PERFORMANCE OF SHEEP FED DIFFERENT MULTI-NUTRIENT BLOCKS (MNB) AS SUPPLEMENT TO MILLET STOVER IN SEMI-ARID ZONE OF NIGERIA.

***Kaganami, M., Usman M. Kolo, Aisha Girgiri, I. Bature, F.I. Abbator and I.D. Mohammed.**
Department of Animal Science, University Maiduguri, Borno State, Nigeria
*Corresponding author: Mobile: 08039235714 Email – mustaphakaganami2016@gmail.com

ABSTRACT
The study was conducted to determine the influence of multi nutrient blocks (MNB) as supplement to millet stover in the Semi-arid region of Nigeria. From result of proximate and *in sacco* degradability properties, four multi nutrient blocks (MNB) were selected and subjected to *in vivo* trial. Twenty (20) sheep with an average body weight of 21.75kg were used for the study. The animals were divided into four (4) treatment groups. The study lasted for 56 days. The results of initial body weight gain, final body weight gain, daily basal intake, daily supplement intake and total feed intake show no significant ($P>0.05$) differences between the treatment means. While there were significant ($P<0.05$) differences among the treatment means on Feed conversion ratio, daily live weight gain and total weight gain. Therefore, it could be concluded that, animals on T3 had better performance; therefore, the diet with (Faidherbia albida +Locust bean pulp +Wheat bran) in diet of sheep increased intake and performance. Furthermore, the four multi nutrient blocks (MNB) under study revealed that it could be valuable alternative animals feed sources in ruminant feeding.

Key words: Multi Nutrient Blocks (MNB), Millet stover, Feed conversion ratio, daily weight gain and total weight gain.

INTRODUCTION
Feed availability has been the major factor affecting ruminant livestock production during the dry season. Poor quality roughages such as crop residues and dry grasses are the available feed resources for feeding ruminants during the dry season. These feed resources are characterized by low intake and digestibility which result in poor animal performances. Supplementation with conventional protein base feed to ameliorate the problem is not within the reach of the small holder farmers. The use of agro-industrial by-products by livestock farmers especially in Nigeria is restricted to few, wealthy individuals because of high cost (FAO, 1996).

Browse plants have been used as supplements to a wide range of forages and agricultural by-products. Norton (1998) stated that they have been incorporated into concentrates as substitute for more expensive processed protein source such as groundnut cake, cotton seed cake, palm kernel cake etc. Studies by Njidda *et al. (*2009) and El- Bahiery *et al.* (2009) showed that *Ziziphus Mauritania* and *Faidherbia albida* have high crude protein (CP) content and could be used as supplement for feeding ruminants.

Multi- nutrient blocks are licks that contain various nutrients such as energy, protein, mineral, vitamins and other nutrients mixed together from various feed ingredients that are used as livestock feeds (Sansoucy, 1998). Feeding of the blocks is convenient and inexpensive method of providing array of nutrients required by both the rumen microbes and animals, which may be deficient in the normal diet (Leng, 1997) sorghum stover.

MATERIAL AND METHODS
Study Area
The study was carried out at the Livestock Teaching and Research Farm of the Department of Animal Science, University of Maiduguri.

Feed Ingredients and Preparation
The feed ingredients used for the study are millet bran, rice bran and wheat bran as energy sources. While *Faidherbia albida* pod and *Ziziphus mauritania* fruit as protein sources, and locust bean pulp used as binder and also for energy source for multi nutrient blocks. And above ingredients were used to formulate supplement diets.

Multi Nutrient Block Formulation

The blocks were formulated using *Faidherbia albida* pods and *Ziziphus Mauritania* fruits as protein sources while Millet bran, Rice bran and Wheat bran as energy sources, Locust bean pulp was used as a binder and also serve as energy source. All ingredients were used in various proportion and cold method of production was used (Leng, 1997).

Table 1: Percentage composition (%) of the Multi- Nutrient Block (MNB)

Percentage (%) of Feed Ingredients Used in the Formulation of the Multi-Nutrient Blocks (MNB)
T1 = 55% MB + 5% LBP + 40% FA
T2= 55% MB + 5% LBP + 40% ZM
T3= 55% WB + 5% LBP + 40% FA
T4= 55% WB + 5% LBP + 40% ZM
T5= 55% RB + 5% LBP +40% FA
T6= 55% RB + 5% LBP + 40% ZM
T7= 55% MB + 5% LBP + 20% FA + 20 % ZM
T8= 55% WB+ 5% LBP + 20% FA + 20% ZM
T9= 55% RB + 5% LBP + 20% FA+ 20% ZM

Abbreviation: MB=Millet bran, FA=*Faidherbia albida*, LBP= Locust bean pulp, ZM=*Ziziphus mauritania*, RB= Rice bran and WB= Wheat bran

Mixing of Feed Ingredients

The feed ingredients were mixed manually in a 200 L drum cut to a height of 50 cm. Batches of 15 kg (ingredients) were mixed in various ratio in order to get a homogeneous mixture as recommended by Mohammed *et al.* (2007).

