



**Performance and Economic Returns by Yankasa Rams Fed Treated Sugarcane Bagasse Supplemented with Varying Levels of Yeast in Total Mixed Ration (TMR)**

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**Abstract**

*This study was conducted to evaluate the growth performance 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 feeding trial lasted for 90 days. The yeast was included at the rate of 0, 5, 6 and 7 g/kg and the diets were offered at 4% body weight. Data generated were subjected to Analysis of Variance using General Linear Model procedure of Statistical Analysis System (SAS) and significant means were compared using Tukey's test. The Crude protein (CP) content of experimental diet varied between 13% and 13.75% while neutral detergent fibre (NDF), acid detergent fibre (ADF), and acid detergent lignin (ADL) ranged from 68.30% to 69.04%, 32.60% to 33.53%, and 11.28% to 33.52%, respectively. The result of the feeding trial showed that there was significant ( $P < 0.05$ ) difference in feed intake, final weight gains and average daily gain. Rams fed TMR with 7 g inclusion level of yeast had significantly ( $P < 0.05$ ) higher weight gain, average daily gain and better feed conversion ratio. It was concluded that yeast inclusion at 7 g/kg improved the growth performance by 34%. Therefore, it should be included in the diet of Yankasa rams for improved performance and higher economic returns.*

**Keywords:** By-products, Baker's yeast, Economic impact, Growth rate,

**Introduction**

Ruminant livestock are kept worldwide for their numerous economic and social contributions to humanity. Nigeria is endowed with an estimated 19.5 million cattle, 72.5 million goats, 41.3 million sheep, 7.1 million pigs, 278,840 camels, 145 million chickens, 11.6 million ducks, 2.1 million turkeys and 974,499 donkeys making the nation the topmost Livestock producer in West Africa (FMARD, 2016). Small ruminants remain popular among the rural populace and resource-poor people. Their importance is primarily associated with their small size, which is significant for the advantage of mankind as it favours low investments, small risk of loss and preference over large ruminants for food, reproductive efficiency and economic use of available land (Omoike, 2006).

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The major limitation to ruminant livestock production in the tropics is lack of availability of quality feed. Smith *et al* (1995) observed that dry season feeding of ruminant animals has always been a constant problem to livestock farmers as feed supplies are limited both in quantity and quality. In the tropics, cereal crop residues such as maize, sorghum, millet stover and rice straw are produced in large quantities and could be used as ruminant livestock feed (Ehoche, 2002).

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). These

additives comprise of probiotics, antibiotics and enzymes. Probiotics are live microorganism that when administered in adequate amounts confer benefit to the host. They have also been reported to influence the production of livestock animals in terms of digestibility, growth rate, pH, and efficiency (Rahman *et al.*, 2013; Mookiah *et al.*, 2014). *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).

The efficiency of energy and protein utilization in the rumen is relatively low and can be improved by the modulation of several metabolic pathways, including the inhibition of methane production and deamination. This low efficiency not only reduces production performance, but also contributes to the release of pollutants to the environment (Tamminga, 1996). Therefore, with this regard and the ban on the use of antibiotics in the diets of animals, this study aims to investigate the use of treated sugarcane bagasse supplemented with yeast to evaluate the growth performance of Yankasa rams and net economic returns.

## Materials 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. (Wikipedia, 2018). It is situated at an altitude of 686m above sea level and lies within the Northern Guinea Savannah zone. The mean relative humidity is 21 and 72% during the harmatan and rainy season respectively. Annual rainfall ranges from 1102mm to 1904mm per annum which last from late April or early May to mid-October. The mean temperature fluctuates from 31°C maximum during the dry season to 18°C minimum during the wet season (Meteorological Unit, IAR, 2018).

### Source of Bagasse and Treatment

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 treated bagasse was then parked in a Pardue Improved Cowpea Storage (PIC) bags for two weeks, after which it was opened and aerated before inclusion in the TMR.

### Source of Animals and Management

The animals were purchased from Anchau central market in Kubau Local Government Area of Kaduna state. Prior to the arrival of the rams, the pens were cleaned and disinfected, the rams were quarantined for 2 weeks; and treated with Ivomectin (Ivomec®) and antibiotics (Tetracycline L.A) at a dose of 1ml/10kg BW 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. Five rams were assigned per treatment; the experimental diets were formulated to be isonitrogenous and isocaloric. The trial lasted for 90 days.

