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Full Length Research Paper

Development of Urea Molasses Multi-nutrient Block (UMMB) Feed for Ruminant Animals as a Supplementary Feed to Cushion the Effect of Draught in Northern Nigeria

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Abstract

This study is as a result of relentless effort in providing ways to minimize the trouble ruminant farmers' face as a result of seasonal grassland scarcity during dry season especially years with intense draught, a common phenomenon in northern Nigeria. Supplementary feed using urea molasses multi-nutrient was developed in a block form from constituents like Molasses, Salt, Urea, Cement and Brewer's grain. Four samples of the block-feed was prepared varying other components such as maize cub, Palm kernel meal, Corn chaff and Beans chaff experimentally chosen for inclusion into each sample (block-feed) based on its comparative advantage over the rest. Four different types of feed-block were developed and fed to 16 different healthy goats of approximately same weight and age, 4 goats for each sample (block feed) for six months at the rate of two times per day. The goats fed with maize cub constituent appear to have improve in weight by 23% of their original weight, while that of palm kernel meal was 21%, Beans chaff 15% and Corn chaff 9%. Maize cub appears to be a better constituent and more readily available than the others in the study areas.

Keywords: *Constituent, Feed-block, Hammer mill, Molasses, Pudding, Ruminant, Urea.*

Introduction

Ruminants (cows, sheep and goats) are important livestock components in all ecological zones and in all types of agricultural systems in tropical Africa (FAO 1991). In Nigeria, they are embedded in the social and ceremonial life to an extent unequalled by other animal species (FAO 1991). Ownership of such ruminants is regarded as an investment that supersedes crop farming and perhaps other agricultural practices in terms of returns in investment.

Meats, especially from ruminants constitute a major protein source in Nigeria. Cow meat accounts for about 60% of all meat consumed in the country - Nigeria (Brimkmann and Adu 1991), while Goats and Sheep meat consumption accounts for about 20% and 10% respectively, other sources like Pig, Camel, etc provide for the remaining percentage.

The northern part of Nigeria is covered with assorted grass vegetation known as savannah which comprises of guinea, sudan and sahel savannah. These grasses normally provide these animals with the needed energy and nutritional requirements that guaranteed growth and reproductions. However, during the dry season a lot of challenges are observed that affect the production and productivity of these animals which are impaired by various constituents namely nutrition (Ademosun 1992). The scarcity of these gracing grasses in the grassland of the savannah is mostly a result of prolonged dry season that mitigate their growth and also indiscriminate bush burning which is basically incessant in the region. These animals suffer a dry season weight loss owing to the poor quality of feed available thereby affecting the important role played by them, in the improvement of the welfare of their owners through income generation when they are sold (Devendra and Chantala Khana 2002).

These constraints can adequately be alleviated by modern technologies such as feeding animals with formulated rations. However, ruminants in these regions are largely in the hands of rural and non-educated farmers who are majorly poor. These farmers are mostly located in the rural areas; it is difficult to reach them with these technologies. They are not even aware of these innovations and in some causes cannot afford them. However, farmers and grazers have developed indigenous methods for coping with the constraints, like the making of hare, foliage etc., these ways are very expensive and delicate in terms of long time storage and the aftermath effect they have on other production processes, for instance the production of beans stalk hay will reduce the quantity per hectarage of bean produced.

It has become necessary to provide alternative, suitable and affordable technologies that can be used in the management of ruminant nutrition during the dry season that is rich in both protein and carbohydrate. Amongst such technologies is the molasses and Urea block formulated rations that has been used in so many parts of the world and is very rich in proteins and carbohydrate. Unfortunately, not all the raw materials that constitute urea molasses block are readily available and affordable, for instance calcium oxide and palm kernel meals are not available and affordable especially in the northern part the country. Therefore, the quest for a substitute for these scarce raw materials is very necessary, as these will cut cost and the stress of making them available. However, this process will involve experimentations of various materials to ascertain their comparative advantage over others in terms of their nutritional viabilities.

Molasses is a major by-product of the sugar industry and is considered a good source of energy for feeding ruminants as it contains high levels of sugars (48–56 percent). Molasses is deficient in protein (<3.5 percent), but it contains water soluble vitamin B, together with iodine, sulphur, cobalt, lead, zinc and manganese. Its proximate analysis indicates 26.5 percent moisture, 3.5 percent crude protein, 0.15 percent ether extract, 57.65 percent N-free extract and 12.2 percent ash *(El Khidir 2007*).

Urea is an inorganic fertilizer, a supplementary protein for ruminants because of their special ability that enable them convert Urea to essential amino acids. The conversion process is carried out by micro-organisms present in their digestive system and this is usually done during metabolism. In formulating urea molasses block diet; however, caution must be taken on the quantity of urea that is added to it due to its toxicity effect. On the average, about 5-25 grams per block have been experimented and found to be acceptable with varying advantages (*Onwuka1999, René Sansoucy et al 2007, Zahari et al 2007*).

Other ingredients used in the process of this block formation include brewer's grain rich in crude fiber that aid digestion, while salt, quicklime (or cement/betonite and other minerals are also incorporated to improve preservation, binders and carrier of nutrients & water imbalance of the animals respectively (Ben Salem et al 2007). Hardness and compactness are crucial criteria that should be borne in mind when defining a formula and making blocks. The choice of appropriate binder and its proportion in the ingredient mixture is important. The assessment of feed block hardness and density, as well as the manufacturing techniques for these non-conventional supplements, has been reviewed by Ben Salem and Nefzaoui (2002). A harder block makes the animal lick the feed block continuously. This releases small amounts of the main nutrients relatively continuously into the rumen, in short bursts depending on the licking frequency, which would be catalytic for microbial activity and stimulate digestion of poor quality feedstuffs. Moreover, this also avoids urea intoxication (Ben Salem et al 2007).

