SERUM BIOCHEMICAL PROFILES OF YANKASA RAMS FED TREATED SUGARCANE BAGASSE SUPPLEMENTED WITH VARYING INCLUSION LEVELS OF YEAST.

***[1]MIJINYAWA, M. A., [3]ABDU, S. B., [2]HASSAN, M. R., [3]JINADU, L. A., [1]NAYAWO A.A., [1]ADAMU, M., [1]ADO, F. H., [1]KIBIYA, H. Y., [1]MUHAMMAD, L. L., [4]BALA, A. G., [5]IRISO, B. V., AND [3]BELLO, S. S[3]**

1 *Department of Agricultural Education, Sa'adatu Rimi College of Education, Kumbotso, Kano*
2 National Animal Production Research Institute, Shika.
3 Department of Animal Science, Ahmadu Bello University Zaria.
4 College of Agriculture and Animal Science, Ahmadu Bello University, Mando, Kaduna state
5 Department of Animal Science, University of Port Harcourt, Port Harcourt, Nigeria
Corresponding author: emmijinyawa@gmail.com; (+2348037158238)

Abstract
A study was conducted to evaluate serum biochemical profiles of Yankasa Rams fed varying inclusion levels of yeast in bagasse based total mixed ration (TMR). Twenty (20) growing Yankasa rams were used for the study, the rams were allotted to four (4) dietary treatment in a completely randomised design. The yeast was included at the rate of 0, 5, 6 and 7g/kg respectively and the diets were offered at 3% body weight. Data generated were analysed using general linear model procedure and significant differences were compared using Tukey test. Blood glucose varies significantly (P<0.05) across treatments. Rams fed 7g/kg inclusion level of yeast had highest blood glucose level while the least was obtained in rams fed 0g/kg inclusion level. It was concluded that increasing the inclusion levels of yeast in bagasse based TMR up to 7g/kg produces more blood glucose by Yankasa rams. Therefore, farmers may include yeast up to 7g/kg in the diets without any detrimental effect.
Keywords*: Bagasse, Blood, Yeast*

Introduction

Bagasse is a fibrous sugarcane by-product containing high fibre (43%) and low nitrogen (0.2%), it has limited use in animal feeds without any proper treatment (Ramli *et al*., 2005). However, its low digestibility limits its use in the row state (Anakalos and Anakalo, 2009). If Bagasse is used as a basal diet, it is important to give the correct supplementation in order to obtain satisfactory physical and economic responses. The supplementation must take account of the productivity of the animals (e.g. growing, fattening, and lactating, etc.), (Mahala *et al*., 2007). Various methods have been used in order to improve intake and digestibility of these poor-quality roughages as feed for ruminant livestock. Mijinyawa *et al*, (2016) reported an increase in performance of bucks fed urea treated sugarcane bagasse supplemented with enzyme.

Feed additives are important components used in improving nutritional quality of feed which is influenced not only by nutrient content but also by other aspects such as hygiene, digestibility, palatability and pH stabilization (Yirga, 2015). *Saccharomyces cerevisiae* is one of the common probiotics used in ruminant diets and known to improve productivity, better nutrient digestion and prevent acidosis (FAO, 2016).

Marerials and Methods

Experimental Site

The experiment was conducted at Teaching and Research Farm of the Department of Animal Science, Ahmadu Bello University Zaria, located on latitude 11° 11' N and longitude 07° 38' E.

Source of Bagasse, Animals and their Management

Sugarcane bagasse was sourced from sugarcane juice producer in Makarfi Local Government Area of Kaduna state. The bagasse was sun dried for three days and ground into smaller particle sizes of approximately 5mm and then treated with urea at 5% (50g of urea was dissolved in one litre of water to treat one kg of bagasse) The animals were purchased from Anchau central market in Kubau Local Government Area of Kaduna state and they were given prophylactic treatment against internal and external parasites.

Experimental Design and Diets

Twenty (20) Yankasa rams with an average live weight of 13±2kg were used for the experiment. The rams were allotted to four dietary treatments in a completely randomized design, to compare the effect of urea treated bagasse with different inclusion levels of yeast in TMR on the performance of Yankasa rams. The yeast was included at the rate of 0, 5, 6 and 7g/kg of the diets respectively. Other feed ingredients include maize offal, cotton seed cake, bone meal, salt and premix.