### Data Collection

Daily feed intake was taken throughout the experiment by weighing the feed offered

each day and the left over in the following day. Daily intake of the diets was estimated for each animal by subtracting the left over from the quantity offered to the animal. Weight of the individual animal was measured at the onset of the trial after an overnight fasting to obtain their initial weights and subsequently at 2 weeks' intervals in the morning throughout the feeding trial. Weight gain was determined by subtracting the initial weight from the final weight within the periods. Feed conversion ratio was also determined, by dividing feed intake by weight gain.

### Economic Analysis

The current market price of the various feed ingredients was used to compute the total cost of feed that was consumed during the feeding trial. Cost of feed per kilogram, feed cost per kilogram weight gain, total weight gain, and cost of live weight of rams were used to determine how profitable or otherwise it was to fatten rams with treated bagasse supplemented with yeast and enzyme at various inclusion levels as described by Anigbogu (2003).

Cost of total feed consumed = Total feed intake x Cost per kg of feed.

Cost/kg weight gain = Cost per kg of feed x Efficiency of feed utilization

Cost of production = Cost of inputs (Cost of feed consumed + Cost of rams)

Gross profit = Price/kg ram x Final weight of ram.

Profit (Net income incurred) = Gross profit - Cost of production.

### 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 and contrast analysis.

The following model was used

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

Where

$Y_{ij}$  = Observation measured,

$\mu$  = Overall mean,

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

$e_{ij}$  = random error.

## Results

### Chemical composition of bagasse

The chemical composition of the urea treated and untreated bagasse are presented in Table 2. Urea treated bagasse had the highest values for ADF and NDF, (28.48% and 50.03% respectively) compared to untreated bagasse with values of 21.56% and 42.71% respectively. There was a marked increase (74%) in crude protein content of untreated bagasse from 2.84% to 11.25% for treated bagasse and numerically higher values were also obtained for dry matter and organic matter

### Effect of inclusion levels of yeast in bagasse based TMR on performance

Table 3a presents the effect of inclusion levels of yeast in bagasse based TMR on growth performance of growing Yankasa rams. Significant ( $P < 0.05$ ) differences were observed in total weight gain and average daily gain (ADG). Rams fed 7g inclusion level of yeast had 34% higher weight gain and ADG than those on control diets. Feed conversion ratio was decreased by 20% in rams fed 7g inclusion level than the control diet. The result of pairwise comparison of the treatments using contrast is given in Table 3b. Significant ( $P < 0.05$ ) differences were observed in total weight gain, ADG and FCR between rams fed control diet and those fed with yeast supplementation. Also, the comparison between rams fed 5g and those fed 6 and 7g inclusion level of yeast was significant. However, there were no differences in weight gain and ADG between those fed control diet and 5g inclusion levels of yeast.

### Effect of inclusion levels of yeast in bagasse based TMR on economic returns

The results of the effect of inclusion levels of yeast in TMR on economic returns is presented in Table 4. A significant ( $P < 0.05$ ) difference was observed in total weight gain, average daily gain and total feed intake across all treatments. Higher weight gains were obtained in rams fed 7g/kg inclusion level (5.54kg) than rams fed 0g/kg inclusion level (3.40kg). However, total cost of feed consumed was reduced in rams with 0g/kg inclusion level (₦970.63) compared to rams fed treated bagasse with 5, 6 and 7g/kg (₦985.01, 1030.17 and 1075.24 respectively). Moreover, value of gain and income incurred over cost increases with an increase in the inclusion levels of yeast.

### Discussions

#### Chemical composition of bagasse

The chemical composition of both untreated and treated bagasse obtained in this study indicated that urea treatment increased the CP of the bagasse up to 74% from 2.84% in the untreated to 11.25% after treatment. This result obtained is lower but similar to the results obtained by Mijinyawa (2016) who reported an increase in CP from 2.69% in the untreated bagasse to 12.31% in urea treated bagasse. Moreover, Ngele (2008), also reported an increase in CP from 4.4% in untreated rice straw to 12.4% in urea treated rice straw. In the same vein, Abdu *et al.* (2012) treated maize Stover with urea and reported an increase in CP from 8.75% in the untreated to 14.38% after urea treatment. Urea is one of the commonest chemicals used to improve on the nutritive value of crop residues, it is cheap and has practical application to small holder farmers (Ehoche, 2002).

#### Effect of inclusion levels of yeast in bagasse based TMR on performance

Feed intake obtained in this study was affected by inclusion levels of yeast in

diets of Yankasa rams, it increased with an increase in the inclusion level of yeast. This was in conformity with the report of Khadem *et al.* (2007) that addition of *Saccharomyces cerevisiae* (SC) at levels 0, 2.5, 5 and 7.5g in a TMR increases the amount of feed consumed. Also, Robinson (2002) established a consistent, although small improvements in dry matter intake. This increase in feed intake may be associated with the addition of yeast which stimulated the rate of degradation of solid feeds in the rumen within the first 6 to 8 hrs after the meal; the animals can ingest more dry matter to fill their digestive compartment at the same level and this physical regulation could be involved to explain the higher feed intake in treatment animals (Pedro *et al.*, 2015).

