

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.

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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.

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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

de vitesse apparente (k_{app}) rend compte de l'affinité et du *turn-over* de l'action de l'enzyme sur elle-même.

Des quantités connues de trypsine ont été incubées à pH 8,0 sur des temps de 0 à 30 min, en présence ou non de tanins. Après incubation, l'activité trypsine résiduelle est mesurée par une addition brutale de caséines : la libération de protons, résultant de l'hydrolyse de ces molécules (pH-stat), rend compte de cette activité résiduelle. Les concentrations en tanins utilisées ont été choisies et exprimées par le rapport pondéral tanin/trypsine (R).

Les résultats montrent, en présence de tanins, une sommation de 2 inhibitions de l'activité de la trypsine :

– l'une est dépendante du temps et montre que la disparition de l'activité par autolyse obéit, encore, au mécanisme d'ordre 2. La constante de vitesse apparente de cette réaction (k_{app}) reste identique à celle observée en l'absence de tanins respectivement 0,0146 et 0,0144 $\mu\text{M}\cdot\text{min}^{-1}$.

– l'autre est indépendante du temps. Elle dépend de manière presque hyperbolique de la concentration en tanins. L'asymptote (65% d'inhibition du témoin sans tanins) est atteinte pour $R > 50$. Des expériences préliminaires montrent l'existence de discrets phénomènes d'agrégation des caséines par les tanins. Ceci expliquerait ce deuxième type d'inhibition.

En conclusion, les tanins hydrolysables de châtaignier n'affectent en aucune manière les propriétés catalytiques (k_{app}) de la trypsine observées au cours de son autolyse. Dans ce système, les tanins n'agissent donc que sur les caséines-substrats.

Passage rate of forage particles in different diets supplied to sheep and buffalo in the digestive tract. S Bartocci ¹, A Amici ², M Verna ¹, S Terramoccia ¹, F Martillotti ¹ (¹ *Istituto Sperimentale per la Zootecnia, Via Salaria, 31, 00016 Monterotondo sc, Rome*; ² *Istituto di Zootecnia, Università della Tuscia, Viterbo, Italy*)

The aim of this work was to examine the effects of 4 diets with different forage/concentrate ratios on the passage kinetics of forage particles through the digestive tract of buffaloes in comparison with that of sheep, which is better known. The trial

was carried out on 4 male Mediterranean buffaloes in comparison with 4 adult rams; the animals were fed 50 g DM/kg LW ^{0.75}, according to a latin square design, during 4 consecutive periods of 21 d each. The 4 complete diets (CP = 14% DM) were made up according to the following concentrate/forage ratios: 12.5:87.5 (A); 25:75 (B); 37.5:62.5 (C); 50:50 (D). The forages utilized were alfalfa hay and corn silage, used always in the ratio 65:35. Mordanted alfalfa hay (Cr = 28 g/kg DM) was used to determine the forage passage rate through the rumen (K1) and through intestinal tract (K2). The time (h) between administration of chromium and the first appearance in the faeces (τ) and mean retention time (MRT) were estimated. The faecal excretion curves for solids was analyzed with a multicompartmental model (NG1) using the observed data according to Dhanoa *et al.*

Comparing the 2 animal species, the lowest rumen passage rate (K1) was recorded in buffaloes (2.4 vs 2.8%/h; $P < 0.05$). No significant difference was recorded (11.4 vs 10.7%/h) in the second compartment (K2), while the appearance of chromium in the faeces after administration (τ) was significantly faster in buffalo than in sheep (7.0 vs 12.8 h). The mean retention time (MRT) in the whole digestive tract was almost the same (57.7 vs 58.2 h). In both species, fed at maintenance level, either rumen passage rate (K1) or intestinal passage rate (K2) decreased with increase of concentrate level in the diet although a significant difference was only recorded between diets A and D for K1 (2.9 vs 2.4%/h).

Conséquences d'une réduction de l'apport de fibres sur l'activité fermentaire cœcale du lapereau. R Bellier, T Gidenne (*INRA, station de recherches cynicoles, centre de recherches de Toulouse, BP 27, 31326 Castanet-Tolosan, France*)

Chez le lapin en croissance, un apport insuffisant de fibres peut modifier l'activité fermentaire cœcale (AFC) et entraîner des troubles digestifs (diarrhée). Nous avons par conséquent déterminé l'AFC *in vivo* et la dégradation des fibres pour 2 groupes de 7 lapereaux (6 sem d'âge, poids vif 1 kg), porteurs d'une canule cœcale, et recevant *ad libitum* 2 régimes isoénergétiques différant uniquement par leur teneur en fibres : un régime témoin «T» (40% NDF, 20% ADF, 23% amidon) ou pauvre en fibres «P» (22% NDF, 11%