Feeding Urea and Molasses on a Straw Diet: Urea Molasses Block vs. Urea Molasses Straw

S.A. Chowdhury and K.S. Huque
Animal Production Research Division, Bangladesh Livestock Research Institute, Savar, Dhaka 1314 Bangladesh

Most of the cereal straws are very low in fermentable energy, protein and some macro- and micro-minerals. To optimize the rumen environment of straw fed animals in terms of the availability of readily fermentable carbohydrates, ammonia N and minerals, supplementation of urea and molasses in the form of block or as liquid feed is often suggested (Preston and Leng, 1987). In the Bangladesh Livestock Research Institute, a technique called UMS has been developed where straw is enriched with 3% urea and 15% molasses (on dry matter basis). The relative performance of cattle fed UMS was compared with that of the urea-molasses block (UMB) containing: molasses 55%, urea 10%, rice bran 13%, wheat bran 15%, calcium oxide 6% and salt 1%.

A feeding trial was conducted with 8 native (*Bos indicus*) bulls of approximately 256 kg live weight. Half of the animals were given ad libitum dry rice straw along with UMB (DSUMB) and the other half was given ad libitum UMS (dry rice straw 82%, molasses 15% and urea 3%). Average amount of brans daily licked by the block fed animals was also given to the animals fed UMS. In both groups, data on the rumen fermentation pattern (pH, ammonia-N, DM degradability), intake, digestibility, microbial N yield, growth rate and feed conversion ratio of the bulls were recorded.

Table 1. Degradation characteristics of a straw sample incubated in the rumen of animal fed either DSUMB or UMS.

Items	DSUMB	UMS	SED
Digestion rate (% per hour)	2.29	2.36	0.65
Extent of digestion (%)	49	59	9.8
48 h DM degradability (%)	32	34	3.3
Rumen pH	7.80	7.71	0.12
Rumen ammonia-N (mg/l)	101	173	22.1

Although not statistically significant ($P > 0.05$), both rate and extent of straw DM degradability were higher in the UMS than the DSUMB. Significantly ($P< 0.05$) higher rumen ammonia N concentration may partly be responsible for a better rumen environment for straw digestion in the UMS fed animals. Complete mixing of urea, molasses and straw probably provided more available fermentable energy, N and minerals to the microcolonies of bacterial cells attached to the fibre or in the fluid than those provided by the DSUMB.

Table 2. Digestibility (%) of different nutrients in animals fed either DSUMB or UMS

ITEM	DSUMB	UMS	SED
Dry matter	47	45	1.9
Organic matter	53	50	3.5
Crude protein	53	55	6.6
Acid detergent fibre	49	52	1.3

Digestibility coefficients of the different nutrients were not different (Table 2) but the intake of straw DM, digestible organic matter, metabolizable energy and digestible crude protein (Table 3) were significantly ($P < 0.05$) higher in the UMS than in the DSUMB. This is probably due to higher rate and extent of straw DM degradability (see Table 1) with the consequent reduction in the retention time of solid digesta in the former than the latter.

Table 3. Intake of different nutrients in animals fed either DSUMB or UMS

ITEMS	DSUMB	UMS	SED
Straw DM intake (kg/d)	3.95	4.65	0.18
Digestible OM intake (kg/d)	2.16	2.61	0.21
ME intake (MJ/d)	34.1	41.2	3.32
Digestible CP intake (g/d)	279	341	35.3

Table 4. Microbial N yield and growth rate of animals fed either DSUMB or UMS

ITEMS	DSUMB	UMS	SED
Microbial N yield (g/d)	23.8	23.8	3.20
Growth rate (g/d)	93	233	51.8
Feed conversion ratio (g feed/g LW gain)	58	26	22.8

The microbial N yield was similar for both DSUMB and UMS, but the growth rate and feed conversion ratio were significantly better in the latter than the former. These differences in the performances of DSUMB and UMS may not be explained by the differences in nutrient intake per se of the two groups of animals. One of the possible reasons could be that the continuous supply of molasses and urea mixed straw (UMS) may synchronize the supply of energy and amino acids at the tissue level which brings the necessary changes in the hormonal level for better growth and feed conversion efficiency. On the other hand during block preparation, molasses was heated above 70oC in the presence of urea which may lead to the formation of 4-methyl imidazole (4Me-I) causing hyperexcitability in cattle (Tillman *et al*., 1957; Perdok and Leng, 1987). Although bulls in the present trial ate about 600 to 750 g of block/d and did not show any symptoms of hyperexcitability, but 4Me-I may cause unavailability of Ca and Mg to the animals due to chelate with the minerals (Vosloo, 1985). This may also affect the overall performances of animal.

The idea of feeding urea molasses multinutrient block is unique in a sense that in addition to correction of nutritional imbalances of straw diets, transportation of molasses may be done through it. However, blocking of molasses and urea with other feed ingredients incurs costs of manufacturing and its preservation in a hot humid climate like Bangladesh needs the inclusion of preservatives. Thus UMB may not always be the effective method of correcting the nutritional imbalances of ruminants in a subtropical humid situation like Bangladesh. In one of our survey study (Huque, 1993), farmers stated that preparation and feeding of blocks are cumbersome process and possibility of its toxicity can not be ruled out if animals bite them. However, UMS found to be much easy, economic and acceptable method of feeding urea and molasses provided molasses is available to the farmers at a reasonable price.

References

Perdok, H.B. and Leng, R.A. (1987) Hyperexcitability in cattle fed ammoniated roughages. Anim. Feed Sci. Technol., 17:121-143.

Preston, T.R. and Leng, R.A. (1987) Matching Ruminant Production System with Available Resources in the Tropics and in the Sub-tropics. Panambul Books, Armidale, Australia.

Tillman, A.D. Gallup, W.D. and Woods, W. (1957) The utilization of ammoniated cane molasses by sheep. J. Anim. Sci. 15:25-35.

Vosloo, L.P. (1985) Onlangse ontwikkeling op die gebied van ruvoervoorsiening aan herkouers. S. Afr. J. Anim. Sci. 15:86-90.