

A RUMEN AMMONIA KINETIC STUDY IN CATTLE

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Poor-quality roughages are deficient in nitrogen (N) for microbial protein synthesis and N supplements increase feed intake of ruminants (Egan 1965). In this study, the kinetics of ammonia (NH₃) metabolism in the rumen of steers fed poor-quality roughage supplemented with urea was studied.

Four 300 kg live weight Friesian steers with rumen cannulae were fed alkali-soaked and washed wheat straw plus urea and minerals at different levels of dry-matter intake. ¹⁵N-(NH₄)SO₄, dissolved in water, was administered as a single dose into the rumen. Loss of labelled N with time was recorded by sequential rumen sampling over 72 h. Mass spectrometry was used for ¹⁵N analysis of rumen NH₃. Rumen NH₃ pool size, total flux through rumen NH₃ pool, irreversible loss and recycling were calculated according to Nolan and Leng (1974). Results for regression of these variables on urea N intake are also given.

The turnover of ammonia in the rumen

Rumen ammonia						
Dry-matter intake (kg/d)	Urea N intake (I) (g/d)	Pool size (g/d)	Flux (F) (g N/d)	Irreversible loss (L) (g N/d)	Recycling (F-L) (g N/d)	Endogenous ammonia flux (F-I) (g N/d)
1.70	20.6	6.45	86.6	44.4	42.2	66.0
2.07	25.1	6.49	111.5	68.3	43.2	86.4
2.42	29.3	6.23	102.2	78.3	23.9	72.9
2.66	32.2	4.80	109.0	76.0	34.0	76.8
3.06	37.0	3.90	112.4	75.7	36.7	75.4
3.47	41.9	6.02	152.8	101.8	51.0	110.9
4.08	44.4	5.57	176.8	126.0	50.8	132.4
Slope		-0.050±0.044	3.22± 0.74	2.73± 0.52	0.48± 0.49	2.20± 0.74
Intercept		7.270±1.50	15.70±25.13	-8.50±17.59	24.40±15.11	16.30±25.19

Rumen NH₃ pool size did not vary with feed intake. However, the flux of NH₃ to the rumen increased with intake as did the irreversible loss of NH₃ from the rumen. The amount of NH₃ recycled from the rumen NH₃ pool back to the same pool within the duration of the experiment was constant over intake levels. The endogenous input of NH₃-N to the rumen was 66 to 132 g per d. This level of endogenous input represented 2.0 to 3.4 times more N than was supplied in the diet and would make a considerable contribution to the N economy of the rumen.

EGAN, A.R. (1965). *Aust. J. agric. Res.* 16: 463.

NOLAN, J.V. and LENG, R.A. (1974). *Proc. Nutr. Soc.* 33: 1.

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