Average daily gain observed in this study (37.76-45.56g/d) was lower than the values of 68.43-95.11g/day reported by Bello (2017) who fed different treated groundnut shell to Yankasa rams, 63.61-68.88g/d reported by Hanwa (2015) who also fed different groundnut haulms to Yankasa rams and 80.26-88.57g/d for sheep fed groundnut straw based blocks supplemented with *Saccharomyces cerevisiae*. However, it was higher than the values 28 to 47g/d reported by Lamidi *et al.* (1998) for Yankasa sheep fed graded levels of *Ficus thonningii* leaves as replacement for fresh *Hyparrhenia rufa*, 24.27-37.78g/d reported by Yashim (2014) who fed inclusion levels of *Ficus sycomorus* leaf meal in concentrate diet to Yankasa rams fed *Digitaria smutsii* hay. Rams fed 7g inclusion level of yeast had the highest average daily gain compared to those in other treatment, this variation may be attributed to the rich source of B-complex, protein and minerals in the yeast. Also, this result is in agreement with Fadel Elseed and Abusamra (2007) who reported that Nubian goat kids had lower average daily gain than those supplemented with 2.5 and 5g/d.

### Effect of inclusion levels of yeast in bagasse based TMR on economic returns

Increasing the inclusion levels of yeast in bagasse based TMR significantly improved total weight gain which invariably increased the value of gain and income incurred over cost of production. The increase in net income can be associated to the higher weight gains by rams fed 7g/kg inclusion level of yeast which resulted in an increased value of gain as such higher net benefit. This finding is consistent with the report of Ahiwe *et al.* (2015) when the author fed diets containing royal yeast additive to broilers at 5g/kg and reported an improved performance with higher economic gains. Moreover, results obtained in this study is in harmony with the report Gafaar *et al.* (2009) and Mijinyawa *et al.* (2016) when the authors fed concentrate (40): roughage (60) mixture containing 15g/head/day baker's yeast supplementation and treated or untreated sugarcane bagasse with or without enzyme supplementation and reported an increased milk yield, feed conversion and economic efficiency and higher net benefit respectively for lactating buffaloes and Red Sokoto bucks.

### Conclusion

From the above study, it was concluded that

1. Urea treatment of sugarcane bagasse improved the CP content by 74%
2. Inclusion level of yeast at 7g/kg improved the growth performance of Yankasa rams by 34%, and incurred more net benefit (₦2329.76)

### Recommendations

At the end of the study, it is recommended that farmers should treat sugarcane bagasse with urea at 5% and supplement with yeast at 7g/kg to enhance the performance of

their rams and have higher economic returns.

### References

- Abdu, S.B., Ahmed, H., Jokthan, G.E., Adamu, H.Y. and Yashim, S.M. (2012). Effects of levels of *Ficus sycamoros* supplementation on voluntary feed intake, nutrient digestibility and nitrogen balance in Yankasa bucks fed urea treated maize stover basal diet. *Iranian Journal of Applied Animal Science* 2 (2): 151-155
- Ahiwe, E.U., Emenalom, O.O., Etuk, E.B., Okechie, U.N., Odoemelam, V.U., Uchegbu, M.C and Okenyi, C. (2015). Effect of broiler starter diet containing royal yeast additive on broiler starter performance and economic of production. *International Journal of Agriculture and Rural Development* 18(1):2024-2028.
- Anigbogu, N.M. (2003) Growth response of West African dwarf lambs fed yam tuber peel. *The Indian Journal of Animal Sciences* 73 (4): 462-463.
- Bello, M.D (2017). Growth and fattening performance of Yankasa rams fed complete diet containing urea and lime treated groundnut shell (*Arachis hypogaea*) shell. Ph.D. thesis, Department of Animal Science, Ahmadu Bello University, Zaria Nigeria.
- Ehoche, O.W. (2002). Feeding strategies for improving milk production. In *Proceeding of the 7th Annual Conference of the Animal Science Association of Nigerian. Abeokuta, Nigeria*. Pp. 19-26

