

The use of ^{15}N for the determination of *in sacco* bacterial contamination of 3 concentrate feeds and N degradability of feeds in the rumen

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The aims of this experiment were to quantify the extent of bacterial contamination (BC) of nylon bag residues, using ^{15}N as a microbial marker and to establish its influence on the effective nitrogen degradability (DT_N) of 3 concentrate feeds.

The N degradability of soya-bean meal (SBM), meat and bone meal (MBM) and wheat bran (WB) was measured using the nylon bag procedure (Ørskov and McDonald, 1979) in 2 adult Friesian steers receiving twice daily a diet based on concentrate and meadow hay (50:50, 13.5% CP, 10 kg DM/d). Two d before starting and during the incubation period ($^{15}\text{NH}_4)_2\text{SO}_4$ (99 atom% excess, 3 g/d) was infused continuously through the rumen cannula. Rumen bacterial N in the residues (as % of total residual N) was calculated from the ratio: (^{15}N atom % excess in the residue/ ^{15}N atom % excess in the bacteria) \times 100. Whole rumen content was sampled in each steer 0, 3, 6 and 9 h after feeding. Liquid and solid associated bacteria (LAB and SAB) were extracted as described by Legay-Carmier and Bauchart (1989). N was determined by the Kjeldahl method. Isotope-ratio analyses were performed according to the Kjeldahl-Rittenberg method using a double-collector mass spectrometer (VG, SIRA 12).

The isotopic excesses for LAB and SAB averaged respectively 0.2430 ± 0.0247 and $0.1935 \pm 0.0241\%$. Rumen bacterial N in the MBM residues was very low and constant throughout the incubation period (fig 1). As a consequence, uncorrected (*Unc*) and corrected (*Cor*) values of DT_N ($k = 6\%$) for contamination by SAB and LAB were respectively 54, 55 and 55%. For WB, rumen bacterial N increased with time from 15 to 57%. Also *Unc*, Cor_{SAB} and

Cor_{LAB} values of DT_N were quite different (69, 78 and 76%), but the effect of reference bacterial sample (SAB or LAB) was not important. SBM had an intermediate behaviour. Until 16 h, rumen bacterial N was lower than 11% but substantially increased after 24 and 48 h incubation (fig 1). However, DT_N values were slightly affected (*Unc* = 64, $Cor_{\text{SAB}} = 67$ and $Cor_{\text{LAB}} = 66\%$).

In conclusion, the BC of undegraded residues markedly affects the DT_N only for fibrous concentrate feedstuffs with a rather low N content. In our experiment, the choice of reference bacterial sample only slightly influenced the results.

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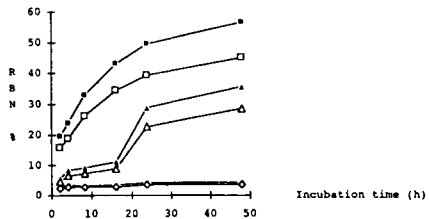


Fig 1. Evolution of ruminal bacterial nitrogen (RBN) in nylon bag residues (% of total residual N) during rumen incubation. ■ WB SAB; □ WB LAB; • KBM SAB; ◊ KBM LAB; ▲ SBM SAB; △ SEM LAB.