NOTA BREVE

MOLASSES BLOCK AS SUPPLEMENTARY FEED RESOURCE FOR RUMINANTS

LAS MELAZAS COMO ALIMENTO SUPLEMENTARIO PARA LOS RUMIANTES

Onwuka, C.F.I.

Department of Animal Nutrition. College of Animal Science and Livestock Production. University of Agriculture. P.M.B. 2240. Abeokuta, Ogun State. Nigeria.

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PALABRAS CLAVE ADICIONALES

Bloques alimenticios. Melazas. Azufre. Urea. Dureza del bloque alimenticio. Almacenamiento.

SUMMARY

Looking for strategies for improving feed resources for goats especially during the dry season of the year, using low cost feed supplements, three levels each of molasses (45, 50 and 55 percent) and urea (5, 10 and 15 percent) were used in making molasses-urea blocks. Elemental Sulphur was added at 0.5 percent level. Preliminary results indicated that premixing the binder (cement, used at 15 percent level) with water in the ratio of 40:100 (w/w) ensured consistent and reasonably dried molasses blocks within 2 to 8 days. Sun-drying took two to five days and was significantly faster ($p<0.05$) than air-drying which took three to eight days. The molasses blocks stored for four months without deteriorating in quality. The blocks were stable for up to five days when soaked in water. This could imply that over-consumption of the urea or molasses, as a result of dissolution, will be reduced, thus making the blocks safe for small ruminant feeding. Chemical analyses showed that the blocks contained high dry matter, 11-16 percent crude protein and 72-75 percent nitrogen free extract on dry matter basis. Nutrient-rich feed blocks can then be prepared and used in strategic ruminant feeding.

RESUMEN

Para mejorar los recursos alimenticios para cabras especialmente durante la estación seca del año con suplementos de bajo costo, se emplearon tres niveles de urea (5, 10 y 15 p.100) y otros tres de melazas (45, 50 y 55 p.100) para hacer bloques de urea-melazas. Se añadió azufre elemental al 0,5 p.100. Los resultados preliminares obtenidos indicaron que la premezcla de aglutinante (cemento al 15 p.100) con agua en la proporción de 40:100 (p/p) aseguró consistente y razonablemente los bloques de melaza desecados en 2-8 días. La desecación al sol se consiguió en 2-5 días y fue significativamente más rápida ($p<0,05$) que el secado por aire que se consumó en 3-8 días. Los bloques de melazas fueron almacenados durante cuatro meses sin apreciar deterioro de la calidad. Los bloques permanecieron estables durante cinco días cuando fueron remojados en agua. Esto podría determinar una reduccion del consumo excesivo de melazas o urea por disolución, por lo que los bloques resultarían más seguros para la alimentación de pequeños rumiantes. Los análisis químicos demostraron que los bloques contenían alto nivel de materia seca, 11-16 p.100 de proteína bruta y 72-75 p.100 de extracto libre de nitrógeno sobre materia seca. Los bloques alimenticios ricos en nutrientes pueden ser así preparados y empleados en la alimentación estratégica de rumiantes.

INTRODUCTION

Goats and sheep rearing has been hampered over the years primarily by the non availability of good quality and quantity of feeds. This is more so for the ruminant animals during the dry season months when the little available forage is low in quality and occasions weight losses, low birth weights lowered resistance to disease, and reduced animal performance. (Onwuka *et al.*, 1989). This therefore calls for a reasonable level of feed supplementation, with particular emphasis on the energy, protein and minerals contents. Considerable use can be made of agro-industrial by products since they are relatively cheaper than the conventional feeding stuffs and can sustain livestock in times of feed scarcity, when energy and protein are limiting.

Molasses and urea are known to respectively contain available energy and nitrogen and are used in feeding. (Preston and Leng, 1990). Pickstock (1985) indicated that in times of drought, when energy and protein reserves of animals fall to dangerously low levels, molasses - urea mixtures can be fed in amounts of up to 2kg a day thereby, helping to satisfy both energy and protein needs for maintenance of ruminants. These will upgrade the energy and ammonia levels in the rumen (Mancini *et al.*, 1997). The amount of energy supplied concurrently by ruminal carbohydrate degradation dictates the extent to which urea can be utilized for microbial protein synthesis. (Mancini *et al.*, 1997) Although liquid nitrogen supplement is being advocated again, the use of liquid molasses and urea has had its problems (ILCA, 1986, Sancoucy, 1986). East African farmers are known to have adopted the use of Molasses/Urea for their ruminant stock (Mwendia and Khasatsili, 1990).

