EFFECTS OF UREA OR MOLASSES-UREA SUPPLEMENTS ON RUMEN MICROBIAL SYNTHESIS IN HEIFERS FED LOW-QUALITY HAY

R. M. DIXON[A], C. SAMSON[AB], A. WHITE[A] and J. TERNOUTH[B]

[A] Queensland Beef Industry Institute, Swan's Lagoon Research Station, Millaroo, Ayr Qld 4807
[B] Department of Agriculture, University of Queensland, St Lucia, Brisbane, Qld 4072

Supplements based on urea or molasses-urea are widely used in the northern cattle industry to reduce production losses and mortalities due to under-nutrition during the dry season (Dixon and Doyle 1996). Dry licks based on urea, salt and cottonseed meal are often used as strategic supplements to reduce rate of liveweight loss, while molasses-urea mixtures are more often fed to maintain growth or as a 'crisis' supplement for survival. The present experiment examined changes in voluntary intake and microbial protein synthesis of young cattle fed low-quality hay and either dry lick or molasses-urea supplements.

Twenty-four *Bos indicus x* Shorthorn cross heifers, initially 10 to 14 months and 208 kg mean liveweight, were held in individual pens. During Period 1 (weeks 1 to 3) all heifers were fed hay *ad libitum*. During Period 2 (weeks 4 to 6) heifers were allocated to four treatments. Hay was fed alone (Nil) or supplemented with dry licks containing either cottonseed meal (DL-CSM) or dried molasses (DL-MOL). The fourth treatment consisted of a molasses-urea supplement (M8U; 7.4% urea). Dry licks contained 27% urea, 18% salt, 14% calcium phosphate, 9% ammonium sulphate and 32% of either cottonseed meal or Palabind® dried molasses (Molasses Products Co., Bundaberg). The hay (0.45% N and IVOMD 31%) consisted of native grass species baled during the late dry season. The concentrations of purine derivatives and creatinine in urine collected twice daily for four days during weeks 3 and 6 were used to measure rumen microbial N synthesis (Chen and Gomes 1992).

During Period 1 hay intake was 2.26 kg dry matter (DM)/d, and microbial nitrogen synthesis 5.0 g N/d or 2.1 g N/kg DM intake. In heifers fed hay alone during Period 2, intake and microbial N production were similar to Period 1 (Table 1). Both types of dry lick and M8U supplement tended ($P<0.10$) to increase hay intake by about 30%. Dry licks increased ($P<0.01$) microbial N synthesis per kg DM intake by 77 to 92%. M8U supplement increased total DM intake by 96%, the increase being associated with increased intake of hay as well as the intake of 1.74 kg M8U. Microbial nitrogen synthesis per day and per kg DM intake was also higher than for the other diets, presumably due to both the higher intake of total DM and the higher digestibility of molasses than of hay. The similar rumen microbial N synthesis with the two dry lick supplements suggested that any benefits of including protein meals in dry licks are due to factors other than changes in rumen microbial activity. In conclusion the experiment showed that both urea-based dry lick and M8U supplements can lead to large increases in protein supply to the small intestine in heifers fed hay of comparable quality to senesced native pasture.

Table 1. Intakes of hay and supplement and synthesis of microbial nitrogen by the heifers

	Treatment					
Measurement	Nil	DL-CSM	DL-MOL	M8U	s.e.m.	Significance
Intake: Hay (kg DM/d)	2.64	3.39	3.51	3.44	0.237	ns
Supplement (kg DM/d)	0	0.12	0.13	1.74	-	-
Total (kg DM/d)	2.64a	3.51b	3.64b	5.18c	0.272	***
Microbial nitrogen flow (g N/d)	6.8a	17.0b	16.2b	36.0c	2.03	***
Microbial nitrogen flow (g N/kg DM intake)	2.6a	5.0b	4.6ab	7.0c	0.67	**

Values within rows with different superscripts differ significantly ($P<0.05$); n.s. not significant;
** $P<0.01$; *** $P<0.001$.

CHEN, X. B. and GOMES, M. J. (1992). Occasional publication, (Rowett Research Institute : U.K).

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