The interpretation of the degradation kinetics of compound feeds and hay. P Susmel, P Spanghero, CR Mills (*Department of Animal Production Science, via S Mauro, 2, Pagnacco, Udine, Italy)*

The aim of the experiment was to interpret rumen degradability data including or excluding washing losses (WL) as 'zero time' with 2 models. Samples of compound feeds containing 60% cereals, 30% beet pulp, molasses, minerals and 0 or 2% urea (U0 and U2, respectively) and a hay (H) were incubated in the rumen of 4 Simmental cows receiving the same basal diet (75:25 hay/concentrate, intake 10 gkg^{-1} LW). Bags (10 x 16 cm, 40-μm pore Ø) contained 2.1 ± 0.1 g of air-dried sample and were incubated for 2, 6, 10, 24 and 48 h (and 72 h for hay) and then washed in the cold rinse cycle of a washing machine; WL were measured by rinsing additional bags in the machine without prior rumen incubation. Bags were dried, weighed and residues analysed for N-Kjeldhal to calculate crude protein degradability *(dg)*.

The interpolations were performed with 2 models (M1 = Ørskov and McDonald, 1979; M2 = McDonald, 1981):

M1: $dg = a + b\,(1-\exp(-ct))$;
$DG = a + (bc)/(c + k)$;

M2: $dg = a + b\,(1-\exp(-ct))$;
$B = (a + b) - WL$;
$L = (1/c)\,\ln(b/B)$;
$DG = WL + (bc)/(c + k)\exp(-(c + k)L))$;

(a = soluble fraction; b = potentially degradable fraction; c = rate of degradation of b; L = lag time, k = rumen turn-over rate = 0.06/h for the concentrates and 0.03/h for the hay; DG = effective degradability).

Each model was interpolated by including or excluding the WL data as 'zero time'.

WL differed ($P < 0.01$) between feeds (60.4, 35.1 and 24.4% for U2, U0 and H respectively). On average WL was higher than both the interpolated *a* values without 'zero time' and the interpolated *a* values with 'zero time' (39.9%, 29.5% and 34.8% respectively, $p < 0.01$).

Including 'zero time' reduced the degradable fraction *b* and the rate of degradation *c* but the combination of these parameters gave similar DG values (average for the 3 feeds, 60.4 and 60.0%). The interpolation with model M2 allowed the calculation of lag phases of 3.52, 3.38 and 3.36 h respectively for U2, U0 and H, but the DG were similar to those of M1 (60.6 *vs* 59.8%).

In conclusion, for the feeds examined, the application of 2 different models and the inclusion of washing losses in the interpolation of the data led to different degradation parameters but similar calculated effective degradability. It is suggested that the simpler model be used with the WL included as the 'zero time' observation since the latter appears to be a truer representation of the actual immediately soluble *a* fraction.

Influence of pH on lipolysis and biohydrogenation of soybean oil in the rumen *in vitro*. C Van Nevel, D Demeyer* *(Department of Animal Production, University of Ghent, Proefhoevestraat, 10, 9090 Melle, Belgium)*

Diets low in roughage appear to lower lipolysis and biohydrogenation of fatty acids in the rumen. This can be due to the low pH in the rumen obtained with these diets. In this experiment, the influence of different pH values on lipolysis of soybean oil (SO) and hydrogenation of liberated fatty acids was investigated *in vitro*. Rumen contents (10 ml) were incubated (6 h) under CO_2 with Burroughs' solution (40 ml) containing 10 mg of N (NH_4HCO_3) and 40 or 80 mg of SO. Different pH values in different incubation flaks were obtained by acidification (HCl; 5 N) of contents before incubation. Changes of pH during incubation were limited (0.04–0.25) because no other substrate was added. Indeed, our preliminary results suggested that lipolysis and hydrogenation were not or only slightly affected by the presence of substrate (hay). Lipolysis and hydrogenation were determined by separation of triacylglycerols (TG) and free fatty acids by TLC and determination of fatty-acid composition by GC after methylation. Accumulation of mono- or diacylglycerols was never observed and the remaining TG were less unsaturated, indicating specificity of lipolysis for polyunsaturated fatty acids (PUFA). The mean pH values studied were: 6.8, 6.3, 5.9, 5.6, and 5.2. At pH 5.9, liberation of fatty acids was lowered, but inhibition was more pronounced in incubations with 80 mg of SO (33 *versus* 11% with 40 mg). At pH 5.2, inhibition was 52% (40 mg incubation) and 75% (80 mg), again indicating

that the extent of inhibition was related to substrate concentration. With the exception of the lowest pH (5.2), where liberation of PUFA was more inhibited, liberation of all fatty acids from SO was roughly inhibited to a same extent by lowering pH. Overall hydrogenation of liberated fatty acids was not affected by pH. Linolenic and linoleic acid were always almost completely hydrogenated, suggesting that hydrogenase action was much less influenced by pH than lipase activity, whereas, in agreement with literature data, C18:1 accumulation was observed.

