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Effect of Urea Molasse Block Supplementation on Growth Performance of Sheep

E. HATUNGIMANA[1], P. NDOLISHA[2]

Department of Animal production, School of Animal Sciences and Veterinary medicine, College of Agriculture, animal Sciences and veterinary medicine, University of Rwanda, Rwanda

Abstract: **An experiment was conducted in the SINA Gerald farm to study the effect of urea molasses Block (UMB) supplementation on the growth performance of sheep. Forty merinos sheep of ten months old were used in the experiment and were divided into four groups of ten sheep each and were arranged in a complete randomized design. Four feeding treatments were used in the experiment, and these were, P0: control group fed on grass only, P1: grass supplemented with UMB containing 3.6% of urea, P2: grass supplemented with UMB containing 4.8% of urea, and P3: grass supplemented with UMB containing 7.2% of urea. The laboratory analysis of feed ingredients of the UMB was also performed to check the nutrient content in terms of Dry matter (DM), Crude protein (CP), Crude fiber (CF), and mineral content in Calcium (Ca), and phosphorous (P). Data on the feeding trial were collected during fourteen weeks, and were subjected to the analysis of variance (ANOVA) using general linear model procedure of GenStat. Means were compared with Duncan's Multiple Range Test. The results of this experiment showed that the UMB supplementation has significantly influenced ($P<0.05$) the live weight gain, and feed conversion ratio in sheep. Feed consumption was higher in non-supplemented groups, but was negatively affected in groups supplemented with UMB ($P<0.05$). With regard to the growth performance of sheep, the group P3 fed on grass supplemented with UMB containing 7.2% of urea, showed a higher growth performance than other groups. It was also observed that the UMB supplementation did not adversely affect the sheep health.**

Keywords: **Urea Molasse Block, supplementation, growth performance.**

1. INTRODUCTION

Livestock production systems in most parts of the world, particularly in developing countries, including Rwanda depends on natural vegetation of the range and farm lands. Periods of rainfall, make forage availability and quality very unpredictable. Seasonal variation in feed quantity and quality causes periods of weight loss and gain in grazing animals. The productivity of the animals is low compared to the performance of the same species in a more favorable environment, but their ability to survive in critical periods is remarkable. During harsh periods like dry season, suitable feeding strategies need to be developed to minimize the adverse effect on livestock production (Kamalzadeh, 1997).

Small ruminant such as goat and sheep are raised by a large number of farmers in Rwanda and they mostly use poor pastures to graze the herds. Decreasing areas of pastures with high population demography have influenced the development of new feeding strategy to improve animal production. Among various supplementing feeding strategies to adopt is the use of urea-molasse multi-nutrient blocks which are easy to produce and store (Togtokhbayar, 2004).

Nowadays cattle farmers use urea which is non-protein nitrogen to be converted into protein, with positive effects on production performance but the research on supplementing urea in small ruminant animals is still limited. Urea may be supplied in the form of urea molasses block (UMB) which consists of urea, molasses, corn meal, minerals, and vitamins

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(Nerc et *al*., 1983; Hendratno, 1988). The feeding of the blocks is an inexpensive method of providing nutrient required by both microbes and the animal, which may be deficient in the basal diet.

It has been observed that small ruminants can contribute efficiently to poverty reduction as they have short reproduction cycle and can provide big returns if special feeding care is developed such as supplementing with urea-molasse multi-nutrient block.

The objective of this study was to assess the effect of urea molasse block on the growth performance of sheep more specifically the effect of urea molasse block supplementation on the weight gain of sheep, the feed consumption and feed conversion rate in sheep fed on grass supplemented with UMB.

2. MATERIAL AND METHODS

Experimental animals:

Forty merinos sheep from the SINA Gerard farm in Rulindo District, were selected among others in the herd based on their age (10 months), average live weight of 20kg and their health status (vigorous and no signs of any disease). Before the period of study, the sheep were fed on grass (penisetum purpureum, leucaena leucocephala and Caliandra carothryrsus as a basal diet supplemented with a small quantity of urea to adapt them on the new feed during one week.

