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Effects of Multinutrient Blocks Supplementation on the Performance of Grazing Yankasa Sheep in the Wet Season of Guinea Savanna Region of Nigeria

[1]*A.A. Mubi,* [2]*A. Kibon and* [2]*I.D. Mohammed*

[1]Department of Animal Production, Adamawa State University, PMB 25 Mubi, Adamawa State, Nigeria
[2]Department of Animal Science, University of Maiduguri PMB 1025 Maiduguri, Borno State, Nigeria

Abstract: The effect of supplement multinutrient block on the Performance of sheep grazing natural pasture was investigated in on farm trial Fifteen (15) Yankasa sheep aged between 14 to 16 months with mean live weights of 37±1.0kg were used for this study and were divided into three groups with five sheep per treatment. The block intake, live weight gain and cost effectiveness were measured. The treatment groups were, grazing with MNBM, grazing with MNBW and grazing with no supplementation There was a significant ($P<0.01$) difference in live weight gain among all groups. The daily block intakes were 0.24kg/day for MNBM and 0.20kg/day for MNBW respectively. The daily live weight gain was 0.11kg/day, 0.19kg/day and 0.21kg/day for the control, MNBW and MNBM. The technology of making multinutrient blocks for wet season supplementary feeding to natural pastures is both simple and practicable in the guinea savanna zones of Nigeria. It also demonstrated that block technology is a cost effective approach to maximizing the utilization of locally available feed resources for better animal performance in the wet season.

Key words: Multinutrients block % Grazing % Yankasa % Wet season

INTRODUCTION

In the guinea savanna zone, the wet season grasses grow luxuriantly and contain adequate protein needed for maintenance and production. As the rainy season progresses, the grasses become fibrous leading to a reduction in nutritional qualities.

Feeding multinutrient blocks as a supplement is very necessary in the rainy season as a form of supplementary nutrient. The multinutrient block technology is applicable in areas whereas ruminants are fed fibrous crop residues or poor quality basal rations, which contain limited amounts of nutrients [1].

The use of the blocks as feed supplement in the rural areas will ensure that the animals are not just being maintained but can be sustained for productive performance. The ease of preparation and maintenance make the blocks technology practicable for adoption by small-scale farmers [2].

This work gives a brief introductory description of the ingredients used for multinutrient blocks production and summarizes the research undertaken at Mubi for standardizing the formulation of multinutrient blocks and developing a feeding system involving their use as supplements to sheep.

The main objective of this study was to evaluate various formulations of multinutrient blocks as supplements for ruminant feeding under the semi-intensive and intensive system of management. The specific objectives were to determine the effects of multinutrient blocks supplementation on the performance of Yankasa sheep grazing natural pastures in the wet season; and evaluate the cost analysis of multinutrient blocks as feed supplement to sheep.

MATERIALS AND METHODS

Study Area: The experiment was conducted at the Livestock Teaching and Research Farm of Adamawa State University, Mubi, Nigeria. Mubi is situated in the Northern Guinea Savanna zone of Nigeria at latitude 11°E and longitude 13°N and 969m above the sea level [3].

The location of Mubi is generally higher compared with other parts of Adamawa State. The elevation ranged from 400-1500 m. The high land mountain ranges from 1200-1500 m; the high plains elevation ranges between 400-800 m and occupy about 40% of the area [4]. The temperature is slightly cool between November and February and there is a gradual increase in the temperature from January. Monthly mean temperatures

Corresponding Authorl: A.A. Mubi, Department of Animal Production, Adamawa State University, PMB 25 Mubi, Adamawa State Nigeria. GSM: +2348136502487.

range from 16 to 27°C [3]. The seasonal pattern of relative humidity is low between January to March. It rises in April and reaches a maximum in August (55-80%). The relative humidity decreases as from October following cessation of rainfall [5]. Monthly rainfall increases from May to August, while it decreases from September to October, the annual rainfall ranged from 1000 to 1050mm [3].

Livestock production is predominantly extensive rather than intensive, using range land, crop residues and collected fodder to a greater extent than sown pastures and concentrates. Livestock production is a business activity to the people of this region, except for the few nomadic cattle rearers that move their herds in and out of the area depending on the season [6].

