Proc. Nutr. Aust. (1990) 15

THE EFFECTS OF NITROGEN SUPPLEMENTATION ON THE CHEMICAL COMPOSITION OF RUMEN BACTERIA

R.S HEGARTY*, I.B. SUDANA and R.A. LENG

Rumen microbial cells are an important source of nutrients for ruminants. Although the composition of microbes can be easily altered (Smith and McAllan 1974), there have been few investigations into factors affecting composition of rumen microbes, and whether these can be manipulated to increase animal productivity (John 1984). The experiment reported here sought to determine if the composition of rumen bacteria could be influenced by the availability of nitrogen (N) in the rumen.

Eighteen rumen-fistulated crossbred sheep (25kg live weight) were allocated randomly to treatment groups according to a 3x2 factorial design. All sheep were offered a basal diet of chopped wheaten straw (WS) fed adlibitum with added minerals, at 0800 h each day. Urea (U)(0, 15 or 30g/d) was sprinkled on the straw in two equal portions at 0800 h and 1300 h. Lucerne chaff (LC)(0 or 150g/d) was given at 0800 h. Samples of rumen fluid-phase bacteria (FPB) were collected 4h post-feeding and their non-ammonia nitrogen (NAN) and lipid contents determined.

Diet	Rumen NH_3 (mgN/l)	Rumen fluid turnover rate (pools/d)	Composition of bacterial DM(%) NAN	Lipid
WS + 0g U	68^{a}	1.93^{a}	7.72^{a}	15.2^{a}
WS + 15g U	223^{b}	2.49^{b}	8.53^{b}	12.9^{b}
WS + 30g U	292^{bc}	1.58^{a}	8.31^{b}	10.6^{c}
WS + 0g U + LC	115^{a}	1.95^{a}	8.36^{b}	12.6^{b}
WS + 15g U + LC	246^{b}	1.87^{a}	8.95^{b}	11.8^{b}
WS + 30g U + LC	334^{c}	1.86^{a}	8.53^{b}	12.3^{b}

Means in the same column with different superscripts are significantly different ($P<0.05$).

Supplementing WS with urea alone, resulted in FPB of lower lipid and higher NAN content than occurred in unsupplemented sheep. This response was not explained by the associated changes in rumen water kinetics. Provision of urea to sheep also receiving LC had little effect on the chemical composition of FPB.

These results suggest that if the diet contains insufficient N, FPB low in NAN and rich in lipid will be produced. It is not known whether this response is achieved by altering the chemical composition of a common bacterial population, or whether different bacterial species exist in the rumen of N deficient compared to N supplemented sheep.

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University of New England, Armidale, NSW, 2351.
* Present Address: NSW Agriculture and Fisheries, Elizabeth Macarthur Agricultural Institute, Camden, NSW, 2570.