- Fadel Elseed, A.M.A. and Abusamra, R.M.A. (2007). Effects of supplemental yeast (*Saccharomyces cerevisiae*) culture on NDF digestibility and rumen fermentation of forage sorghum hay in Nubian goat's kids. *Research Journal of Agriculture and Biological Science*. 3(3): 133-137.
- 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.
- FMARD (2016). Federal Ministry of Agriculture and Rural Development. Retreat on Livestock and Dairy Development in Nigeria - Keynote address Delivered by the Hon. Minister of Agriculture and Rural Development, Chief Audu Ogbeh June 7, 2016. (<http://fmard.com.ng/?feed=rss>)
- Gaafar, H.M.A., Mohi El-Din, A.M. A., Basiuoni, M.I. and El-Riedy, K.F.A. (2009). Effect of concentrate to roughage ratio and baker's yeast supplementation during hot season on performance of lactating buffaloes. *Slovakian Journal of Animal Science*, 42 (4): 188 -195.
- Hanwa A.Y (2015). Assessment of two Groundnut (*Arachis hypogaea l*) varieties for forage, pod yield characteristics and effect of feeding the haulm to Yankasa rams. Ph.D. thesis, Department of Animal Science, Ahmadu Bello University, Zaria Nigeria.pp87
- IAR. (2018). Institute for Agricultural Research, Ahmadu Bello University, Zaria, Kaduna state Nigeria. Meteorological Service Unit. Weather report.
- Khadem, A.A., Pahlavan, M., Afzalzadeh, A. and Rezaeian, M. (2007). Effects of live yeast *Saccharomyces cerevisiae* on fermentation parameters and microbial populations of rumen, total tract digestibility of diet nutrients and on the in situ Degradability of alfalfa hay in Iranian Chall sheep. *Pakistan Journal of Biological Science*. 10: 590-597.
- Lamidi, O.S., Osinowa, O.A., Adamu, A.M. and Ofalayon, R.A. (1998). Performance and Nutrient Utilization by Sheep fed Ficus Leaves. *Nigerian Journal of Animal Production*, 25(1):63-67.
- Mijinyawa, M. A. (2016). Evaluation of treated and untreated bagasse with or without enzyme supplementation on performance of Red Sokoto bucks. M.Sc. Thesis, Department of Animal Science, Ahmadu Bello University, Zaria Nigeria. p 68.
- Mijinyawa, M. A., Lamidi, O. S., Abdu, S. B., Umar, H., Muhammad, H. A. and Bala, A.G. (2016). Economic evaluation of treated and untreated sugarcane bagasse with or without enzyme supplementation in total mixed ration on Performance of Red Sokoto bucks. In: Proceeding of the 2<sup>nd</sup> International Conference on drylands. December 12-16, 2016. Bayero University Kano, Nigeria. p135.

- Mookiah, S., Sieo, C.C., Ramasamy, K., Abdullah, N. and Ho, Y.W. (2014). Effects of dietary probiotics and symbiotic on performance, ceecal bacterial population and ceecal fermentation concentrations of broiler chickens. *Journal of the Science of Food and Agriculture*, 94(2):341-348.
- Ngele, M. B. (2008). Fermentation and metabolic trends in rams fed roughages with various supplements. *PhD Thesis, Abubakar Tafawa Balewa University, Bauchi, Nigeria*. Pp 87-89
- Omoike, A. (2006). Small ruminant livestock production in Nigeria. *Journal of Agriculture and Social Research*. 6(2):22-31.
- Pedro, A. H.G., Lara-Bueno A., Mendoza-Martinez G. D., Bárcena-Gama J. R., Plata-Pérez F.X., López-Ordaz R., and Martínez-García J.A. (2015). Effects of feeding yeast (*Saccharomyces cerevisiae*), organic selenium and chromium mixed on growth performance and carcass traits of hair lambs. *Journal of Integrative Agriculture*. 14(3): 575–582.
- Rahman, M., Mustari, A., Salauddin, M., Rahman, M. (2013). Effects of probiotics and enzymes on growth performance and hematobiochemical parameters in broilers. *Journal of Bangladesh Agricultural University*, 11(1):111-118
- Robinson, P.H. (2002). Yeast products for growing and lactating ruminants: impacts on rumen fermentation and performance. In: Proceedings of the XII International Meeting in Milk and Meat production in Hot Climates, University of Baja California, Mexicali, Mexico, p.12.
- SAS (2002). INSTITUTE inc. SAS/STAT user 's guide.6.03 Edition, Gray NC, USA.
- Smith, J. W., Larbi, A., Zabbar, M. A. and Akanbi, J. (1995). Voluntary intake by sheep and goat of *Gliricidia sepium* fed three states and at three levels of supplementation to a basal diet of *Panicum maximum*. International livestock research Institute (ILRI) Ibadan, Nigeria.
- Tamminga, S. (1996). A review on environmental impacts of nutritional strategies in ruminants. *Journal of Animal Science*, 74: 3112-3124
- Wikipedia (2018). Wikipedia. Registered trademark of the Wikipedia foundation, Inc, a nonprofitorganisation
- Yashim, S.M (2014). Effect of Inclusion Levels of Fig (*Ficus Sycomorus*) Leaf Meal in concentrate diets on the Performance of Yankasa Rams Fed *Digitaria Smutsii* Hay. Ph.D. thesis, Department of Animal Science, Ahmadu Bello University, Zaria Nigeria. p 59
- Yirga, H (2015). The use of probiotics in animal nutrition. *Journal of Public Health*, 3: 132. DOI:10.4172/2329-8901.1000132.