Feeding and Management

Prior to the commencement of the study, the animals were given prophylactic treatment consisting of intra- muscular injection of oxytetracycline (LA: 1ml/10kg body weight, multi vitamin and ivormetin 1m/50kg). The basal diet (millet stover) and water was provided *ad- libitum*, while the supplement was provided. Concentrate were provided to T1 (control) while T2, T3, T4 and T5 were supplemented with different multi nutrient blocks.

Feeding trial

Animals and experimental design

Twenty (20) growing sheep weighing on average were used for the feeding trial. Feeding trial was carried out using multi- nutrient blocks (MNB) as a supplement to millet stover. The four (4) multi-nutrient blocks (MNB) were selected based on proximate composition and *in sacco* digestibility. Multi-nutrient blocks (MNB) that are high in crude protein (CP) content and dry matter degradability were selected as supplement. The animals were weighed and divided into five (5) groups. Each group of four animals with four replicates were randomly assigned to one of the five (5) treatments in a completely randomized design. Each group was received each multi- nutrient block except for the control (T1), which was not be administered the multi- nutrient blocks a formulated diet, and water were offered *ad-libitum* to all group as basal diet. The experiment lasted for 56 days.

Statistical Analysis

All data collected were subjected to analysis of variance (ANOVA) using completely Randomized Design (CRD) Significant differences between means were compared using the least Significant Difference (LSD). Duncan Multiple Range Test (DMRT) at level of 0.05% significant difference.

RESULTS AND DISCUSSION

Growth performance of sheep fed multi nutrient blocks (MNB) as supplement to millet stover

The results of growth performance of sheep fed different multi nutrient blocks (MNB) as supplement to millet stover based diet are presented in Table 2. There were significant ($P < 0.05$) differences in total weight gain, daily weight gain, and feed conversion ratio while initial body weight, final body weight, daily basal intake, daily supplement intake and total feed intake were not significantly ($P > 0.05$) different among the treatment groups. Animals on all treatments gained weight indicating that the multi nutrient blocks had positive effect on the live weight performance of the sheep. However, T3 was significantly ($P<0.05$) different from other treatments in the total weight gain, daily weight

gain and feed conversion ratio. The highest value of total weight gain and daily weight gain recorded by animals on T3 could be due to low feed conversion ratio compared to other treatments group.

The initial body weight of sheep fed with different multi nutrient blocks and millet stover as based diets the values ranged from 20.00 kg (T2) to 21.78 kg (T5). The highest final body weight was recorded in T3 (32.38 kg) while the lowest value (27.25 kg) was recorded in T1 (control). The highest value was recorded in T3 (55% wheat bran + 5% locust bean pulp + 40% *Faidherbia albida*) this might be due to high crude protein content. The result of the study is in line with Ranjbari and Rasti (2000) when sheep supplemented with mineral blocks and grass whose stated that multi nutrient blocks (MNB) improved the body weight of the animals, compared to control which received no multi nutrient blocks (MNB).

The daily basal intake was 0.84, 0.84, 0.83, 0.85 and 0.77 (kg DM) for T1, T2, T3, T4 and T5 respectively. The highest value was recorded in T4 0.85 (kg DM) while the lowest value was recorded in T5 0.77 (kg DM). The highest values recorded in T4 could be attributed to the high crude protein intake. Among the treatments that were supplemented with multi nutrient blocks T3 had the highest crude protein intake followed by T4. The results of daily supplement intake were also recorded that there was no significant ($P > 0.05$) among the treatment group, the values ranged between 0.14 – 0.15 (kg Dm). This indicated that the daily supplements consumed from each treatment are statistically similar.

