MEASUREMENT OF BLOOD FLOW TO THE RETICULO-RUMEN OF SHEEP USING COLOURED MICROSPHERES

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The use of radioactive microspheres to measure regional blood flow is a well established technique (Hales 1974). Non-radioactive microspheres labelled with different colours are now commercially available (E-Z Trac, USA). Estimation of blood flow using coloured microspheres correlates well with measurements using radioactive microspheres (Hale et al. 1988). The objective of this study was to determine whether estimates of blood flow using coloured microspheres can detect changes in regional blood flow to the reticulo-rumen of sheep after feeding.

Surgery was conducted on two 12-month-old cross-bred female sheep with liveweight of 26.2kg (#10) and 24.7 kg (#135). Sheep are anaesthetised (Nembutal) and PVC catheters inserted into the left ventricle of the heart via a carotid artery, and the descending aorta via a femoral artery. At least two days were allowed before measurements were made. Both sheep were fed daily at 0900 hours with ad libitum oaten hay, while sheep #135 received an additional 300g of lupin grain at 0900 hours. Blood flow measurements were made immediately prior to feeding (F1), at 1030 hours (F2), 1200 hours (F3), 1330 hours (F4) and 1500 hours (F5).

At each measurement time eight million microspheres (15μm diameter) of a different colour were injected into the left ventricle while a reference blood sample was withdrawn (6.02 ml/min) from the descending aorta. At the end of the experiment sheep were killed and the reticulo-rumen dissected into its components and weighed. To estimate blood flow, the number of microspheres of each colour was estimated in both the reference blood sample and rumen tissue following digestion in 2M NaOH.

Table: Regional blood flow (ml/min/100g tissue) in the reticulo-rumen.

	Sheep #10					Sheep #135				
	F1	F2	F3	F4	F5	F1	F2	F3	F4	F5
Reticulum	22	36	41	39	84	15	46	37	53	27
Rumen	27	35	50	33	60	38	89	58	151	52

Our estimates of regional blood flow to the reticulo-rumen are similar to those previously reported in adult Welsh sheep (Barnes et al. 1983). We believe that the measurement of blood flow using coloured microspheres is sufficiently sensitive for qualifying changes in blood flow to the reticulo-rumen of sheep after feeding.

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