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SUPPLEMENTATION OF CREOLE SHEEP WITH MULTINUTRITIONAL BLOCKS IN TLAXCALA, MEXICO

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Abstract: A participatory experiment was carried out with three sheep farmers from the municipality of Benito Juarez, Tlaxcala, Mexico. Multinutritional blocks (BMN) were used to observe their effect on weight gain. The BMN had a content of 45% molasses, 25% corn stubble and 5% urea. Despite the different feeding plans and times of the year in which the experiment was carried out, there were weight gains in the three herds, however these were significant only in herd three (3.8 kg and increase). In the case of the females participating in the study, the weight gains were significantly higher than those registered by the males.

Keywords: Sheep, sustainability, weight, multinutritional blocks, Tlaxcala

INTRODUCTION

Sheep production in Mexico is a very important activity since it includes a population of 8,725,882 heads and 286,991 heads: Sheep farming is also very important for the State of Tlaxcala. Despite being the Mexican state that occupies the 11th place in number of sheep heads, it is the first place in sheep density per km2 (71.8). This is compared to the State of Mexico, which has the largest sheep population in the country but with a density of 60.22 sheep per km2 (SIAP, 2022). The sheep in Tlaxcala is also a livestock species with a greater inventory in relation to other domestic species, only surpassed in absolute numbers by birds that produce meat and eggs. (SIAP, 2022). However, sheep production in Tlaxcala and Mexico is considered low with problems ranging from the lack of organization of producers, lack of infrastructure, technological deficiencies in all areas, particularly in animal nutrition (CESPOET, 2022).

A cheap, technologically simple and efficient alternative to improve the nutrition of sheep in the State is the Multinutritional

Blocks (BMN). BMMs are nutritional supplements that allow us to supply nutrients such as proteins, carbohydrates and minerals slowly and safely. One of the greatest advantages of the Multinutritional Blocks is that they improve the rumen environment by increasing the number of microorganisms (Arias et al, 2012). Due to their nutritional characteristics, the BMNs not only help to reduce weight loss during dry seasons with low forage availability, they also allow the animals to gain weight under grazing or stable conditions (ref) since they help to improve the relationship protein-energy in the animal and, as mentioned before, improve the digestibility of fibrous forages (ref).

The objective of this work was to evaluate the use of multinutritional blocks on weight gain in sheep herds from the State of Tlaxcala.

MATERIALS AND METHODS

The experiment was carried out in the Municipality of Benito Juárez, Tlaxcala, Mexico from April 2021 to October 2021 (7 months). The municipality is located in the central Mexican Altiplano at 2,530 meters above sea level, its geographic coordinates are between 19 degrees 35 minutes north latitude and 98 degrees 26 minutes west longitude. It borders to the north with the state of Puebla, to the south with the municipality of Sanctórum de Lázaro Cárdenas, to the east with the municipality of Tlaxco and to the west with the municipality of Sanctórum de Lázaro Cárdenas. In most of the municipality, the sub-humid temperate climate prevails with summer rains. The maximum annual average temperature recorded is 20.8 degrees Celsius. During the year there are variations in temperature ranging from 9.8 degrees Celsius as a minimum, to 22.7 degrees Celsius as a maximum. The maximum average rainfall recorded is 128.3 and the minimum is 7.3 millimeters.

We worked in a participatory manner with three producers from the municipality. The three had criollo or mestizo sheep

The duration of the experiment with **producer 1** was a month and a half, from April 13, 2021 to May 28, 2021 (dry season). His herd's diet consisted of corn stubble, quelites (*Amaranthus hybridus*), purslane (Portulaca oleracea), grass (*Cynodon dactylon*).

The feeding was based mainly on grazing, in times of drought fodder or commercial food is administered; Grazing takes place on a hill near the town and they are only carried out in rainy weather. This producer had 6 sheep, of which 1 is male and 5 females, this as of 04/14/2021 and on 04/20/2021 informs us of the birth of a lamb. The pens were built of block with sheets and wood. In the elaboration of blocks, the inconvenience was that the stubble was not found more ground. In this herd there were two pregnant ewes and the average weight of the herd was 30.83 kg.