The values recorded for total dry matter intake were 0.99, 0.88, 0.99, 0.99 and 0.93 for T1, T2, T3, T4 and T5 respectively. The highest value of total dry matter intake was recorded in T1, T3 and T4 0.99 (kg DM) while lowest value was recorded in T2 0.88 (kg DM). This is in line with the report of Ranjbari and Rasti (2000) when sheep fed with multi nutrient blocks and agro industrial by products, who stated that formulated multi nutrient blocks (MNB) with different variety of ingredients with or without molasses increased feed intake. The result of total weight gain showed that there were significant differences ($P < 0.05$) among the treatment groups. The values were 6.23, 8.63, 10.88, 8.63 and 9.85 kg for T1, T2, T3, T4 and T5 respectively. T3 recorded the highest value (10.88 kg) and the lowest value was recorded in T1 (6.25 kg). However, the total weight gain recorded for T2 and T5 are statistically similar while T3 and T5 are statistically similar 10.88 to 9.85 kg respectively. T1 was significantly difference ($P< 0.05$) from the treatment groups.T1 control (without multi nutrient blocks) recorded the lowest value among other treatment groups. The difference might be due to the not supplemented with multi nutrient blocks (MNB). Multi nutrient blocks (MNB) provide an almost continuous supply of nutrients which is usually deficient in millet stover that limit fibre digestion in the rumen and multi nutrient blocks (MNB) can be a source of rumen protein, macro and micro minerals, vitamins, and additive to manipulate rumen fermentation Mubi *et al.* (2011). The value recorded for T1 (6.25 kg) was similar to the value (6.30 kg) reported by Habib *et al.* (1990) when supplemented sheep with multi nutrient blocks and the positive effect of multi nutrient blocks (MNB) on overall performance on a low plane of nutrition that is a crop residue or millet stover based diet given in large quantities.

The average Daily weight gain differed significantly ($P < 0.05$) among the treatments. The highest value was recorded in T3 0.19 kg while the lowest value was recorded in T1 with the value of 0.11 kg. However, the T2 and T4 values are statistically the same 0.15 kg while among these treatment groups only T1 which served as control (without multi nutrient blocks (MNB) recorded the least value. The variation might be attributed to supplementation of (T2 to T5) with multi nutrient blocks (MNB).

The higher value recorded for T3 might be due to the high crude protein content of the *F*aidherbia *albida* used in the formulation of the multi nutrient blocks (MNB). Habib *et al.,* (1990) when sheep supplemented with multi nutrient blocks and sorghum stover as basal diet, reveal that those sheep that consumed multi nutrient blocks (MNB) perform better than those fed control diet. This suggests that the multi nutrient blocks (MNB) improving rumen fermentation which provides a better balance of nutrients to the animals for absorption.

The result of feed conversion ratio (FCR) Showed that there were significant ($P < 0.05$) differences among the treatment groups. The values were 8.99, 5.85, 5.15, 6.49 and 5.5 for T1, T2, T3, T4 and T5 respectively. The highest value was recorded in T1 (8.99) While the lowest value was recorded in T3 (5.15). However, the values recorded for T2, T3 and T5 are statistically similar. For feed conversion ratio the lower the value the better the feed conversion ratio.

In the present study T3 recorded the best feed conversion ratio. The result revealed the ability of animals on T3 to convert the feed consumed to weight gain follow by T2 and T5 while T1 (control) recorded the poorest feed conversion ratio. T3 recorded the best feed conversion ratio which indicated efficiency in feed utilization. T1 (control) recorded the poorest feed conversion ratio. The result of this study is in line with the finding of Mohammed *et al.* (2007) when sheep supplemented with different multi nutrient blocks and wheat bran, reported that supplementation of multi nutrient blocks (MNB) with different feed ingredients to sheep under Semi-Arid environment improve the performance of sheep grazing natural pasture.

Table 2: Growth Performance of Sheep fed different Multi nutrient blocks (MNB) and Millet stover based diet

Parameter	T1 (control)	T2	T3	T4	T5	SEM
Initial body weight (kg)	21.03	20.00	21.50	21.75	21.75	0.91^{NS}
Final body weight (kg)	27.25	28.63	32.38	30.38	31.63	0.92^{NS}
Daily basal intake (kg DM) 0.84	0.80	0.83	0.85	0.73	0.36^{NS}	
Daily supplement intake (kg DM) 0.15	0.14	0.15	0.15	0.14	0.11^{NS}	
Total feed intake (kg DM) 0.99	0.88	0.99	0.99	0.93	0.11^{NS}	
Total weight gain (kg)	6.23^{c}	8.63^{b}	10.88^{a}	8.63^{b}	9.85^{ab}	0.40^{*}
Daily weight gain (kg)	0.11^{c}	0.15^{b}	0.19^{a}	0.15^{b}	0.18^{ab}	0.01^{*}
Feed conversion ratio	8.99^{a}	5.85^{c}	5.15^{c}	6.49^{b}	5.75^{c}	0.34^{*}

a, b, c, = means in the same row with different super scripts are significantly (P>0.05) different
NS = not significantly (P<0.05) different, SEM = standard error of mean,* Means significantly (P>0.05) different.

CONCLUSION

The results of this present study reveal that the growth performance indicated the sheep in T3 had better performance than other treatment groups while the lowest performance recorded in T5. It is well established that using multi nutrient blocks improved performance of sheep. The process of making multi nutrient blocks is simple and does not required sophisticated equipment and can be made by used of wide variety of by products which are available locally.

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