Table 1: Gross composition of experimental Diets

	Levels of yeast			
Parameters	**0**	**5g**	**6g**	7g
Maize offal	36.2	36.2	36.2	36.2
Bagasse	30	30	30	30
Cotton seed cake	25.5	25.5	25.5	25.5
Rice offal	5	5	5	5
Bone meal	2	2	2	2
Salt	1	1	1	1
Premix	0.27	0.27	0.27	0.27
Total	**100**	**100**	**100**	**100**
Calculated CP	14	14	14	14
Calculated CF	16.21	16.21	16.21	16.21
M.E(Kcal/kg)	2267	2267	2267	2267

Blood Metabolites Evaluation

About 10mls Blood samples was collected from three (3) rams in each of the treatment at the end of the digestibility trial using Hypodermic Syringe through the jugular vein and stored in a plain bottle for determination of Serum Biochemical indices such as blood glucose, total protein, creatinine and blood urea nitrogen at Veterinary Teaching Hospital Zaria. Determination of the blood glucose levels was done by the Glucose Oxidase Principle (Beach and Turner, 1975), total protein was estimated by the method of Henry and Stobel, (1957), Creatinine was determined according to the method described by Lamb, (1991) and blood urea nitrogen was determined by the method of Tannins and Maylor, (1968).

Statistical Analysis

All data collected at the end of the experiment were analysed using GLM procedure of statistical Analysis system (SAS, 2002). Significant differences in treatment means were compared using Tukey test.

The following model was used

$Y_{ij} = \mu + T_i + e_{ij}$

Where

Y_{ij} = Observation measured,

μ= Overall mean,

T_i=effect of inclusion levels of yeast (0, 5, 6 and 7g)

e_{ij}= random error.

Results and Discussions

The effect of inclusion levels of yeast in bagasse based TMR on blood serum indices in presented in Table 2. The results indicated that all parameters measured were similar (P>0.05) except for blood glucose level which differed significantly (P<0.05). Blood glucose level increases with an increased in the inclusion level of yeast by 19% in rams fed TMR with 7g inclusion level of yeast. Higher blood glucose level was recorded in rams fed TMR with 7g/kg inclusion level of yeast (74.00mg/dl), then rams fed TMR with 6g/kg inclusion level of yeast (66.83mg/dl), followed by rams fed on 5g/kg inclusion level of yeast (61.50mg/dl) and the least was recorded in rams fed TMR without yeast supplementation (60.16mg/dl).

The pairwise comparison presented in Table 3 showed significant (P<0.05) difference in total protein across all comparison Blood glucose was significant (P<0.05) between rams fed control diet and those on other treatment and also rams fed 5g inclusion level of yeast and those fed 6 and 7g inclusion level of yeast.

Table 2: Effect of inclusion levels of yeast in urea treated bagasse based TMR on blood serum indices of Yankasa rams

	Inclusion levels of yeast (g/kg)					
Parameters	**0**	**5**	**6**	**7**	**SEM**	**Normal range**
Total protein (g/dl)	6.13	6.23	6.53	6.8	0.60	6-7.9g/dl
Blood urea N (mg/dl)	13.66	13.33	14.0	15.0	1.59	10-30mg/dl
Blood glucose (mg/dl)	60.16^{c}	61.50^{bc}	66.83^{b}	74.0^{a}	2.93	50-80mg/dl
Creatinine (mg/dl)	1.8	1.8	1.76	1.63	0.09	1-2mg/dl

^{a,b,c,} Means with different superscript across treatment differ (P<0.05) significantly,
SEM=Standard Error of
mean

Table 3: Contrast analysis of the different treatment combinations on blood serum indices of Yankasa rams

		P values			
Contrast	AIM	TP	BUN	BG	CREATININE
0 vs 5g	Control vs low level	0.289	0.882	0.752	0.677
0 vs 6g	Control vs medium	0.002	0.767	0.145	0.066
0 vs 5 and 6g	Control vs low and medium	0.013	0.797	0.293	0.176
0 vs 5 and 7g	Control vs low and high	0.001	0.863	0.068	0.809
0 vs 5, 6 and 7g	Control vs all levels	0.0009	1.000	0.046	0.323
5 vs 6 and 7g	Low vs medium and high	0.0007	0.797	0.039	0.477

