

VARIABILITY IN MICROBIAL PROTEIN SUPPLY UNDER DIFFERENT SUPPLEMENTATION STRATEGIES

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Microbial crude protein (MCP) supplies most of the metabolizable protein available to ruminants. Supply of MCP depends on the amount of organic matter (OM) fermented in the rumen and on the efficiency of production (ie g MCP/kg digestible OM; DOM). Depending on which feeding standards are used, the efficiency of MCP production varies from 130 to 170 g/kg DOM, with rumen dilution rate as influenced by level of feeding having a major influence on this value. In this experiment, the efficiency of MCP production was determined in steers fed a Rhodes grass hay basal diet (69 ± 0.2 g crude protein (CP)/kg DM; 56 ± 1.1% *in vivo* OM digestibility) and receiving a range of supplements.

Ten Brahman crossbred steers (147 ± 2.4 kg initial liveweight) were offered the hay *ad libitum* supplemented with increasing amounts of grain sorghum, barley, molasses or cottonseed meal and the MCP production was determined by the excretion of purine derivatives in the urine (Chen and Gomes 1995). Each feeding period was made up of a 3 week preliminary feeding phase and a 1 week experimental period during which intake, and faecal and urine output were measured. Sorghum and barley supplements included (w/w, as fed) 1.74% urea plus 0.36% sulphate of ammonia (N:S = 10:1), and molasses contained 3% urea (w/w). Each run included two supplement types each at five levels of feeding, with the 10 steers randomly allocated to treatments. This was repeated three times for each pair of supplements such that each value represents the mean of three animals (see Table 1).

Table 1. Efficiency (± s.e.) of microbial crude protein (MCP) production (g MCP/kg DOM) for steers given Rhodes grass hay and increasing intakes (% of liveweight) of various supplements

	Intake of supplement				
	0	0.5	1.0	1.5	2.0
Sorghum	92.1 ± 4.20	96.2 ± 10.89	101.5 ± 9.87	119.9 ± 26.38	129.2 ± 20.93
Barley	92.1 ± 4.20	113.3 ± 8.70	120.9 ± 14.10	144.8 ± 19.14	148.0 ± 13.60
Molasses	62.0 ± 3.28	83.6 ± 4.48	116.0 ± 7.08	124.3 ± 5.72	134.2 ± 9.47
Cottonseed meal	62.0 ± 3.28	89.9 ± 5.66	115.5 ± 3.97	115.3 ± 7.41	145.4 ± 5.80

Concentration of ammonia-N in the rumen fluid of steers (3 hours post-supplement feeding) was 28 mg/L for the controls, increasing to 111, 229 and 268 mg/L for the 2% of liveweight (W) molasses, grains (combined) and cottonseed meal treatments respectively. Supplementation increased the efficiency of MCP production to normal levels observed in the literature, ie *ca.* 130-170 g/kg DOM (eg SCA 1990), but these values were not attained until supplement intakes were at least 1.5% W (Table 1). The efficiency of MCP production from this tropical hay was thus low (<100 g MCP/kg DOM), in agreement with the few data cited in SCA (1990). This highlights the large potential to increase protein supply to animals consuming tropical forages but it is uncertain why low levels of supplementation with readily fermented carbohydrates (0.5% W) did not markedly improve the efficiency of MCP production in this experiment. There was little difference between the supplement types that could not be explained by the variable extent of rumen digestion of the organic matter.

It may be concluded that the efficiency of MCP production from tropical forages is low, is able to be increased by supplementation with non-structural carbohydrates and degradable nitrogen sources, but does not increase as rapidly as expected when these nutrients are provided.

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