drained viscera (PDV) and liver. Steers were fed, every 2 h, a lucerne: ground maize-soya-bean meal (75:25; 0.52 MJ metabolizable energy per kg live weight^{0.75} per day diet without (170 g crude protein (CP) per kg dry matter (DM) and with 20 g urea per kg DM (220 g CP per kg DM) in a split-plot design. After diet adaptation (15 days), measurements of net nutrient flux were obtained immediately before beginning and ending a 72 h mesenteric vein infusion of L-arginine (ARG, 15 mmol/h). ARG infusion increased ($P < 0.001$) net PDV ARG appearance by 14.3 mmol/h but net PDV metabolism of other nutrients was unaffected apart from increases ($P < 0.07$) in n-butyrate absorption and urea removal. Dietary urea addition increased ($P < 0.001$) PDV absorption and liver removal of NH_4N , which accounted for 0.80 of increased liver urea N output ($P < 0.004$). On average, increased liver removal of ARG ($P < 0.001$) accounted for 0.65 of increased liver urea N output ($P < 0.03$) resulting from ARG infusion. Liver α -amino N (AAN) and oxygen metabolism were unaffected by treatments, although ornithine output ($P < 0.001$) and alanine ($P < 0.006$) and glutamine ($P < 0.08$) removal were increased by ARG infusion. Glutamate output was reduced by dietary urea addition ($P < 0.03$). Increased absorption of ammonia and ARG both stimulated the urea cycle but had little effect upon the net splanchnic metabolism of other nutrients and did not affect net liver removal of AAN or oxygen.

174. Comparative study of rumen activity in Churra and Merino sheep

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Ten rumen-cannulated ewes (five of Churra breed and five of Merino breed) were fed alfalfa hay at maintenance level divided into two equal portions at 10.00 and 18.00 h. Samples from five substrates (grass hay, barley straw, filter paper, barley and fish meal) were incubated into nylon bags in the rumen of each sheep for 3, 6, 12, 24, 48, 72 and 96 h, in order to evaluate differences in rumen activity between breeds. Data from dry-matter disappearance were fitted to the model $y = a + b(1 - e^{-ct})$, except those from filter paper which were fitted to the model $y = b(1 - e^{-ct})$. Rumen fluid was sampled for 2 days before the morning meal and 3, 6 and 12 h afterwards and pH was determined. The pH values followed the same pattern in all sheep and were significantly higher ($P < 0.05$) in the Churra (mean value: 6.41) than in the Merino sheep (6.10) at all sampling times. Compared with the Merino, the Churra sheep presented significantly higher rates of degradation (*c* value) of filter paper (0.0512 v. 0.0343; $P < 0.06$), barley straw (0.0389 v. 0.0332; $P < 0.07$), grass hay (0.0482 v. 0.0332; $P < 0.01$) and fish meal (0.0295 v. 0.0180; $P < 0.01$). However, there was no difference between breeds in the potential degradability of these substrates, although the potential degradability of barley was higher ($P < 0.01$) in the Churra sheep (90.8 v. 89.6). The differences between the two breeds from *in sacco* results would indicate possible differences in the capacity for degrading fibre.

175. The effect of yeast culture on rumen fermentation: growth of the yeast in the rumen and the requirement for viable yeast cells

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Six rumen cannulated sheep received 1200 g/day of a diet of hay, barley, molasses, fish meal and a minerals/vitamins mixture (500,

229.5, 100, 91 and 9.5 g/kg dry matter respectively) in two equal meals. Three sheep were supplemented with 4 g/day of a commercial yeast culture (YC, Yea-sacc, Alltech). After 24 days, YC was removed from the ration and rumen samples collected at regular intervals for 72 h. Fractional liquid outflow rates from the rumen were slightly higher in animals that had been receiving YC (0.104 and 0.116 (s.e.d. 0.0059) per h for the control and YC, respectively, $P < 0.05$). However, the outflow of chromium mordanted yeast added to the rumen (0.095 (s.e.d. 0.0017) per h) was similar to the decline in the number of viable yeast cells in the rumen (0.086 (s.e.d. 0.0031) per h) of animals that had been receiving YC. Numbers of viable yeast cells in the rumen of animals not receiving YC were low (1.8 (s.e.d. 0.08) $\times 10^4$ per ml) and did not vary with time. The effects of YC on the rumen fermentation were further investigated using the rumen simulation technique (Rusitec). The basal diet fed to sheep (20 g/day) was supplemented with YC, irradiated YC (25 kGy) or autoclaved YC (15 p.s.i. at 120°C for 15 min). Treatments were evaluated in duplicate in each of two 21-day periods. Total bacterial numbers were significantly stimulated by YC and irradiated YC, with a greater stimulation evident in response to YC than irradiated YC. Numbers were not stimulated by autoclaved YC (1.77, 3.55, 2.47 and 2.19 (s.e.d. 0.252) $\times 10^8$ per ml for the control, YC, irradiated YC and autoclaved YC, respectively, $P < 0.05$). Numbers of cellulolytic bacteria were stimulated by YC and irradiated YC but not by autoclaved YC (0.50, 0.98, 1.37 and 0.59 (s.e.d. 0.106) $\times 10^6$ per ml respectively, $P < 0.05$). The results suggest that the *Saccharomyces cerevisiae* cells in YC did not grow in the rumen and that non-viable cells retained some stimulatory activity, but that for the full effects of YC on the rumen fermentation to be released YC needs to be both viable and metabolically active.

176. Salivary losses of purine derivatives

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The incomplete recovery of absorbed purines as urinary derivatives suggests the possibility of alternative ways of excretion. Salivary losses of purine derivatives were studied in 12 mature ewes equipped with oesophageal fistula and two indwelling catheters in the cheeks. Animals were fed 800 g/day of a chopped or pelleted fescue hay in 12 equal fractions. Basal flow of saliva through the oesophagus was estimated from the continuous infusion through the catheters of 0.3 g/day Co-ethylene diamine tetra-acetic acid in water solution (0.6 g/l). Saliva was periodically sampled between meals during 5 days and analysed for Co by atomic absorption and for purine content by high performance liquid chromatography. Co concentrations in saliva showed a high variability between sampling periods within sheep (CV = 0.25) and between sheep (CV = 0.24). Saliva flow averaged 7.0 (s.e. 0.56) l/day and did not differ between treatments. Mean concentration of total purine derivatives in saliva was 8.5 $\mu\text{mol/l}$, accounting for 5.21 (s.e. 0.25), 0.66 (s.e. 0.18), 1.89 (s.e. 0.39) and 0.75 (s.e. 0.20) $\mu\text{mol/l}$ of allantoin, uric acid, hypoxanthine and xanthine, respectively. Traces of creatinine were also detected (3.37 (s.e. 0.20) $\mu\text{mol/l}$) being the ratio allantoin to creatinine (1.8 (s.e. 0.15)) within the range observed in the urine. It is concluded that purine losses through saliva recycling to the rumen are negligible which implies the urinary recovery of absorbed purines may be assumed as constant, independent of variations in saliva production.