NITROGEN BALANCE OF GROWING YANKASA RAMS FED MASAKWA AND SAMSORG-17 STOVER SORGHUM VARIETIES AND CONCENTRATE DIETS

[1]*Abdulkadir K., [2] Hassan, M. R., [3]Musa, A., [1]Saleh, I., [1]Jamilu, A. and [4]Usman Sani Dutsinma

[1]Livestock and Fisheries Department, National Agricultural Extension and Research Liaison Services, (NAERLS) ABU, Zaria
[2]National Animal Production Research Institute (NAPRI) Shika, ABU, Zaria
[3]Department of Animal Science, Ahmadu Bello University, Zaria.
[4]Katsina State College of Health Science and Technology.
*Corresponding author: khuzaifaabdulkadir@gmail.com, +2347039666594

ABSTRACT
An experiment was conducted to evaluate the nitrogen retention (balance) of growing Yankasa rams fed either Masakwa or SAMGORG-17, each supplemented with concentrate. Twelve growing Yankasa rams were used for the study. They were arranged in a completely randomized design, and each ram served as a replicate. Four (4) dietary treatments were formulated to supply the nutrients requirement of the growing Yankasa rams. Diets 1, 2, 3 and 4 contained Masakwa crushe + concentrate, SAMSORG-17 crushed + concentrate, Masakwa chopped + concentrate y and SAMSORG-17 chopped + concentrate respectively. Molasses was added each to the stover daily at 5%. The result showed that, growing Yankasa rams fed Masakwa crushed had significantly (P<0.05) higher values for Nitrogen intake compared to those fed Masakwa chopped and SAMGORG-17 chopped; however, was statistically the same (P>0.05) as those that were fed SAMSORG-17 crushed. The result also showed that growing Yankasa rams fed Masakwa crushed had significantly (P<0.05) higher values for Nitrogen retained compared to all other treatment groups. Further, the result for Nitrogen absorbed as % intake indicated that, group fed Masakwa crushed had significantly higher (P<0.05) values compared to those fed Masakwa chopped, but statistically (P>0.05) similar to groups fed SAMSORG-17 crushed and SAMSORG-17 chopped. However, the result did not show (P>0.05) any difference for all the groups in terms of faecal nitrogen, urinary nitrogen and total nitrogen outgo. It was therefore concluded that Masakwa crushed improved utilization in growing Yankasa rams.
Keywords: Nitrogen balance, sorghum stover, Yankasa rams

INTRODUCTION

The problem of low animal protein intake in livestock of Africa and particularly Nigeria is critical and forms a real challenge to animal scientists and policy makers Abubakar *et al*., 2010). The primary concern of animal nutritionists, is to balance the nutrients that provide the major building blocks for tissue synthesis (Leng, 1990). Small ruminants also contribute by providing income to households, besides being store of wealth and security during periods of lack. According to Ozung *et al*., (2011), they can be reared for income generation, religious purposes, household consumption, hobby and as security against crop failure. Sheep population in Nigeria which is estimated to be 33.9 million, make it the second most important livestock species in the country (FAO, 2008). Lebbie (2004) stated that goats and sheep play a unique role in the food chain and overall livelihood of rural households. Sorghum stover is one of such usable crop residues. As ruminant feed, it consists of leaves and stalk after harvest and has been used mostly as roughage for cattle, sheep, goats and horses (Alawa and Umunna, 1993). In ruminants fed on crop residues such as sorghum stover, degradability is relatively low due to high lingo-cellulose and low N content, and will not provide sufficient nutrients for maintenance requirements. However, increasing the protein content of diets fed to ruminants optimizes degradation of basal and or supplementary diets and may result in increased utilization of soluble nutrients with improved animal performance Bogoro *et al*., (2006a). Molasses is a by-product of the sugar industry and reduces the dustiness of feeds with fine particles Nguyen (2008). Molasses is used to enhance the quality of pelleted feed and reduces the dustiness of feeds with fine particles (Nguyen, 2008; McDonald *et al*., 2011). This study was therefore, conducted to determine the nitrogen balance in growing Yankasa ram fed two sorghums stover fortified with molasses and concentrate.