* Research financed by IWONL, Brussels

Ruminal and hindgut digesta kinetic parameters in sheep estimated from faecal-marker excretion and slaughter trials.
A de Vega, J Gasa *, C Castrillo, JA Guada *(Dpto de Producción Animal y Ciencia de los Alimentos, Miguel Servet, 177, 50013 Zaragoza; * present address: Dpt de Producio Animal, Universitat Autónoma de Barcelona, Bellaterra 18193, Barcelona, Spain)*

Faecal-marker excretion curves after a pulse dose of reference substances have been used to estimate digesta kinetic parameters through the different mixing compartments of the gut, although there is a lack of agreement on their interpretation. In order to better understand this subject, an experiment was carried out on 4 pairs of twin Rasa Aragonesa ewe lambs fed a chopped (C; 44.8% digestible organic matter (DOM)) or pelleted (P; 40.9% DOM) lucerne hay at 90% of their voluntary intake (65 and 88 g DM/kg body weight$^{0.75}$) and offered in 12 daily equal meals. Animals were single dosed 10 g of Yb-labelled forage and 0.5 g of Co-EDTA, and 19 faecal samples were taken for up to 144 h. Slow (K_1) and fast (K_2) fractional outflow rates were obtained from the marker concentration curves using the multicompartmental model. After a 2-d resting period and for 5 consecutive days, daily doses of 6 g of Yb-labelled diets and 0.2 g Co-EDTA were given by mouth in 12 separate distributions at intervals of 2 h. Pairs of animals were slaughtered every 2 h on the 6th day, and fractional outflow rates of both markers from reticulo-rumen (Kr) and hindgut (K_{HG}) calculated for each animal. Calculations were made using the hourly infusion of markers and their actual amounts in the compartments. The latter were estimated from digesta marker concentrations and the total amount of material present in the pools considered. Mean K_1 values were 0.056 (diet C) and 0.077 (diet P) h^{-1} for Co-EDTA ($P < 0.001$) and 0.049 (C) and 0.057 (P) h^{-1} for Yb-labelled diets ($P > 0.05$). K_r value were 0.072 (C) and 0.154 (P) h^{-1} for Co-EDTA ($P < 0.01$) and 0.040 (C) and 0.063 (P) h^{-1} for Yb-labelled particles ($P < 0.05$). Average K_2 values were 0.445 (C) and 0.627 (P) h^{-1} for Co-EDTA and 0.309 (C) and 0.405 (P) h^{-1} for Yb, whereas K_{HG} values were always lower than K_2 and nearly constant (0.138 ± 0.012), independently of the marker or the kind of diet considered. In conclusion, K_1 did not reflect the differences in Yb fractional outflow rates from the rumen between C and P, while in the case of Co-EDTA differences of K_r due to diet were much higher than differences in K_1. K_{HG} values were independent of K_2 with both markers.

Evaluation of faecal indicators to predict voluntary intake of *Dichantium sp* by cattle in Guadeloupe.
M Boval [1], A Xandé [1], JL Peyraud [2], G Aumont [1], O Copry [1], B Calife [1] *([1] INRA, Station de Zootechnie, BP 1232, 97185 Pointe-à-Pitre Cedex, Guadeloupe; [2] INRA, Station de Recherches sur la vache laitière, 35990 Saint-Gilles, France)*

The faecal index method has been widely used for estimating digestibility. Single sward regression equations are more accurate than general equations. The objective of this study was to establish a reliable regression between organic matter digestibility (OMD) of *Dichantium* (dominant in native pastures) and *in vitro* digestibility (IVD) or faecal indicators: crude protein (CP), neutral detergent fiber (NDF), acid detergent fiber (ADF), and residual nitrogen in ADF (N_{ADF}). Bands of fresh forage were cut from 20 to 70 d of regrowth, and chopped. Six creole calves weighing 256 ± 32 kg were housed in metabolic cages (with *ad libitum* access to water and a mineral supplement) and were fed 80 percent *ad libitum* twice daily Measurements were carried out during 50 d after a 3-week adaptation period. Offered forage, refusals and faeces were weighed every day for each animal. Samples were dried at 80°C, during 48 h for forage and 72 h for faeces. Dry matter