After the adaptation period, sheep were randomly divided into four groups each made of ten sheep in a Complete Randomized Block with four treatments: P0 (sheep fed on grass only, control), P1 (sheep fed on grass with UMB containing 3.6% of urea), P2 (sheep fed on grass with UMB containing 4.8% of urea) and P3 (sheep fed on grass with UMB containing 7.2% of urea).

Formulation and preparation of Urea-molasse blocks:

For the formulation and preparation of UMB, different ingredients were purchased in Zamura feed company, and these are urea, maize bran, common salt, cement, and soybean meal. Molasse was bought from the Kabuye sugar plant located in the surburb of Kigali city. The following table (1) illustrates the urea molasse block ingredient composition.

Table 1: Ingredient composition of the urea molasse block (%)

Treatments	P0	P1	P2	P3
Ingredient (%)				
Urea	-	3.6	4.8	7.2
Molasses	35	35	35	35
Maize bran	43.5	43.5	42.2	39.8
Soybean	13	13	13	13
Limestone	2	2	2	2
Cement	3	3	3	3
TOTAL	96.5	100	100	100

Urea molasse Block preparation:

For the preparation of Urea Molasse block (UMB), five stages were rigorously followed and these are: selection and preparation of feed ingredients, mixing ingredients, molding the mixture, turning or cutting the block, and drying the blocks. All feed ingredients were weighed before mixing according to the formula that was set to meet the nutrient requirement of sheep according to NRC, (1985). The following ingredients were used: molasses, urea, limestone/minerals, soybean, cement and maize bran. After a homogenous mixture was made, it was introduced into a mold so that it should have a particular preferred size and shape.

The board was then taken away the day after molding to facilitate the drying process. The cutting was done later with a flat spade. The blocks were removed simply by turning the containers upside down tapping on the bottom of the container. After the removal of the moulds and cutting up, blocks were arranged in the drying area on wooden shelf. The blocks were not exposed to direct sunlight, but under a shade with good ventilation.

Sheep feeding trial:

The UMB was supplied every morning before feeding grass and each animal was given 70g UMB and the experiment covered fourteen weeks from October 2012 to January 2013.

Animal body weight was measured at a weekly basis. The feed intake of the basal diet was measured each day by measuring the differences between the amount of the feed offered to sheep and the leftovers.

3. PRESENTATION OF THE RESULTS

The following table (2) illustrates the nutrient content of different feeds used in the experiment.

Table 2: Nutrient composition of feeds and ingredients used for making UMB

	DM (%)	CP (%)	CF (%)	Ca (%)	P (%)
Penisetum purpureum	15	10.8	31.2	0.6	0.4
Leucaena leucocephala	31	24	24	-	-
Soybean meal	89	48	5.6	2.1	1.4
Maize bran	88	10.6	10.1	0.04	0.24
Molasse	78	4.3	-	1.0	0.1
Wheat bran	90	11.2	2.3	0.12	1.2
Limestone ground	99.7	-	-	33.6	0.03

DM= Dry matter, CP= Crude protein, CF= Crude fiber, Ca= Calcium, P= Phosphorus

The ingredients used in making the urea Molasse Block showed a higher nutrient content in terms of Crude protein, Dry matter and they were also low in crude fiber. The following table (3) illustrates the growth performance of sheep in terms of average daily gain, final body weight gain, and the feed consumption and feed conversion ratio of grass fed to different lots of sheep.

Table 3: The growth performance, feed consumption and feed conversion ratio in sheep

Parameters	P0	P1	P2	P3
Initial body weight (kg)	20.2^a	20^a	20^a	20.1^a
Final body weight(kg)	22.4a	24.1^b	24.4^b	25.4^c
Average Daily Gain (g/day)	22.0^a	40^b	44.0^c	54^d
Feed consumption (kg/day)	6.0^a	5.1^b	4.8^b	5.0^b
Feed conversion ratio	38.8^a	18.0^b	15.2^c	13.2^d

$^{a, b, c, d}$ Means in the same row with different superscripts differ (P< 0.05)

The following figure (1), illustrates the progressive growth performance of sheep during 14 weeks according to the four feeding treatments.