MATERIALS AND METHOD

Study area

The experiment was conducted at the small ruminants unit of the Teaching and Research Farm, Department of Animal Science, Faculty of Agriculture, Ahmadu Bello University, Zaria Kaduna State, Nigeria. Zaria is located between two latitude of 11^0 14' 14''N and two longitude 7^0 38' 65''E at an altitude of 610m above sea level (Ovimap, 2016), within the Northern Guinea Savannah Zone of Nigeria.

Source of experimental animals and their management

Twelve growing Yankasa rams of average weight of 18±0.5kg were used for the experiment and were sourced from Getso Monday Market, Gwarzo Local Government, Kano State. Feeding troughs and drinkers were thoroughly washed and disinfected before the arrival of the animals. The animals were dewormed with Albendazole oral suspension at 1 ml per kg live weight and 0.1ml/10kg body weight of Ivermectin to treat against endo and ectoparasites during the adjustment period of 10 days.

Feeds, Feeding Management, Data Collection and analysis

Masakwa and SAMSORG-17 sorghums stover were harvested at 12 weeks after grown in Feeds and Nutrition Research Program of National Animal Production Research Institute, Shika, Zaria. After being harvested, each variety was divided into two Masakwa; half were chopped and other half were crushed and the same applied to SAMSOR-17. The cutlass was used for chopping while a machine for crusher was used for crushing. Stover was sundried with adequate turning. There was uniform inclusion of 5% molasses in both stovers before giving to the animals daily. The rams were balanced for their weight before being randomly allocated to dietary treatments. They were arranged in a Completely Randomized Design (CRD). Three (3) rams each were assigned per treatment for the crushed and chopped sorghums stover prepared from both Masakwa and SAMSORG-17, making 6 rams for each stover. The animals were fed experimental diets in their individual crate at 2% of their body weight. A concentrate diet was formulated and fed to animals at 1% of their body weight and fed to animals before offering stover. The experimental animals were taken to the metabolic crate individually and the animals were allowed to get accustomed to the crate for a period of 10 days.

Faecal output was weighed and 10% of each day's collection was sub sampled and oven dried at 60°C for dry matter determination which was bulked and stored until ready for laboratory analysis from which crude protein (CP) were determined, according to AOAC (2005). The samples were collected for 7 days.

Daily urine output was collected in a plastic container containing 10mls $0.1NH_2SO_4$ placed under the metabolic crate. At the end of the collection period (7 days), 10% of the urine was bulked, sub sampled and stored in a refrigerator until when the nitrogen determination was carried out.

RESULTS AND DISCUSSION

The result for nitrogen balance of growing Yankasa rams fed either Masakwa or SAMGORG-17 each supplemented with concentrate fortified with molasses is shown on Table 1. It was observed from the results that growing Yankasa rams fed Masakwa crushed had significantly ($P<0.05$) higher values (11.39 g/day) for Nitrogen intake compared to those fed Masakwa chopped (5.02 g/day) and SAMGORG-17 chopped (7.86 g/day), however, was statistically the same ($P>0.05$) as those were fed SAMSORG-17 crushed (9.15 g/day). The result also showed that, growing Yankasa rams fed Masakwa crushed had significantly ($P<0.05$) higher values (5.58 g/day) for Nitrogen retained compared to all other treatment groups. Further, the result for Nitrogen absorb as % intake indicated that, group fed Masakwa crushed had significantly ($P<0.05$) higher values (48.82 %) compared to those fed Masakwa chopped (22.50 %), but statistically ($P>0.05$) similar to groups fed SAMSORG-17 crushed (33.34 %) and SAMSORG-17 chopped (36.04 %). However, the result does not show ($P>0.05$) any difference for all the groups in terms of faecal nitrogen, urinary nitrogen and total nitrogen outgo. The highest nitrogen intake (11.39 %) values obtained from the result, indicate greater nitrogen availability in the Masakwa crushed feed form. The percentage of nitrogen absorbed relative to intake varied among treatments. Rams fed crushed Masakwa sorghum absorbed 48.82 % of the nitrogen intake, which was significantly higher compared to other treatments. The findings were in line with that of Munza (2021) who fed sorghum hay and silage with concentrate supplementation and has significant difference in nitrogen intake, retained and absorbed, and had no significant effect on faecal, urinary loss, total, absorbed and nitrogen retained as percent intake. However, the results obtained in the stated parameters was not within the range by Abubakar *et al*., (2010) report who used cotton seed cake and sundried broiler litter in feeding Yankasa rams, this might be as result of different feed materials.

