Molasses urea blocks as an emergency diet for sheep in the Sudan

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SUMMARY

A ten - week trial was conducted to assess the nutritive value of molasses urea blocks (MUBs) for feeding sheep in the Sudan. Sixteen adult wethers of the Sudan Desert ecotype of 51.8 i 0.1 kg average liveweight were used. After a three - week preliminary period, the animals were divided according to live weight into two equal groups which were alloted at random to either Con- trol or Treatment. The control group was offered ad libitum a conventional diet of 60% concentrate compound and 40% roughage; while the treated group had a free access to MUBs and weighed allowance of roughage regu- lated to maintain a 60% and 40% intake of the two diet fractions respectively. The high intake of the MUBs did not induce any adverse effect on the ani- mals. No significant ($p > 0.05$) difference were observed between the two groups in dry matter intake (DMI). However intake of water was significantly higher for the treated group (3 litres per kg DMI) compared with the control (2 litres per kg .DMI). The control and treatment diets induced significantly different liveweight gains of 140 g per day and 13 g per day respectively. The recorded gain of the control wethers was due to accretion of fat depots. The results demonstrate the potential of the MUBs as a source of energy and nitro- gen in sheep nutrition during periods of emergency or feed scarcity.

INTRODUCTION

Livestock is one of the major agricultural endowments of the Sudan. Un- der natural grazing, livestock suffer serious seasonality in feed supply both in quality and quantity. This is true particularly in dry summer months when an- imals could hardly secure enough to maintain themselves albeit the availability of huge tonnage of crops residues and agro-industrial by-products e.g. peanut hulls, molasses, bagasse and sorghum stover.

Under these circumstances molasses and urea are attractive sources of en- ergy and nitrogen to supplement the low quality roughage to enable animals maintain themselves.

The present work was initiated to test the suitablility of two feeds i.e. mo- lasses and urea offered ad. lib. in blocks (MUB) prepared as described by Sansoucy (1986).

MATERIALS AND METHODS

Livestock:

The experiment involved sixteen adult wethers of the Sudan Desert Sheep purchased from a local market. They were of an average 51.8 i 0.1 kg live- weight. On arrival at the experimental compound they were treated with "Ivomec" against endoparasites and sprayed with "Gamatox“ for control of ectoparasites and given a prophylactic dose of “Terramycin".

Feeds and feeding :

Table (1) shows the composition-and chemical analysis of the experimental diets. The MUBs were made mainly from molasses as energy source and urea as NPN according to the modifiied method described by Sansoucy (1986). Wheat bran and peanut hulls were used as structural material and cement add- ed as a binder. Molasses, urea, salt and cement were mixed together in an or- dinary concrete mixer. Water was added in as much as to facilitate the mixing process.

This required approximately 20 litres of water per 100 kg molasses. After thorough mixing peanut hulls and wheat bran were added to give sm1c- ture to the mixture. In this respect peanut hulls were found to have a high de- gree of absorbancy.

The resulting mixture was poured into a 16 - compartment mould of 24 X 24 X 16 cm. It was made of 2 mm thick steel sheet suitably allotted to provide a weild-free easily dismantled mould. Once filled the mixture was pressed by hand and left to settle one hour before the iron sheets were removed. The re- sulting blocks (each about 12 kg) were then left in shade to be air dried.

All animals were individually fed. The control group was offered the concentrate diet ad. lib. (10% weigh back) in two meals at 08.00 and 16.00 h. Whereas wethers of the treatment were offered a daily allowance of one kg roughage and in addition they had free access to a preweighed MUB placed in each pen. Feeds offered and refused were subsarnpled for chemical analysis.

Table 1: Ingredients of the experimental diets (g/ kg as fed):

Diets	Control (1)	Treatment	
Concentrate compound	600	-	
Roughage (2)	400	400	
MUB (3)		600	
Chemical analysis and nutritive values (g/ kg DM):			
	Control	Treated	MUB
DM	968	876	821
CP	135	146	212
NDF	574	427	224
ASH	078	177	230
DOM	523	412	509
ME (MJ/ Kg DM)	07.9	06.2	07.7

(1) Diet of 60% concentrate compound (40% cotton seed meal, 16.7% wheat bran, 41.7% sorghum grain and 1.6% common salt) and 40% roughage mix- ture (75% peanut hulls and 25% peanut hay).
(2) Same mixture of peanut hulls and peanut hay as described in (1).
(3) Molasses urea block (MUB) composed of 47.3% molasses, 18.8% wheat bran, 14.2% peanut hulls, 6.1% urea, 6.1% common salt and 7.5% cement.