Identification of Forages in the Grazed Area: The grazing area is about 150 hectares of land. The grasses/browse plants in the grazing area during the period of study (rainy season) were identified. Samples were collected for identification by cutting the young vegetative portion of the plant during the early blooming period, by using a quadrat of 0.5m x 0.5m in dimension. Within a quadrat, grass samples were cut at a height of approximately 3 - 15cm from the ground.

Experimental Animals: Fifteen (15) Yankasa sheep aged between 14 to 16 months with mean live weights of 37±1.0kg were used for this study. The sheep were conditioned using the procedure described in Experiment 4. They were given prophylactic treatments, consisting of intra-muscular injection of Oxytetracycline (LA: 1ml/10kg body weight). They were routinely dewormed with Banminth F^R (12.5g/kg body weight) and bathed with $Asuntol^R$ powder solution (3g/ litre of water) to eliminate ectoparasites.

Treatment and Experimental Design: Fifteen Yankasa sheep were used for the trial. Animals were weighed and allocated to three treatment groups with 5 animals per treatment each in a completely randomized block design. The treatments were:

Tsg_1 = Multinutrient blocks with molasses only + grazing
Tsg_2 = Multinutrient blocks without molasses + grazing
Tsg_3 = No supplementary blocks (grazing alone) - control

The multinutrient blocks supplementation was provided after the day's grazing.

Housing and Management: The experimental sheep were housed in their individual pens made up of concrete floor and nutrient blocks after grazing. Each pen was supplied with feeding and watering troughs. The pens were swept daily to remove urine, faeces and the left-over feeds. Multinutrient blocks were offered at 4.00pm daily after grazing, clean drinking water was also provided. Fourteen days adaptation period was allowed before data collection.

Data Collection

Multinutrientb Block Intake: The multinutrient block intake was determined daily by weighing the initial block and subtracting the left over from the initial quantity offered throughout the trial period.

Live Weight Changes: The animals were weighed at the beginning of the experiment and thereafter at weekly intervals to determine live weight change throughout the period of the study. The experiment lasted for 16 weeks.

Statistical Analysis: The analysis of variance completely randomized block design was carried out on all collected data [7]. Significant differences among treatment means were determined using the Least Significant Difference (LSD) method.

Cost Analysis of Feed Intake: The cost of multinutrient blocks intake was calculated.

RESULTS AND DISCUSSIONS

Multinutrient Blocks Intake: The results of multinutrient blocks supplementation on the performance of sheep grazing natural pastures in the wet season.

The mean daily consumption of blocks was 0.20 and 0.24 kg/day for MNBW and MNBM respectively. MNBM group had a higher blocks intake than the MNBW group and this may be due to palatability and softness of the MNBM blocks. Intake of grazed pastures was not determined because of difficulty in determining the fodder intake of the grazing animals. However, the groups supplemented with multinutrient blocks performed better than those on grazing alone with no supplementation. The results obtained in this experiment were similar to the findings of Saskatchewan [8] who reported an intake of 220-230 g/day in sheep grazing natural pastures supplemented with multinutrient blocks.

Other workers Kyriazakis and Oldham, [9], Villalba and Provenza, [10] reported that sheep on multinutrient blocks supplementation after grazing pastures, improved their balance of dietary protein and energy. Dixon *et al*. [11] reported that ingestion of multinutrient blocks after grazing would potentially have positive effects by increasing microbial fermentation and the supply of absorbed amino acids. Nitrogen in multinutrient blocks nourishes the microbes in the rumen thus making them more efficient in digesting forages. Similar intake of multinutrient blocks after grazing was reported [12, 13].

Live Weight Changes: The effects of supplementing multinutrient blocks on live weight change of Yankasa sheep grazing pasture is summarized in Table 2. The live weight changes obtained were 0.11 kg/day for control, 0.19 kg/day for MNBW and 0.21 kg/day for MNBM and all the groups significantly (P<0.01) differed. No weight loss was observed as a result of non-supplementation. This may be attributed to the appreciable amount of nutrients in the grazed pasture during the rainy season. The higher live weight gains of the supplemented groups with multinutrient blocks may be due to the supply of degradable nitrogen derived from multinutrient blocks, which contributed to the improved growth of rumen microorganisms and invariably increased the supply of microbial protein to the animal. Another probable reason may be as a result of optimum nutrient supplied by the multinutrient blocks supplementation.