**Table 1: Gross composition of experimental Diets**

Parameters	Inclusion levels of yeast			
	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

M.E=Metabolizable energy, CP=crude protein, CF= crude fibre

Note: The yeast supplementation is not part of the formulated diet

**Table 2: Chemical composition of urea treated and untreated bagasse.**

Parameters (%)	Treated bagasse	Untreated bagasse
Dry matter	93.81	92.23
Organic matter	90.95	89.80
Crude protein	11.25	2.84
Crude fibre	22.08	22.39
Ether extract	0.82	0.67
Ash	2.86	2.43
Nitrogen free extract	62.99	71.67
Acid detergent fibre	22.48	21.56
Neutral detergent fibre	50.03	42.71
Lignin	10.21	13.50

**Table 3a: Effect of inclusion levels of yeast in bagasse based TMR on performance**

Parameters	Inclusion levels of yeast				SEM
	0	5	6	7	
Initial weight (kg/h)	14.10	14.60	14.90	14.76	0.506
Final weight (kg/h)	17.50	18.20	19.00	19.30	0.690
Total weight gain (kg/h)	3.40 <sup>c</sup>	3.60 <sup>bc</sup>	4.10 <sup>ab</sup>	4.54 <sup>a</sup>	0.350
ADG (g/h)	37.76	40.00	45.56	50.44	0.003
Feed intake (g/h)	488.00 <sup>b</sup>	493.00 <sup>ab</sup>	511.00 <sup>ab</sup>	524.00 <sup>a</sup>	17.26
FCR	13.35	12.40	11.56	10.44	0.90

<sup>a,b,c</sup> Means with different superscript across treatment differ (P<0.05) significantly, SEM=Standard Error of mean, ADG=average daily gain, FCR=Feed conversion Ratio. Kg/h=Kilogram per head, g/h=Gram per head



**Table 3b: Contrast analysis of the different treatment combinations**

Contrast	AIM	P values		
		TWG	ADG	FCR
0 vs 5g	Control vs low level	0.676	0.676	0.453
0 vs 6g	Control vs medium	0.156	0.156	0.169
0 vs 5 and 6g	Control vs low and medium	0.285	0.285	0.220
0 vs 5 and 7g	Control vs low and high	0.120	0.120	0.092
0 vs 5, 6 and 7g	Control vs all levels	0.038	0.038	0.044
5 vs 6 and 7g	Low vs medium and high	0.026	0.026	0.032

TWG=Total weight gain, ADG=Average daily weight gain, FCR=Feed conversion ratio

**Table 4: Effect of inclusion levels of yeast in bagasse based TMR on economic benefit**

Parameters	Inclusion levels of yeast (g/kg)				SEM
	0	5	6	7	
Total weight gain (kg)	3.40 <sup>c</sup>	3.60 <sup>bc</sup>	4.10 <sup>ab</sup>	4.54 <sup>a</sup>	0.35
ADG(g)	37.76 <sup>b</sup>	40.00 <sup>b</sup>	45.56 <sup>ab</sup>	50.44 <sup>a</sup>	3.99
Total feed intake (kg)	43.92 <sup>b</sup>	44.37 <sup>ab</sup>	45.99 <sup>ab</sup>	47.16 <sup>a</sup>	1.5
Total cost of feed (₦)	970.63	985.01	1030.17	1075.24	-
Cost/kg gain (₦)	285.53	273.50	251.10	236.66	-
Value of gain (₦)	2550	2700	3075	3405	-
Income over cost (₦)	1579.37	1714.99	2044.83	2329.76	-

<sup>a,b,cd</sup> Means with different superscript across treatment differ (P<0.05) significantly, SEM=Standard Error of mean, ADG=Average daily gain