Fresh water was freely available to the experimental animals. Measurement of water intake was carried out during a 48 - hour period at regular weekly in- tervals. The water offered and refused by each animal was measured at meal times to the nearest 0.01 litre. The total water intake was calculated as intake of free water plus water secured from feedsl The water lost through evaporation was measured by placing a bucket of water of a similar size in an adjacent pen.

The digestible organic matter (DOM) of the treatment and control diets was determined in vivo. Three sheep were involved from each experimental group. Total faeces voided were collected during the last seven days of the trial. The DOM of the roughage fraction (75% peanut hulls + 25% peanut hay) was determined with another group of three sheep using the same meth- od. Faecal collection was preceded by one week preliminary period. Data ob- tained from the in vivo determinations were used to calculate the DOM of the MUB and the concentrate mixture of the control diet. The metabolizable ener- gy (ME) was calculated by the equation:

$$ME\ (MJ/\ Kg\ DM) = DOM \times 4.4 \times 4.184 \times 0.82$$

Experimentation."

The wethers were allowed a three - week adaptation period before being admitted to the ten - week experimental. In the former period all animals were housed in one large pen and were group fed ad. lib. on peanut hulls and MUBs. The wethers were reweighed before, commencement of the experi- ment and accordingly paired. One animal from each pair was allotted at ran- dom to either control (fed on the concentrate diet) or treatment (offered MUBs). During the experimental period the animals were individually housed in pens 1.0 X 1.5 meter. Each pen was eqipped with a galvanised bucket for water and a feeder. All pens were under one and the same overhead shade. Pens of the treatment group were equipped with metal stands for the MUBs.

Throughout the experimental period all animals were weighed weekly before the miming meal. At the end of the experiment the wethers of both groups were slaughtered over eight days. The slaughter and carcass analysis were conducted according to the method described by Gaili (1979).

Statistical analysis:

Differences between the two groups in feedlot perfonnance and carcass analysis were examined for significance by Student paired t - test (Snedicor and Cochran, 1967).

RESULTS

Table (2) presents the feedlot performance of the control and treated ani- mals. The DMI of the two groups was not significantly ($p > 0.05$) different. It is noteworthy that the average daily intake (as fed) of the latter fr group om the MUBs and roughage was 1191 g and 858 g respectively. These amounts were f d 58‘? ' ' ' oun 0 and 42% of the whole diet respectively. However 1n terms of dry matter the MUBs intake was 54% of the total diet. Accordingly the av- erage intake of ME by the treated group was 25.5% lower than the control. Consistently the control group was significantly ($p < 0.001$) higher in daily liveweight gain compared with the treated animals which were more or less within maintenance.

The water intake of the treated animals was significantly ($p < 0.001$) higher than that of the control. In relation to DMI that was three litres and two litres of water per kg DMI for the treated and control group respectively.

Table 2: Feedlot performance of the experimental animals:

	Groups			
	Control	Treated	S.E.	
No. of animals	8	8	-	
Initial L. Wt. (kg)	49.5	50.9	1.9	NS
Final L. Wt. (kg)	59.7	51.8	3.2	**
Period (days)	73.5	73.5	-	
L. Wt. gain (g/ day)	140	13	22	***
DMI (g/ day)	1840	1761	106	NS
CP (g/ day)	248	251	15	NS
ME (MJ/ day)	14.5	10.8	0.8	***
Water intake (L/ day)	3.76	5.27	0.41	***

*In this and the following tables NS = not significant, * = $p < 0.05$, ** = $p < 0.01$, and *** = $p < 0.001$.*

Table (3) shows the slaughter and carcass parameters of the experimental animals. It is observed that the control group reached a significantly heavier slaughter ($p < 0.01$) and warm carcass weight ($p < 0.001$) than the treated group. However the latter group had signifcantly ($p < 0.01$) higher percent- age of bone tissues. The total fat depots (carcass fat + internal fat + tail fat) was about 50% greater for the control than the treated group.