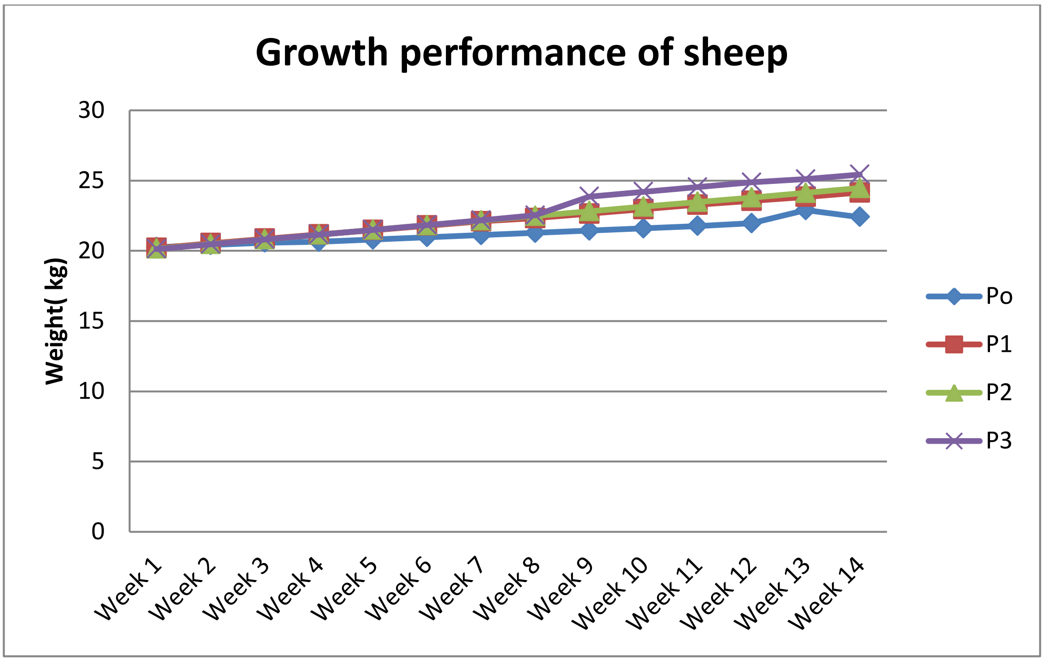

Fig 1: Progressive growth performance of sheep according to 4 treatments

The following figure (2) shows clearly the comparison of the body weight of sheep before and after the experiment.

