied in this experiment fall within normal range. Therefore, this study recommends that SCPM could be incorporated into the sheep diet up to 100% as replacement level for wheat offal. However, further studies should be carried out in order to evaluate performance, digestibility and economic incorporation. Also the result of the experiment could be used to improve sugarcane production, income generation from the peels as well as job creation.

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REFERENCES

Abbasi, S. A., Vighio, M. A., Soomro, S. A., Buxachiwal, A., Gadahi, A. and Wang, G. L. (2012). Effect of Different Dietary Energy Levels on the Growth Performance of Kamori Goat Kids. *IJAVMS*, 6 (6): 473-479.

Altman, R. B (1979). Avian clinical Pathology, Radiology, Parasitic and Infections Diseases. In: Proceedings of American Animals Hospitals Association, South Bend. IN.

Ashiru, R. M. (2014). Performance of Yankasa rams fed ensiled sugarcane waste treated with non protein nitrogen source and soya bean meal. Unpublished PhD Thesis, Department of Animal Science, Bayero University, Kano, Nigeria.

Banerjee, G. C. (2007). Textbook of Animal Husbandry, Eight Edition, New Delhi, Oxford, Publishing Co. PVT Limited. 1079pp.

Baker, F. J. and Silverton, R. E. (1985). Introduction to Medical Laboratory Technology. Butter-worth Company. Ltd. 6th Edition. Pp. 107-115.

Bartel, H. and Bohmer, M. (1972). Metal Serum Creatinine Determination with Protein Preparation. *Clinical Chemistry* Acta 37: 193.

Burtis, C. A., Ashwood, E. R. and Bruns, D. E. (1999). In: Tietz textbook of clinical Chemistry and Molecular diagnostics, 3rd Edition, AACC. pp. 1915-1916.

CTA (2015) Goat keeping: Useful management practices for smallholders. Agromisa Foundation and CTA, CTA Publications Distribution Service, Wageningen. *www.cta.int*

Dateandtime.info (2018). http://dateandtime.info/citycoordinates.php?id=2335204 This page was last edited on 18 March 2018, at 13:29.

Eroschenko, V. P. (2000). Di fiore's Atlas of Histology with functional Correlation. 9th Edition Lippincolt Williams and Wilkins, USA.

Douman, B. T., Watson, W. A. and Biggs, H. G. (1971). Albumin standards and measurements of serum albumin with bromocresol green. *Clinical Chemistry.* Acta, 31: 87-96.

FAO (2010) *Good practices for the feed industry – Implementing the Codex Alimentarius Code of Practice on Good Animal Feeding*. FAO Animal Production and Health Manual No. 9. Rome.

Njidda, A. A., Hassan, I. T. and Olatunji, E. A. (2013). Haematological and biochemical parameters of goats of semi arid environment fed on natural grazing rangeland of Northern Nigeria *Journal of Agriculture and Veterinary Science (IOSR-JAVS)* e-ISSN: 2319-2380, p-ISSN: 2319-2372. Volume 3, Issue 2 (May. - Jun. 2013). pp. 01-08 www.iosrjournals.org

Njidda, A. A., Shuai'bu, A.A. and Isidahomen, C. E. (2014). Haematological and Serum Biochemical Indices of Sheep in Semi-Arid Environment of Northern Nigeria. *Global Journal of Science Frontier Research: D Agriculture and Veterinary Volume 14 Issue 2 Version 1.0 Year*

Ochepo, C. O., Ochepo, G. O. and Ayoade, J. A. (2012). The utilization of complete diet containing sugarcane peels by goats. Proceedings of the 37th annual conference of the Nigerian Society for animal production, University of Agriculture, Makurdi, March 18-21, 2012. pp. 507 – 511.

Premium Times News Paper (2017). Premium Times News Paper, Thursday, May11, 2017. www.premiumtimesng.com.

Rec. (Recommendation of the Deutsche Gsellschaft for Klinische. Rec. GSCC). (1972). (DGKC); J. *Clinical Chemistry*. *Chemial Biochem.* 10: 182.

Reitman, S. and Frankel, S. (1957). Quantitative *in vitro* determination of liver enzymes ALT, AST: *American Journal of Clinical Pathology*. 28:56 Recommendation of DeutsheGresellschaft fur Klinishe Chemie (Re DGKC) (1972): Quantitative *in vitro* Determination of Alkaline Phosphate (ALP) in Serum. *Journal of Clinical Chemistry Biochem.* 10: 182.

