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Total viable ruminal bacteria and volatile fatty acids in ruminants fed diets containing proteins of different degradabilities

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The influence of protein supplements of different rumen degradability (DT%) on the ruminal microbial number in dairy cows was studied.

Two Friesian cows were fed the following diets: A = 100% *Polyphyta* hay; B = 10% extracted soybean meal (DT 70%) + 90% *Polyphyta* hay; C = 10% corn gluten meal (DT 30%) + 90% *Polyphyta* hay. The crude protein content was 8.2% for diet A, 12.7% for diets B and C respectively. The diets were given according to a factorial design with changeover. The animals were fed twice daily and samples of whole rumen contents were withdrawn 3 h after morning feeding for 2 consecutive d. The total microbial number was determined by direct count on Petri dishes in BHI agar medium (Holdeman *et al*, 1977) under an anaerobic glove box (atm 95% CO_2; 5% H_2) after 5 d incubation at 39°C. The rumen volatile fatty acid levels (VFA) were determined by gas chromatography.

The total microbial counts were $1.23 \pm 0.75 \times 10^{10}$, $0.59 \pm 0.40 \times 10^{10}$ and $0.83 \pm 0.30 \times 10^{10}$ cells/g dry rumen content for diets A, B and C respectively. Diet A had slightly higher ($P \leq 0.25$) microbial counts compared to diet B. No difference was found between diet A and C or between diet B and C. The data showed high SD values owing to variability between animals.

Acetic, propionic and butyric acid content of diet A was found to be significantly higher compared to diet B. No significant difference was found between C and the other 2 diets.

In conclusion, supplementation by protein with faster rumen degradability kinetics compared to *Polyphyta* hay and corn gluten feed negatively affected the production of ruminal microflora and consequently the VFA content decreased, probably since the N and C sources of the diet were not available at the same time for microbial growth (Wallace *et al*, 1988).

Holdeman LV, Cato EP, Moore WEC (1977) *Anaerobe Laboratory Manual.* Virginia Polytech Inst and State Univ, VA, 4 th edn, 1-156

Wallace RJ, Cotta MA (1988) *The rumen Microbial Ecosystem* (Hobson PN, ed) Elsevier Appl Sci, Amsterdam, 217-227

Table I. Volatile fatty acid data (mmol/100 ml rumen fluid).

Diet	*Hay*	*Soy*	*Corn gluten*
Acetic acid	2.26 ± 1.57^{A}	$1.44 \pm 0.38B$	1.91 ± 1.59^{AB}
Propionic acid	0.90 ± 0.10^{a}	0.53 ± 0.17^{b}	0.68 ± 0.49^{ab}
Isobutyric acid	0.05 ± 0.01	0.09 ± 0.03	0.12 ± 0.07
Butyric acid	0.61 ± 0.04^{a}	0.39 ± 0.12^{b}	0.44 ± 0.33^{ab}

^{A,B} $P \leq 0.05$; ^{a,b} $P \leq 0.10$.