The likes of Aganga et al 2005, H. Bheekhee 1999 and Onwuka 1999 advocated for urea molasses multi-nutrient block that can last long on storage without growing any moulds. This is important since drought in some ecological zones of tropical Africa can last longer than necessary. Another important factor to consider in preparing urea molasses multi-nutrient block is the drying process. Basically, rural farmers seldom have the drying machines or technologies since these machines are not readily available and/ or affordable. Both sun drying and air drying for the period of 5-15 days has been found to completely dry the block (Aganga et al 2005). The objective of the paper therefore, is to compare ruminants fed with different ratios of urea molasses multi-nutrients block locally develop.

Study Area

Northern Nigeria is majorly separated from the southern part of the country by two major rivers (Niger and Benue River) only for Benue and Kwara state that had part and whole of their states across these rivers respectively. This part of the country occupies an approximate area of about 730,855km^2, lying between longitude 3^0E and 15^0E, and latitude 6^0N and 14^0N. The vegetation is completely savannah; a total grass land with sparse trees which only cluster along the river bands. Dual season of rainy and dry period are experienced (Manta et al. 2010). The extend of dry period increases as you move northward, an average rainfall that ranges from 1200mm to 2500mm is experienced annually, with low humidity and a high temperature especially during dry season, except at the plateau areas (Met. Report, 2009). There is very little of tsetse fly infestation in this region, unlike the southern region. This makes northern region of the country the most suitable place for cattle ranch and ranch of other ruminant animals.

Methodology

Comparative analyses of the block-feed constituents were carried out to ascertain the most nutritionally viable amongst calcium oxide and cement, palm kernels, maize cub, corn chaff and beans chaff. While readily available ingredients like molasses, urea, brewer's grain and salt where kept as constant constituents†. The surface area of the solid constituents were reduced by milling using conventional hammer mill was used to mill them. The milled constituents of about 3mm diameter were placed in a concrete mixer, and mixed thoroughly for 30 seconds before adding molasses. It was later mixed into a pudding like substance for 10 minute. After mixing, these resultant puddings like mass was poured into square plastic moulds which were lightly oiled to prevent the pudding feed-block from adhering to the sides of the moulds. After 2 hours the feed-blocks had hardened sufficiently enough to turn them out of the moulds. However the blocks at this stage were still soft and needed to be handled with care. The blocks were further sun dried for a period of 10-12 days to harden it.

No analysis was perform for chemical nutrients, since this is not the objective of the paper; however, the procedure used for mixing the feed composition was as outline in *Alemu Yami 2007* and *Onuka* 1999.The assessment of the nutritional viability of the feed-block on the ruminant animals that were fed by them was based on weight increase and their physical appearance. Four different kinds of feed-blocks made up of four different kinds of constituents were fed differently to 16 (4 goats for each group) healthy goats of approximate same weight and age for six months at the rate of two times per day. After six months of intensive care and feeding the 16 goats were properly examined; the findings are as tabulated in Table 2.

Results

It was observed from the weight increase and physical appearance of the animal that cement can be a very good substitute for calcium oxide, while maize cub appears to be a better constituent than palm kernel meal, corn chaff and beans chaff; this is attested in Table 2.

Recommendations

It was observed that the addition of dried brewers grains in a coarsely ground form greatly assists the rapid hardening and subsequent hardness of the block. Substitution of the brewer's grains appears to be possible but only by other fibrous vegetable materials that are less expensive. From the empirical results in Table 2, the importance of supplementary feed using urea molasses multi-nutrient block is very clear to the understanding of an ordinary man. That is the northern Nigeria ruminants farmers like others in tropical Africa should start experimenting on urea molasses multi-nutrient block as one of the reliable solutions that can curb the scarcity of natural balanced nutritional grasses during dry season especially when draught is experienced to the extreme.

†*See Table 1 for details of the urea molasses multi-nutrient block*

Table 1: Percentage Composition of the Raw Materials

Sample	Raw Materials	% Composition
A	Molasses	50
	Palm Kernel Meal	10
	Dried Brewers Grains	15
	Urea	10
	Calcium Oxide/Cement	10
	Salt	5
Total		100g
B	Molasses	50
	Maize Cub	10
	Dried Brewers Grains	15
	Urea	10
	Calcium Oxide/Cement	10
	Salt	5
Total		100g
C	Molasses	50
	Corn Chaff	10
	Dried Brewers Grains	15
	Urea	10
	Calcium Oxide/Cement	10
	Salt	5
Total		100g
D	Molasses	50
	Beans Chaff	10
	Dried Brewers Grains	15
	Urea	10
	Calcium Oxide/Cement	10
	Salt	5
Total		100g

Table 2: Comparison of weight gain

Parameter	Sample A	Sample B	Sample C	Sample D
Number of animals	4	4	4	4
Experimental period (days)	180	180	180	180
Initial live weight (kg)[£]	51.42 (0.324)	50.53 (0.215)	50.95 (0.412)	50.89 (0.332)
Final live weight (kg)	62.21 (0.431)*	62.15 (0.332)*	55.54 (0.422)	58.52 (0.211)*
Mean % increase (kg)	21	23	9	15
Daily gain (g/day)	59.62	64.93	25.48	42.41

**significant at 5% level, [£]Weights are mean weight of the 4 goats in each category*

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