THE INFLUENCE OF MOLASSES IN CONCENTRATES ON PASTURE INTAKE AND RUMEN DIGESTION BY HOLSTEIN-FRIESIAN STEERS

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Molasses is widely used as an energy supplement at up to 3 kg/day for tropical animal production. Walker *et al.* (1996) found that a combination of grain and molasses could support higher milk yields than grain alone when cows grazed tropical grass pasture, but molasses reduced production when cows grazed irrigated rye grass. In this study combinations of molasses and/or grain were fed to four mature rumen fistulated steers in a 4x4 Latin square pen experiment. For one month, all were fed a supplement of 2 kg grain + 2 kg molasses with Rhodes grass pastures. Steers were then individually fed fresh chopped Callide Rhodes grass *ad lib.* with (i) no supplement (Nil); (ii) 4 kg rolled sorghum grain (Grain); (iii) 2.8 kg grain + 1.5 kg molasses (70G/30M); or (iv) 2 kg grain + 2.5 kg molasses (50G/50M) in a 14 day experimental period. The feeds were given at 0830 hours with extra pasture as required throughout the day. Pasture intakes and refusals were measured on days 1 to 10. On day 10, samples of rumen liquor were collected before feeding (0 hours) and 2, 5 and 8 hours after supplementation for analysis of pH, NH_3 and VFA. On days 11 to 14, a nylon bag degradability study used four reference feedstuffs: sorghum grain, cottonseed meal, lucerne hay or hand plucked Rhodes grass (oven dried) similar to as fed. Grain and forages were milled to 2 mm. The effects of diet on effective rumen degradability of dry matter (ERDDM%) and protein (ERDP %CP) were calculated (AFRC 1993).

Supplementation reduced pasture intake (P=0.069) (Table 1), with no difference between supplements. Inclusion of molasses did not influence starch, protein or fibre digestion as measured by ERD for the reference feedstuffs (Table 2). Total VFA and acetic, propionic and n-butyric acids in rumen liquor (at each time period and average daily) increased with supplementation and with increasing molasses in the concentrate (P<0.01) (Table 1). Rumen pH declined with supplementation and was lowest for 50G/50M (P<0.05). Supplementation had no significant effect on rumen NH_3. Observed differences in rumen VFA for the iso-energetic molasses/grain combinations suggest more efficient microbial fermentation and may relate to the relatively low rumen degradability of sorghum grain (Moss *et al.* 1998). Molasses and grain together might maintain a more stable rumen environment which could help explain the apparent positive response observed by Walker *et al. (*1996).

Table 1. Effect of grain and molasses on forage intake, rumen fermentation and feed degradation

Supplement:	Nil	Grain	70G:30M	50G:50M	P	s.e.m.
Pasture intake (kg DM/day)	12.4^{a}	10.7^{b}	10.7^{b}	11.0^{ab}	0.069	0.41
Mean rumen ammonia (mmol/L)	3.4	3.3	2.8	3.1	ns	0.25
Mean total VFA (mmol/L)	95^{a}	103^{ab}	111^{bc}	120^{c}	0.01	3.36
Mean acetic acid (mmol/L)	71^{a}	75^{a}	79^{a}	84^{b}	0.05	2.57
Mean propionic acid (mmol/L)	13.9^{a}	14.3^{ab}	16.1^{bc}	17.9^{c}	0.01	0.58
Mean butyric acid (mmol/L)	8.2^{a}	9.7^{a}	13.0^{b}	15.8^{c}	0.01	0.52
Mean rumen pH	6.43^{a}	6.33^{a}	6.31^{ab}	6.11^{b}	0.05	0.063

Table 2. Effect of grain and molasses on rumen degradability of selected feeds

Reference feed	CP%	Nil	Grain	70:30	50:50	Nil	Grain	70:30	50:50
		ERDDM (%)				ERDP (%CP)			
Sorghum grain	9.6	53	51	53	51	41	36	38	39
Cottonseed meal	44	43	41	43	42	51	45	51	53
Lucerne hay	29	60	60	59	59	71	70	70	69
Rhodes grass	9.6	35	34	34	33	22	14	20	15

AFRC (1993) 'Energy and Protein Requirements of Ruminants'. (CAB: International: Wallingford UK).

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