Results in this study were in line with the findings of Salman [14] who reported that feeding Awassi ewe multinutrient blocks during grazing improved their weight gain compared to the control and observed no weight loss. Similar trends were also observed on the on-farm experiment; ewes gained higher live weight as a result of multinutrient blocks supplementation compared to non-supplemented group after grazing pastures during the wet season.

The daily live weight gain obtained was similar to the 200 g/day, in sheep on grazing alone as previously reported [15]. The positive live weight of the supplemented groups may also be as a result of improved supply of energy and amino acids at the tissue level which brings the necessary changes in the hormones for better growth. However, it was observed that with the advancement of grazing period, quantity and quality of grasses available for grazing becomes inadequate to support the animal's body condition.

Mahajen *et al*. [16] in Their study reported that grazing of mature pastures alone is not sufficient for better live weight gain and therefore recommended that supplementation should be introduced for better performance of grazing sheep.

Table 1. Multinutrient blocks supplementation

Performance Indices (kg)	Diet formulations MNBM	MNBW	CNTL	SED	Sig. Level
Daily block Intake	0.24^{a}	0.20^{b}	0.00^{c}	0.01	**
Initial mean Live weight	37.40	37.40	37.40	-	ns
Final Mean Live weight	60.92^{a}	56.68^{b}	49.57^{c}	0.09	**
Daily Live weight Gain	0.21^{a}	0.19^{b}	0.11^{c}	0.02	**

KEY SED = Standard error of difference between two means

abc = ^{abc} Means within same row having different superscripts differ significantly

* = (P<0.05)

* * = (P<0.01)

ns = non Significant

MNBM = Multinutrient Blocks with Molasses

MNBW = Multinutrient Blocks without Molasses

CNTL = Control (grazing natural pastures only)

Table 2: Cost analysis of multinutrient blocks intake on the performance of grazing Yankasa sheep in the wet season

Parameters	Treatments MNBM	MNBW	CNTL
Block intake (x/day/animal)	5.24	3.02	00.0
Block intake per treatment (x/day/animal)	26.20	15.10	00.0
*Total cost of block intake (x)	2934.40	1691.20	00.0
Total weight gain (kg)	23.52	19.28	12.17
Cost per unit gain (x)	24.95	17.55	-

KEY MNBM = Multinutrient blocks with molasses

MNBW = Multinutrient blocks without molasses

CNTL = Control (grazing natural pastures only)

* = Total cost of block intake for the entire experiment

Cost Analysis of Blocks Intake: The cost effectiveness of supplementing sheep with multinutrient blocks with or without molasses.

The highest cost of intake was obtained in the supplemented group with molasses. The daily block intakes per head/day were x5.24 and x3.02 for the multinutrient blocks with and without molasses respectively; the higher cost of multinutrient blocks with molasses was related to the high cost of molasses. From this study, it can be deduced that the feed cost was better in the multinutrient block without molasses. The costs per unit (x) kg gain were x24.95 and x17.55 for MNBM and MNBW. The MNBW supplementation is cheaper than MNBM due to cost of molasses as an ingredient in the formulation of blocks with molasses.

The cost of molasses was high thus making it economically unattractive. This is similar to the findings of Baset *et al.* [17] and Hussain *et al.* [18] who reported that, inclusion of molasses in the production of lick block reduced the cost benefit due to high cost of the molasses.

CONCLUSION AND RECOMMENDATIONS

The experiments with sheep during the wet seasons have improved available knowledge on the positive effects of using multinutrient blocks as a supplement to animals on poor quality straws and ruminants grazing natural pastures. The encouraging results on feed intake, live weight gain, nutrient digestibility and cost analysis of production and utilization further justify the need for the use of the multinutrient blocks as supplements for cattle and sheep.

Although preparations and handling of blocks may be cumbersome processes multinutrient blocks are economic and acceptable method of feeding urea and molasses provided molasses is available to the farmers at a reasonable price. Multinutrient blocks supplementation of sheep grazing natural pastures can enhance higher live weight gains during the wet season. Growth rate was significantly higher when blocks were made available after day time grazing. It is concluded that multinutrient blocks can improve the efficiency of utilization of poor quality roughages and improve animal performance that otherwise could only be obtained by using greater qualities of conventional energy and protein supplements.

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