The use of feed blocks is particularly convenient because they are then easy to transport and the blocks readily give their nutrients to the animals. Making these nutrients in the form of multinutrient feed blocks with cement as a binder also ensures slow release of the otherwise toxic molasses and urea. This study was therefore underaken with the objective of designing some low cost, high quality feed supplements which could be used to improve the performance of sheep and goats and are adoptable by small ruminant farmers especially for dry season feeding.

MATERIALS AND METHODS

COMPOSITION OF THE UREA-MOLASSES BLOCKS

The ingredients used in the urea molasses blocks and their levels of inclusion are listed in **table I**. Three levels of molasses were used - 40, 45 and 50 p.100 levels. Urea was included at levels between 5 and 15 p.100. Cement (in the fine powdery form) was used as the binder type in this trial. Four (4) replicates of each molasses level were made. Elemental Sulphur was used to supply sulphur at 0.5 p.100 level.

Order of mixing

The mixture was put together in the order listed in **table I**. Cement in the powdery form was mixed directly at first. In the final block mixture, cement was mixed firstly with water at the ratio (w/w) 40 parts of cement to 100 parts of water and added along with the other ingredients strictly in the order of molasses, urea, NaCl, cement mixture, elemental sulphur and finally, rice bran.

Moulding of the mixture

The mixture was poured into a cellophane - lined plastic mould measuring 14.5cm x 11cm x 6.5cm. The cellophane paper was to facilitate removal of the urea-molasses block when formed.

Table I. *Ingredient composition (g/100g dm) strenght (day 10) and water solubility of the molasses-urea blocks.* (Ingredientes (g/ 100g ms), resistencia y solubilidad en agua de los bloques urea-melazas).

Ingredients	Treatments			
	1	2	3	4
Molasses	-	40.0	45.0	50.0
Urea	-	15.0	10.0	5.0
Salt	5.0	5.0	5.0	5.0
Cement	15.0	15.0	15.0	15.0
Sulphur	0.5	0.5	0.5	0.5
Rice bran	24.5	24.5	24.5	24.5
Wheat bran	55.0	-	-	-
Total (g)	100	100	100	100
Strenght	fairly strong	very strong	strong	strong

Solubility. Did not dissolve in water up to day 5 but were fairly sticky

Drying

Two drying methods were used i.e air-and sun-drying. The air-dried samples were left under a roofed open-sided building and allowed to dry gradually. The sun dried samples were put on table tops and exposed to the rays of the sun when the air temperature was as high as 30°C. Care was taken to ensure that they were not touched by rain drops. These methods were chosen to simulate the drying conditions which prevail in the rural areas where so much of sheep and goats (small ruminants) production activities go on.

Measurement of block strength

On the tenth day after the blocks were moulded, all the replicates of the blocks in all the treatments were tested for their strengths by placing a 55kg weight on each of them for 5 minutes.

Chemical and statistical analyses:

The ingredients used and the block mixtures moulded were analysed for their proximate contents i.e. moisture, crude protein, ash, crude fibre and ether extract using the methods of AOAC (1984). Data obtained were analysed and the means separated with the t-test. (Steel and Torrie, 1980)

RESULTS AND DISCUSSION

Premixing of binder

The consistency observed in the final block mixtures indicated the need for premixing the cement (binder) in water before adding to the mixture. This also tended to ensure an even spread of the cement in the feed mixture while facilitating an improved uniform hardening of the block.

Strength of mixture

The final molasses-urea blocks made were strong **(table I)** indicating that the ingredients used were held together reasonably well by the cement binder i.e. they did not crumble thereafter and were therefore not crushible. This has the advantage of ensuring gradual release of the urea and molasses to animals when they are fed such feed blocks. If otherwise, urea and molasses toxicity will occur, as noted by Preston and Leng (1990). When soaked in water, the blocks did not also dissolve up till the fifth day. It is worth noting here that for ruminants to have access to the nutrients in salt, mineral or molasses blocks, licking action with their tongues is important i.e. a sort of abrassion. Their saliva would not therefore soak the blocks, unnecessarily dissolve the nutrients and, by so doing, oversupply urea or molasses to the animals. This quality is useful when blocks are given to range animals (Preston and Leng, 1990).

Storage of urea blocks

The blocks did not grow moldy even when stored for four months after preparation. This implies that when prepared towards the end of the rainy period, they could be used up till the beginning of the next rainy season, when more feed would be available to the ruminants.

