PORTAL BLOOD FLOW AND NUTRIENT EXCHANGE IN LAMBS MAINTAINED BY TOTAL INTRAGASTRIC INFUSION

B. J. LEURY, M. JOIS*, B. J. HOSKING AND A. R. EGAN

Intragastric nutrient infusion is a useful model for studying the efficiency with which nutrients are utilised since nutrient input can be directly controlled. However, there have been very few studies which have measured exchange of nutrients across the portal-drained viscera (PDV) in infused animals. We report a preliminary study in which portal blood flow (PBF) and nutrient exchange across the PDV were estimated in lambs maintained by intragastric infusion at two levels of energy but the same protein level.

Three first-cross wethers (mean liveweight 27.9kg) were surgically prepared with rumen and abomasal fistulas, catheters in the portal vein (via caecal vein) and femoral artery, and an ultrasonic bloodflow probe (Transonics Inc.) around the portal vein. Following recovery, the animals were infused intaruminally with VFA (Ac:Pr:Bu in molar ratio of 75:15:10), and intra-abomasally with casein(100g/d)-vitamin mixture. All infusion procedures were essentially as described by Orskov et al. (1979). Four sets of arterial and portal blood samples were taken at 20 min intervals on day 10 and day 20 of infusion when animals were receiving 4.1 (Low) and 8.2 (High) MJ GE/d, respectively, as VFA plus casein. Animals were on each infusion level for at least two days before measurements were made. PBF was also recorded. PDV flux was calculated as follows: PBF X (portal-arterial) concentration difference. Data for PBF and PDV flux at the two infusion levels are presented in the table (negative values indicate net utilisation). Values represent means±SEM. Flux data for Low and High-Low are the average of two animals.

	Low	High	High-Low
Portal Bloodflow (ml/min)	934±16	1022±2	87±14
Hematocrit (%)	28	29	
PDV Flux (mmol/h):			
Glucose	-3.88	-5.67±2.31	0.49
Urea-N	-14.89	-7.83±1.59	5.98
Ammonia-N	9.16	10.07±0.76	0.17

Despite a nearly twofold increase in GE intake, there was only a small, although significant ($p < 0.05$), increase in PBF. This finding contrasts with marked differences seen in PBF measured by flow-probes in sheep which had large differences in feed intake (eg Lush and Gooden, 1988; Leury and Jois, unpublished), but is consistent with the study of Gross et al (1990) in which PBF, measured by PAH dilution in lambs maintained by intragastric infusion, was not influenced by different levels of energy and protein infused. In all animals there was a net uptake of glucose and urea-N, and a net absorption of ammonia-N by PDV. Glucose utilisation tended to increase and urea-N cycling decrease in animals on High infusion. These data indicate that intragastric infusion in combination with portal absorption measurements is a potentially useful approach for studying nutrient utilisation in sheep.

GROSS, K. L., HARMON, D.L. AND AVERY, T. B. (1990). J. Anim. Sci. 68: 214.
LUSH, J. M. and GOODEN, J. M. (1988). Proc. Nutr. Soc. Aust. 13: 107.
ORSKOV, E. R., GRUBB, D. A. WENHAM, G. AND CORRIGALL, W. (1979). Brit. J. Nutr. 41: 553.

Department of Agriculture, The University of Melbourne, Parkville, Vic 3052
* Present address: School of Agriculture, La Trobe University, Bundoora, Vic 3083