Producer 2. The experiment lasted 2 and a half months, from May 22, 2021 to August 8, 2021. The diet was corn stubble, Grass (*Cynodon dactylon*) and Plum leaves (*Spondias purpurea*). In this herd there were 16 animals in total with 3 pregnant ewes. All the animals were native and the average weight of the herd was 67.44 kg. The main diet was grazing supplemented with commercial feed. The corral was built of block, cement floor, sheet and mesh. The feeder was made of steel and the drinker was made of a small cup with a valve. Regarding food, it consisted of grazing that was carried out at home, since it has a large piece of land and grass in certain areas of it, it is carried out by the family, which is made up of the producer, his wife, and 1 grandson; especially grazing is around 1 hour.

With the Producer 3 The duration of the experiment was 2 months. From August 29, 2021 to October 22, 2021. The feeding of this herd was based on corn stubble, sorghum,

peach leaves (*Prunus persica*), plum leaves (*Spondias purpurea*) and corn grains (*Zea Mays*). There were no pregnant ewes in this herd. The animals were crossbreed and the average weight was 14 kg. The feeding was based on grazing with food preparation with corn, stubble and sorghum. The herd consisted of 12 animals, 5 of which were used for the experiment. The corral was made of wooden sticks, blocks, sheet metal, and mesh, and the feeder was made of stainless steel, while the drinkers consisted of cans or plastic tubs.

The BMN were prepared according to the method described by Arias et al and their composition was as follows.

Ingredients	%	kg of ingredient
Molasses	45	3.15
Corn stubble	25	1.75
wheat salvage	10	0.7
Cement	5	0.35
Urea	5	0.35
Cal	5	0.35
Minerals for sheep	5	0.35
Total	100	7

Table 1. Composition of ingredients of the BMN used in the experiment

The compaction of the block is very important because a badly forged block can result in it being consumed by few animals, bringing with it the problems of urea poisoning. The idea of the block is that it is a slow consumption supplement (licked) and not eaten. I include cement or lime within the flours or powders and these must be 5-10% to achieve good compaction. Fiber sources such as bagasse also help us to give the product greater strength.

The preparation of the block is very simple: the ingredients are mixed trying to homogenize the mixture as well as possible. Once mixed and homogenized, they are taken to a container (bucket or bucket) covered by plastic or nylon and smeared with molasses and left to dry for 12-24 hours. When the block is well compacted, it is removed and wrapped in plastic or newspaper and it is ready to be used. These blocks, obviously, must be placed under a roof to prevent them from melting due to rain or high temperatures.

STATISTICAL ANALYSIS AND EXPERIMENTAL DESIGN

Growth data on 27 sheep present in three herds that used BMN in supplementation for an average of 60 days were used. As variables of interest, the weight of the animals at the beginning and end of the test, as well as the weight gain in the period, were recorded. Descriptive statistics were calculated for the variables of interest and through analysis of variance the incidence of the fixed effects of sex (male and female) and producer (P1, P2 and P3) was evaluated. The management of the information, the analysis of variance and the tests of comparison of means were carried out with the R program.

RESULTS

Table 2. The three groups of sheep showed increases in weight, being more notable with producer 3 (P<0.05)

	P1	P2	P3
Start	33.167 ± 1.09	66.187 ± 2.218	16 ± 1.105 a
Final	34.967 ± 1.541	68.312 ± 3.136	19.8 ± 1.562 b

Producer (P). Different letters indicate significant differences (P<0.05)

Table 2- Average of the initial and final weights (kg) in sheep supplemented with BMN

Table 3. Greater weight gains are observed in group 3 (P<0.05) probably due to the difference in concentrate used.

	GP
P1	1.8 ± 0.325 a
P2	2.1 ± 0.382 a
P3	3.8 ± 0.483 b

Producer (P). Different letters indicate significant differences (P<0.05)

Table 3- Weight gain in sheep supplemented with BMN

In table 4 it can be observed that there was a greater increase in the weight gain of the females of the three groups with respect to the males. It is well known that the production of microbial protein improves the consumption of grass and concentrates, which results in a greater weight gain. Aranguren-Méndez et al. (1997) indicate that NNP supplementation favors the protein-energy response that in females promotes the development and maturity of the endocrine system and gonadal activity, factors that are determined by weight.

	GP
Males	1.54 ± 0.210 a
Females	2.65 ± 0.412 b

Different letters indicate significant differences (P<0.05)

Table 4- Weight gain according to sex in sheep supplemented with BMN

CONCLUSION

It can be concluded that with the results obtained there was an important relationship in the weight of the sheep with the environment and with their extra feeding management; The 3 producers were offered the BMN with the same ingredients. However, the weights varied due to the extra feed that each producer provided to their cattle as a complement.

This tells us that having extra blocks and feed we can obtain heavier sheep, favoring small producers and helping their economy.

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