Saleh, G. (2017). Nutritional Evaluation of Sugarcane Peels for Feeding Goats. Duetschland/Germany, LAMBERT Academic Publishing. p. 1.

Saleh and Kaankuka (2016) Site effects on energy, phytonutrients and anti-nutrient contents of ruminant feed-grade sugarcane peels. 21st Animal Science Association of NigeriaASAN-NIAS Annual Conference, University of Port Harcourt. 18th - 22nd September 2016. pp. 927 – 930.

Saleh, G. and Maigandi, S. A. (2014). Quantification and Uses of Sugarcane Peels among the Sheep and Goats' Owners in Nassarawa Local Government Area of Kano State. Proceedings of the 39th Annual Conference of the Nigerian Society for Animal Production, BABCOCK University, Ilishan-Remo, Ogun State. March 16th -19th, 2014. pp. 151-153.

SPSS (2013). *Statistical Package for Social Sciences*, Version 24, Window 32, IBM SPSS Statistics, IBM Corporation, North Castle Drive Armonk, NY 10504-1785. U.S.A

The Merck (1998). The Merck Veterinary Manual. 8th Edition. Susan, E. (ed) Published by Merck and CO., Inc. Whitehouse station, N. J., USA. 2305pp.

Vugrovečki, A.S., Vojta, A. and Šimpraga, M. (2017). Establishing reference intervals for haematological and biochemical blood variables in Lika pramenka sheep. *Veterinarski arhiv* 87 (4), 487-499.

Wikipedia, the free encyclopedia (2018). https://en.wikipedia.org/wiki/Kano.This page was last edited on 18 March 2018, at 13:29.

Table 1 Composition of the Sugarcane Peels Meal Based Diets

Ingredients (%)	**Experimental Treatments**				
	A	**B**	**C**	**D**	**E**
Sugarcane Peels Meal	0	8.75	17.5	26.25	35
Wheat Offal	35	26.25	17.5	8.75	0
Rice Offal	20	15	10	10	05
Cotton Seed Cake	05	05	10	15	15
Sorghum Stover	10	10	10	07	10
Cowpea Husk	17	17	12	10	07
Groundnut Haulm	10	15	20	20	25
Salt	1	1	1	1	1
Bone Meal	2	2	2	2	2
Total	**100**	**100**	**100**	**100**	**100**
Calculated Values					
CP (%)	12.87	12.14	12.11	12.12	11.27

Table 2: Effect of Feeding Sugarcane Peels Meal Based Diets on Haematological Profile of Yankasa fattening sheep

Parameters	Treatments					SEM
	A	B	C	D	E	
Packed Cell Volume (PCV) (%)	34.00	35.67	34.00	32.33	32.33	2.99
White Blood Cell(WBC) ($x10^9$ /l)	9.53	5.73	3.90	16.10	3.77	8.23
Lymphocytes (%)	43.33^{b}	76.33^{a}	50.33^{b}	82.67^{a}	83.33^{a}	7.77
Neutrophils (%)	56.33^{a}	31.67^{bc}	46.00^{ab}	17.33^{c}	16.67^{c}	7.90

SEM: standard error of mean $^{a.b,\ c}$ *Means on the row with different superscripts are significantly (p<0.05) different.*

Table 3: Effect of Feeding Sugarcane Peels Meal Based Diets on Serum Biochemistry of fattening Yankasa sheep

Parameters	Treatments					SEM
	A	B	C	D	E	
Total Protein(g/L)	70.33^{ab}	62.00^{b}	64.00^{b}	74.00^{a}	68.00^{ab}	3.58
Albumin (g/L)	39.67^{ab}	34.67^{b}	39.00^{ab}	43.67^{a}	34.67^{b}	2.43
Globulin(g/L)	32.67^{a}	27.00^{bc}	26.67^{c}	32.00^{ab}	27.33^{bc}	2.19
Alkalin Phosphate (uI)	19.67^{ab}	19.33^{ab}	17.00^{b}	16.00^{b}	25.67^{a}	3.52
SGOT(uI)	11.00^{b}	10.33^{b}	21.67^{a}	8.67^{b}	8.33^{b}	3.52
SGPT(uI)	7.67^{ab}	6.00^{b}	11.00^{a}	7.67^{ab}	8.33^{ab}	1.63

SEM: standard error of mean $^{a.b,\ c}$ *Means on the row with different superscripts are significantly (p<0.05) different. SGOT = Glutamic Oxaloacetic Transaminase; SGPT = Glutamic Pyruvi Transaminase.*