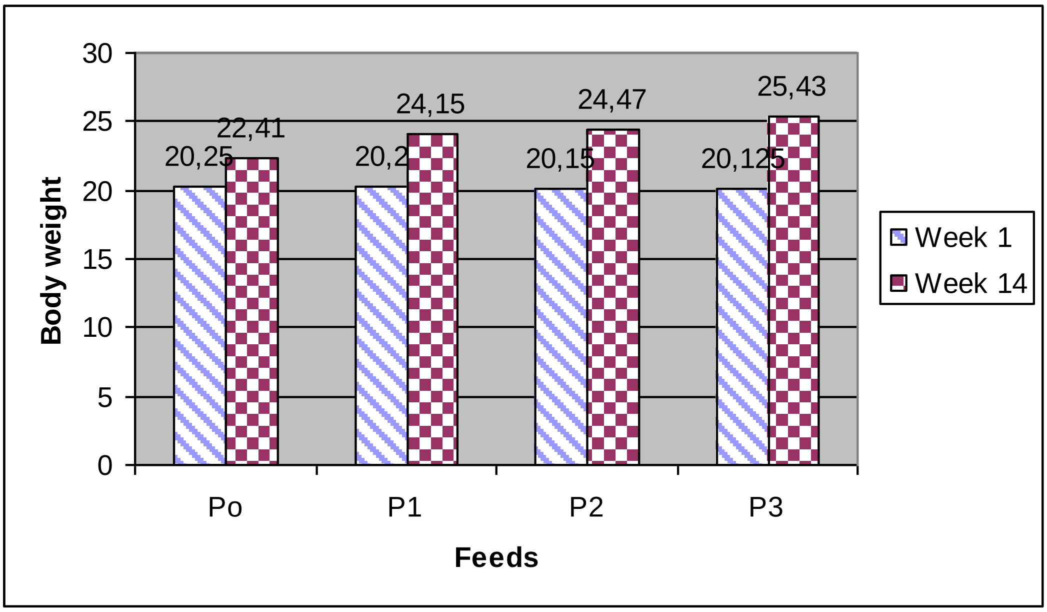

Fig 2: Comparison of live weight (kg) on first week and last week of experiment

4. DISCUSSION OF RESULTS

From the table 3 live weight gain, feed consumption and conversion were significantly different ($P<0.05$) among treatment groups. Those results are similar to those of Ibrahim (1991)**,** respectively 21.6g, 42.4g, 46.1g, and 46,4g.

By Duncan's Multiple Range Test it was shown that the live weight gain of sheep in P1, P2, and P3 were higher ($P<0.05$) than of T0.The increase in live weight gain was due to the UMB supplementation. When comparing the three treatments in which urea was included we noted that there is significant difference (P<0.05) between P1&P2, P1& T2, and P2&P3. The supplementation with urea molasse block has significantly increased the live weight of sheep due to different inclusion levels of urea in the Urea Molasse Block.

As molasse may increases the energy content of feeds, even the digestibility coefficient was increased. During the insufficient feed availability according to Kamalzadeh (1996), appropriate feeding strategies need to be developed to minimize the adverse effect on sheep production in order to achieve nutrient restriction and delay of growth until an adequate good quality of feed is available and benefit from compensatory growth.

When the fodder quality decreases or is absent and the available feed does not fully meet the nutrient requirements for early growth, good quality feeds make sheep to deposit approximately 165g protein per kg gain (Mc Donald , 1988), and small amounts of intestinal amino acid nitrogen are required in excess of that derived from the rumen microbes. With insufficiently high-quality forage available, however, the extent and efficiency of microbial production are low, and rumen by-pass protein negligible. According to Hoover (1986), urea molasses supplementation to low quality forages, could increase the efficiency of microbial protein production.

Preston & Leng (1987) and Oosting *et al.*, (1995) reported that ruminants may show higher roughage intake as a result of an increased small intestinal availability of amino acids.

Basal feed consumption was decreased (P<0.05) by UMB Supplementation in all groups of sheep. Rumen microbial protein is needed to fuel growth (Leng *et al.*, 1996). By UMB supplementation, extra energy and nitrogen are offered to support the synthesis of an increasing amount of microbial protein.

By UMB supplementation extra energy and Nitrogen (N) are released to support the synthesis of an increasing amount of microbial protein. The feed conversion of treatment P0 was higher (P<0.05) than P1, P2 and P3.This means that UMB supplementation caused a decreased feed conversion about 35%. This is most probably related to increased protein deposition associated with the improved N retention. According to Haresign (1991), the degradation of fibrous matter is increased in association with rumen microbes. It is therefore considered that animals supplemented with UMB digested the feed more efficiently than those without urea molasse block supplementation.

5. CONCLUSION

According to the results of this experiment it is concluded that urea molasses block supplementation caused an improved growth performance of the sheep particularly in weight gain by 4.1, 4.4 and 5.3kg for group P1, P2 and P3 respectively. The supplementation of UMB slightly reduced the feed consumption but increased the feed conversion ratio of 18.0, 15.2 and 13.2 for group P1, P2 and P3 respectively. It was also observed that supplementing UMB did not negatively affect the sheep health (because urea is toxic when used in high quantity and molasses can increase the blood glucose and leads to hyperglycemia). Urea Molasses Block is a high protein concentrate feed source that supplies non-protein nitrogen (NPN) as well as minerals and vitamins to rumen microbes. The utilization of UMB is a good way of providing readily degradable protein and fermentable energy to ruminant animals and help increase the protein supply to ruminants in situations where this may be limited.

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