nal digesta was calculated from PEG and Yb recovered in faeces.

When feeding the pulp diet, total OM intake was higher (14.1 *vs* 13.1 kg/d, $P < 0.10$), OM digestibility was lower (0.76 *vs* 0.79, $P < 0.01$), but DOM intake (DOMI, 10.5 kg/d), the proportion of DOMI that disappeared in the rumen (0.66) and N intake (49 g/kg DOMI) were not affected, compared to the wheat diet. Decrease of ruminal pH after a meal was less pronounced with pulp than with wheat (–0.2 *vs* –0.6 units, $P < 0.05$).

When feeding pulp diet, mean rumen ammonia was lower (171 *vs* 250 mg/l, $P < 0.01$), non-ammonia nitrogen flow (NAN) was slightly higher (41.7 *vs* 37.2 g/kg DOMI, $P < 0.08$) and ruminal N losses were lower (7.6 *vs* 11.5 g/kg DOM, $P < 0.08$) than with wheat diet. Urinary N and milk N output were not modified, since duodenal protein supply largely exceeded the animals requirements on both diets.

The efficiency of microbial synthesis did not vary (27.7 g/kg DOMI). Therefore, the difference in NAN flow could be ascribed to a higher flow of undegraded feed nitrogen when pulp diet was fed. This agreed with the lower protein degradability of the pulp diet (0.79 *vs* 0.84) calculated from the *in sacco* degradabilities of feeds and assuming that carbohydrates did not modify the degradability of white clover.

The rate of energy supply in the rumen had only moderate effects upon N metabolism in dairy cows fed fresh forage diets.

Influence of the source of protein in the ration on the duodenal flow of amino acids in lactating dairy cows. JC Robert, BK Sloan, C Denis *(Rhône-Poulenc Animal Nutrition, 03600 Commentry, France)*

Four mid-lactation Holstein dairy cows fitted with rumen and duodenal cannulae were offered diets of maize silage *ad libitum* plus 2 types of concentrate in a cross-over design experiment (3 x 3 week-periods). Both concentrates contained equivalent quantities of wheat, barley, beet pulp and molasses 14, 26, 8.3 and 5%, respectively; in addition A and B contained, respectively: corn, 9 *vs* 6.9%; soyabean meal (SBM), 4.5 *vs* 21%; formaldehyde-treated SBM 29 *vs* 0%; fishmeal, 0 *vs* 13%; corn gluten meal, 1.5 *vs* 4.7%; and urea 1.7 *vs* 0.1%. A and B were also designed to contribute similar quantities of duodenal lysine (L) but larger quantities of methionine (M) for diet B (~ 5 g).

Ytterbium acetate was continuously infused into the rumen. During each period a total collection of faeces was made between days 16 and 21. Four samples of duodenal contents were collected each day between days 18 and 20 so as to give, on a daily basis, one sample for every 1 h 20 min from 06.00 to 20.40 h. The samples were pooled for each cow for each period, lyophilised and analysed for ash, total N and Yb; duodenal contents were also analysed for individual AA (17) and DAPA. Nitrogen, apparent PDIN and PDIE intakes (g) were similar: 421 *vs* 426, 1 784 *vs* 1 820 and 1 785 *vs* 1 807, for A and B, respectively. Total duodenal flows of N, AA, M and L (g) were for A and B, respectively: 416 *vs* 372 (SED 26), 2 139 *vs* 1 852 (SED 143), 35 *vs* 36 (SED 3.2), and 139 *vs* 124 (SED 8.3). Duodenal concentrations (as a mean of 17 AA) of M were 1.6 and 1.9 (SED 0.10) ($p < 0.05$) and of L were 6.5 and 6.7 (SED 0.14), for diets A and B, respectively.

An estimation of microbial nitrogen flow (g) of 251 *vs* 211 for A and B, respectively, relied on the assumption that the duodenal microbial N/DAPA ratio could be estimated from the ratio of the concentration of N (7.9% DM) to DAPA (0.33% DM) in free rumen bacteria. Thus, the apparent efficiency of microbial protein synthesis was lower for diet B than diet A: 13.8 *vs* 20.6 g (microbial N x 0.8 x 6.25)/100 g organic matter apparently digested in the rumen, masking a possible positive effect of B *vs* A on individual methionine flows.

Action des tanins hydrolysables sur la trypsine bovine. N Zimmer [1], J Lafont [2], R Cordesse [1] *([1] UZM, ENSA-INRA, 9, place Viala, 34060 Montpellier cedex 1 ; [2] GBSA, USTL, place Bataillon, 34095 Montpellier cedex 5, France)*

Les tanins, polyphénols présents dans de nombreux fourrages, peuvent soustraire des protéines alimentaires de la protéolyse par formation de complexes : s'agit-il d'un effet sur l'enzyme et/ou sur le substrat ?

Pour répondre à cette question, nous avons suivi l'autolyse de la trypsine bovine et observé l'effet des tanins hydrolysables de châtaignier sur ce phénomène : sans tanins, la disparition de l'activité catalytique par autolyse se déroule selon un mécanisme d'ordre 2 dont la constante