Table 3: Slaughter and carcass analysis of the experimental animals:

	Groups			
	Control	Treated	S.E.	
No. of animals	8	8	-	
Slaughter Wt. (kg)	59.7	51.8	3.2	**
Warm carcass Wt. (kg)	29.5	24.4	1.2	***
Dressing %	49.6	47.3	2.6	*
Gut fill (% of L. Wt.)	15.9	17.8	1.2	NS
Muscles %	56.0	58.5	2.3	NS
Bone %	19.1	23.7	1.5	**
Subcut. and intermuscular fat%	23.4	16.0	2.0	**
Connective tissues %	1.5	1.8	0.3	NS
Enternal fat (1) + tail fat (% of L. Wt.)	10.8	6.7	1.2	**

(1) Omental fat + mesentric fat + cavity fat.
N. B. Tissues are percentages of carcass weight.

DISCUSSION

In this study addition of cement as a binder to the MUB at the rate of 7.5% was found to have no adverse effect on the health of the experimental ani- mals. Examination of the alimentary tract and other intemal organs of the slaughtered wethers fed the MUBs did not disclose any abnormalities. Only a dark colouration of the nimen mucus membrane was observed in all animals of this group: that could be attributed to some MUB residues found in the ru- men papillae. The observation may worth further investigation specially when the MUBs are fed for longer period. This confirrn earlier work of Karadzhyan and Evoyan (1984) who fed cement as mineral supplement at the rate of 3% in cattle diets.

The relatively lower ME content of the MUB (table l) compared with the concentrate portion of the control diet was due to the high ash content (23.0%) in blocks. Feedlot data (table 2) showed no significant difference be- tween the MUB and concentrate fed groups in DM and CP intake. In the present work the MUB constituted 54% of the DMI of the treated diet. The observed intake of MUB in this work (1850 gl 100 kg liveweight) is much higher than that reported in the literaturre for sheep (Sudana and Leng, 1986; El Fouly and Leng, 1986 and Soetanto et. al., 1987) or cattle (Leng, 1983 and Kunju, 1986). It is noteworthy that the wethers developed taste to the blocks shortly after commencement of the experiment. the sheep started eating the MUB by biting and chewing the outer hard cmst before reaching the internal soft part. The intake of MUBs reported by Sudana and Leng (1986) and Soetanto et. al. (1987) was 18% of the total DMI. It may be agrued that pres- entation of the blocks in containers to sheep (Sudana and Leng, 1986) limited the surface area available to the animals to enhance intake.

The water intake of the two groups (table 3) calculated per kg DMI was found similar to intakes reported by Kahlifa (1973) and Osman and Fadlalla (1974) for Sudan Desert sheep. However the significantly higher water intake of the treated group warrant that water should be freely available to animals offered MUBs. Most of the reports (Sansoucy et. al., 1986; Sudana and Leng, 1986; Soctanto et. al.,

1987) are concerned with the use of MUBs to enhance digestion of low quality roughages or agro-industrial by-products by catering for energy, nitrogen and other nutrients to the rumenal flora. However the use of MUBs as an emergency diet Ito rescue animals in drought stricken areas may necessiate its offer with limited amounts of available roughage i.e. as a major component of the diet. Concurrently the high intake of MUBs reported here maintained a liveweight gain of 13 g per day. This is about similar to the per- formance of lambs fed on MUBs with a basal diet of chopped wheat straw (Sudana and Leng, 1986) and is slightly lower than that reported for lambs fed on MUBs with waffered cane tops (Soetanto, 1986).

It is observed that 60% of the difference in carcass weight of the experi- mental animals (table 3) is attributed to deposition of fat by the control group. It _has been elucidated that most of the changes in liveweight of this group oc- cured in fat depots. In a previous comparative study with growing Sudan desert lambs slaughtered at 26.2 kg, 31.6 kg and about 40.0 kg liveweight, El Khidir et. al. (1984) reported a decline in the percentage of bone tissues concomitant with an increase in deposited carcass fat. The present work re- vealed a similar trend in variations between the two types of tissues coupled with increase in slaughter weight (table 3).

In conclusion this study demonstrates the potentials of the MUBs as a source of energy and protein to be used as an emergency diet with limited amount of roughage for sheep. The blocks could also be used as maintenance diet for sheep at time of feed scarcity. It may be emphasized that the use of MUBs with good quality roughage and! or true protein supplement could sup- port a relatively higher growth or fattening perfonnance.

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