Table 1: Nitrogen Balance of Growing Yankasa rams Fed Hays of Two Sorghum Varieties Fortified with Molasses

	Masakwa		SAMSORG-17		
Parameter (g/day)	Chopped	Crushed	Chopped	Crushed	SEM
Nitrogen intake	5.02^{c}	11.39^{a}	7.86^{b}	9.15^{ab}	0.78
Feacal N Loss	1.32	1.37	1.46	1.44	0.046
Urinary N Loss	4.23	4.44	3.69	4.42	0.36
Total N Outgo	4.88	5.18	5.15	5.86	0.33
N Retained	1.61^{b}	5.58^{a}	2.72^{b}	3.29^{b}	0.55
N Absorbed as % Intake	22.50^{b}	48.82^{a}	33.34^{ab}	36.04^{ab}	4.89

^{abc} Means with the same superscript along the columns are not significantly different at $P>0.05$, N = Nitrogen, SEM = Standard Error Mean,

CONCLUSION

It was concluded from the study that both the sorghums stover varieties and the two processing method (chopped or crushed) significantly influence nitrogen utilization in Yankasa rams. Crushed Masakwa stover fortified with molasses is the most effective treatment for optimizing nitrogen retention and absorption, suggesting it could be a preferred choice for enhancing the productivity of Yankasa rams.

REFERENCES

Abubakar, M., Adegbola, T. A. Abubakar, M. M., Shehu, Y., Ngele, M. B. and Kalla, D. J. U. (2010). Nutritional evaluation of different sources of nitrogen on digestible nutrient intake, nitrogen balance and production of rumen metabolites in growing Yankasa sheep. *Emirate Journal of Food and Agriculture.* 2010. 22 (4): 298-307 http://ffa.uaeu.ac.ae/ejfa.shtml 300.

Alawa, J.P. and Umunna, N.N. (1993). Alternative feed formulation in developing countries prospects for utilization of agro-industrial by products. *Journal of Animal Production*. Res., 13:63-98.

A.O.A.C. (2005). Official Method of Analysis. International, Association of Official Analytical Chemists, 24th Edition Washington D.C. USA. Pp 200-210.

Bogoro, S., Kalla, D.J.U. and Manshop, C. (2006a). Effect of quality of diets on the in-sacco in- vivo rumen degradability of cottonseed cake and sorghum stover. *Journal of Arid Agriculture*. Vol. 16, 139-143.

FOA, (2008). Food and Agricultural Organisation Nigerian statistics for live animals from 1998-2008. Food and Agricultural Organisation, Rome, Italy.

Lebbie, S.H.B. (2004). Goats under Household Conditions. *Small Ruminant Research*. 51: 131 – 136.

Leng, R. A. (1990). Factors affecting utilization of poor quality forages by ruminants particularly under tropical conditions. Nutr. Res. Rev. 3:277- 303.

McDonald, P., Edwards, R.A., Greenhalgh, J.F.D., Morgan, C.A., Sinclair, L.A. and Wilkinson, R.G., (2011). Animal Nutrition (7th ed.). Pearson Education Limited, Harlow, England.

Munza, M.M. (2021). Forage yield and quality of sorghum (*Sorghum bicolor* L. Moench) varieties at different sowing dates, harvest and utilization of the silage by growing Yankasa rams. Department of Animal Science, Faculty of Agriculture, Ahmadu Bello University, Zaria. PhD thesis.

Nguyen, T.L.T. and Gheewala, S.H., (2008). Life cycle assessment of fuel ethanol from cane molasses in Thailand. *Intentional Journal of Life Cycle Assess*. 13, 301-311.

Ovimap. (2023). Ovi location map: Ovi Earth Imagery Data.

Ozung P. O., Nsa E. E., Ebegbulem V. N., and Ubua J. A. (2011). The Potentials of Small Ruminant Production in Cross River Rain Forest Zone of Nigeria: A Review. *Continental Journal of Animal and Veterinary Research*, 3 (1): 33 – 37.