Drying the blocks

Table II indicates that the sun-dried mixtures dried faster than those that were air-dried. While the air-dried samples hardened from 3 to 8 days, the sun-dried samples used 2 to 5 days to harden. Both ways, the drying times appear okay although drying was faster ($p<0.05$) under the sun. However, the air-drying process has the advantage that in rural areas where goats and sheep are free roaming, the blocks can be better protected from being crushed or smashed when dried in shades away from these scavangers.

Table II. *Drying time for the blocks (days).* (Tiempo de secado (días) de los bloques).

	Treatments (means ± S.D.)			
	1	2	3	4
Air	5.25 ± 0.25^b	6.50 ± 0.29^c	7.50 ± 0.29^c	3.00 ± 0.00^a
Sun	3.75 ± 0.25^b	4.50 ± 0.29^b	5.00 ± 0.00^b	2.00 ± 0.00^a

a,b,c = Means with varying letter superscripts under different columns are significantly different ($p<0.05$)

Chemical composition of ingredients and blocks

The determined chemical contents of the major ingredients used in

Table III. *Chemical composition of the major ingredients used in the feed blocks (g/100g dm).* (Composición química de los principales ingredientes usados en los bloques alimenticios (g/100 g ms).

Ingredients	Rice bran	Molasses	Urea
Dry matter	96	70	97
Nitrogen	1.28	0.48	45.00
Ash	14.8	7.62	0.01
Crude fibre	22.60	0.28	0.02
Ether extract	3.20	1.01	0.08

preparing the mixtures are shown in **table III**. Fertilizer-grade urea was used to supply nitrogen while molasses played the dual role of supplying readily available energy and binding the other ingredients together. Rice-bran, essentially, provided fibre (CF=22.6 p.100). The chemical composition of the dried urea-molasses blocks are shown in **table IV**. The dry matter levels are quite high indicating reasonable extent of drying.

These look adequate especially since the blocks are to serve as supplements to other conventional feedings-stuffs like cassava and yam peels, etc. and urea is known to release its NH3 very rapidily. In this preliminary report, the nitrogen free extractives could be used as a reflection of the Energy/Carbohydrate content of the blocks. The high levels (72-75 p.100 NFE) show the high energy content of the supplement, given the molasses content. In effect, such urea-molasses blocks would be able to give reasonable levels of available energy and nitrogen when used in animal feeding trials.

The fibre content of the control feed block treatment was higher ($p<0.05$) than the others arising from its high wheat bran content **(table V)**. With the inclusion of 0.5 p.100 elemental sulphur, the blocks made here could show an improvement over those earlier proposed by Sansoucy (1986). The importance of this is that with a non-protein nitrogen source like urea, the ruminants are expected to synthesize their amino acids and these feed blocks recognise the sulphur needs for the synthesis of sulphur amino acid.

Preliminary feeding of the blocks to goats showed that blocks in treatments 1, to 4 were acceptable while the goats consumed 0.88 to 1.33 p.100 of their body weights as Dry matter from the feed blocks i.e. 60-132g of block.

Table V. *Chemical composition of the urea-molasses blocks (g/100dm).* (Composición química de los bloques de urea y melazas (g/100 ms)).

Parameters	Treatments 1	2	3	4
Dry matter	85.21	86.21	84.39	83.15
Crude protein	11.74	14.48	12.43	10.91
Ash	4.32	3.16	3.21	3.03
Crude fibre	13.89[a]	6.14[b]	7.02[b]	6.56[b]
Ether extract	3.04	2.01	2.43	2.13
NFE	67.01	74.20	74.91	72.37

a,b= Means (average of 4 analyses each) in different columns with the same superscript are not significantly different ($p>0.05$).

CONCLUSION/RECOMMENDATION

Given the gap in feed availability to ruminants, especially during the dry season months of November through April, these blocks which are potential sources of readily available energy and nitrogen would go a long way in filling this gap. Undoubtedly, this will ensure that the animals are not just being maintained but will be sustained for productive purposes - weight gain, reproduction and milk yield.

At the rural level this is a feed support system that will be worth looking at since most of the ingredients used are sourced locally and could be readily available. Live animal feeding will, however, throw further light on the added usefulness of such a feed supplement. The ease of preparing the blocks makes it practicable for adoption by small scale farmers at rural level. Sun-drying could be used as a better drying option.

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