

DIETARY COMPOSITION AND UPTAKE OF NUTRIENTS INTO PORTAL BLOOD OF SHEEP

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Although it is well known that the composition of the diet affects productivity in animals there are few data showing effects of diet on appearance of nutrients in blood. In the study reported here, effects of diet composition on net portal appearance (NPA) of key energy-yielding nutrients and arterial concentrations of nutrients were measured in animals fed diets of different composition which were fed at the same level of metabolisable energy (ME).

Three Merino wethers, 37-44 kg liveweight, were kept in metabolism crates. They had been surgically prepared at least two weeks before the experiment, such that polyvinyl chloride catheters were inserted into the portal vein and a femoral artery and a transit time blood flow meter (Transonics Inc., Cornell, USA) was implanted around the portal vein. Over successive periods of 12 days, and in a Latin Square sequence, the wethers were fed either chopped lucerne: oaten chaff (40:60 L/OC), chopped lucerne: rolled barley grain (60:40, L/BG) or chopped lucerne: rolled barley grain: fish meal (30:60:10, LBFM). Amounts of dry matter offered for each diet were adjusted so that the wethers were fed to meet calculated requirements for ME. Measurements of portal blood flow, net portal appearance and arterial plasma concentrations of metabolites made on day 12 of each period and intakes of nutrients over days 8-12 of each period are shown in the Table.

		L/OC	L/BG	LBFM			L/OC	L/BG	LBFM
Dry matter intake (g/d)		838 ^a	615 ^b	511 ^b	Acetate* (mM)	1.13	1.04	1.04	
Crude fibre intake (g/d)		237 ^a	143 ^b	90 ^b	Propionate* (mM)	0.02	0.02	0.02	
Crude prot. intake (g/d)		92	98	101	Butyrate* (mM)	0.02	0.03	0.08	
Digestible crude protein intake (g/d)		64 ^a	76 ^b	84 ^b	3-OH-but.* (mM)	0.35	0.40	0.59	
Dry matter digestibility (%)		54 ^a	64 ^{ab}	75 ^b	Glucose* (mM)	4.95	4.30	4.07	
Portal blood flow (l/min)		1.10	1.01	0.87	FFA* (mM)	0.20	0.27	0.25 ^b	
					Urea* (mM)	3.61 ^a	5.48 ^b	6.17 ^b	
					NPA (mmoles/min)				
					- acetate	0.36	0.47	0.56	
					- propionate	0.18	0.13	0.13	
					- butyrate	0.02	0.02	0.05	
					- 3-OH-butyrate	0.05	0.19	0.29	

*values for arterial plasma
a,b,c - values with different superscripts differ significantly, P<0.05

There was a trend for portal blood flows to be related to dry matter intake. It is evident from arterial plasma concentration of FFA and glucose that the wethers were adequately fed. In spite of the marked differences in intakes of crude fibre and dry matter and differences for dry matter digestibility, there were no differences in arterial concentrations nor NPA of most metabolites. Plasma urea apparently was related to intake of crude protein and it is of interest that concentrations of 3-OH-butyrate increased.