TP=Total protein, BUN=Blood urea nitrogen, BG=Blood glucose

Total protein, blood urea nitrogen and creatinine measured were similar across treatment groups but total glucose differed significantly ($P<0.05$) with increase in inclusion levels of yeast. The result obtained in the present study is in agreement with the findings of Milewski and Sobiech (2009). The authors reported that dietary supplementation of dried yeast caused an increase in the concentrations of blood glucose. These results are consistent with the findings of Lesmeister *et al*. (2004). The authors showed that addition of *Saccharomyces cerevisiae* significantly increased the production of propionic acid, the main substrate for glucose synthesis in ruminants. The higher blood glucose concentrations in ewes fed supplemental dried yeast could be related to the elevated concentrations of mannan oligosaccharide which are precursor of VFA and stimulate an increase in energy metabolism parameters. However, the values of total glucose, blood urea nitrogen, blood glucose and creatinine reported in this study were within the normal range of (6-7.9g/dl, 10-30mg/dl, 50-80mg/dl, and 1-2mg/dl respectively) (Margi 1995). However, the values are lower to the values of 14.0-21.4g/dl reported by Aliyu *et al*. (2012) when the author fed urea and poultry treated kyasuwa to Yankasa rams.

References

Aliyu, I. D., Maigandi, S.A., Muhammad, I.R and Garba, Y. (2012). Haematological Indices and Blood Urea Nitrogen of Yankasa Ram Lambs Fed Poultry Droppings and Urea Treated *Pennisetum pedicellatum* (kyasuwa). *Nigerian Journal of Basic and Applied Science*. 20(1) 39-43. Retrieved from http://www.ajol.info/index.php.njbas/index. on 30/7/2018

Anakalos A, F. and Anakalo, M.G. (2009). Enhancement of the nutritive value of bagasse using chicken manure. *African Journal of Food, Agriculture, Nutrition and Development*, 9 (8): 125-133.

FAO (2016). *Probiotics in Animal nutrition-production, impact and regulation* by Yadav S, Bajagai, Athol V. Klieve, Peter J Dart, and Wayne L. Bryden. Editor Harrinder, P.S, Makkar. FAO Animal Production and Health Paper No. 179. Rome.

Lesmeister, K.E., Heinrichs, A.J. and Gabler M.T. (2004). Effect of supplemental yeast (*Saccharomyces cerevisiae*) culture on rumen development, growth characteristics, and blood parameters in neonatal dairy calves. *Journal of Dairy Science*., 87:.1832–1839.

Mahala, A.G., Babiker S. A., and Gutbim, N. E (2007). Improvement of digestibility of sugar cane bagasse by fermentation with chicken manure. *Research Journal of Agriculture and Biological Science*. 3 (2): 115 – 118.

Margi, S. (1995) *Veterinary Clinical Laboratory Procedures.* Ed. Duncan, L.L, pub. Mosby, St. Louis Missouri pp 146-148.

Milewski, S. and Sobiech, S. (2009). Effect of dietary supplementation with Saccharomyces cerevisiae dried yeast on milk yield, blood biochemical and Haematological indices n ewes. *Bulletin of Veterinary Institute Pulawy*.53: 753-758.

Mijinyawa, M. A., Lamidi, O. S., Abdu, S. B., Umar, H., Muhammad, H. A. and Bala, A.G. (2016). Effect of treated and untreated sugarcane bagasse with or without enzyme supplementation in total mixed ration on Performance of Red Sokoto bucks. *Journal of Animal Production and Research*, 28(2):150-160.

Newbold, C., McIntosh F and Wallace, R. (1998). Changes in the microbial population of a rumen-simulating fermenter in response to yeast culture. *Canadian Journal of Animal Science*, 78(2): 241-244.

Ramli, M. N., Imura, Y., Takayama, K., and Nakanishi, Y. (2005). Bioconversion of sugarcane bagasse with Japanese koji by solid-state fermentation and its effects on nutritive value and preference in goats. *Asian-Australian Journal of Animal Science*. 18:1279-1284.

SAS (2002). INSTITUTE inc. SAS/STAT user ′s guide.6.03 Edition, Gray NC, USA.

Wikipedia (2014). Wikipedia. Registered trademark of the Wikipedia foundation, Inc, a nonprofitorganisation http://en.m.wikipedia.org/wiki/Ahmadu_Bello_University

Yirga, H (2015). The use of Probiotics in Animal Nutrition. *Journal of Public Health*, 3: 132. DOI:10.4172/2329-8901.1000132.