

THE USE OF A COMBINED MAMMARY GLAND AND HIND LIMB MUSCLE
PREPARATION FOR STUDIES ON METABOLITE UTILISATION IN THE
CONSCIOUS LACTATING EWE

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Earlier studies have established the utility of combining classical arterio-venous (AV) difference studies with isotope dilution when examining the uptake and oxidation of substrates by specific tissues in relation to whole body metabolism (Linzell and Annison 1975). These techniques have been successfully applied to the study of mammary metabolism (Linzell 1968) and muscle metabolism in the sheep hind limb (Jarrett *et al.* 1976; Pethick and Lindsay 1978). We have examined the feasibility of establishing mammary gland and hind limb preparations in the same animal, in order to study the control of nutrient utilisation in both tissues simultaneously. Catheters were introduced into the carotid artery, and into the jugular, subcutaneous mammary, external pudendal and recurrent tarsal veins of lactating ewes accustomed to handling, at least 4-5 days before tissue metabolism was examined. Relatively unchanged levels of plasma free fatty acids, glucose and lactate during blood sampling indicated the absence of significant stress.

Blood flow through muscle and mammary tissue was measured using tritiated water (Pappenheimer and Setchell 1972). In the ewe, mammary venous drainage is carried by several major vessels, and total blood flow was measured from the AV difference of methionine, and its output in milk (Davis and Bickerstaffe 1978). The contribution of the subcutaneous mammary and external pudendal veins to total mammary venous outflow varied widely between sheep.

Blood flow measurements for mammary and hind limb muscle tissue made in 6 lactating ewes are shown below. Total mammary blood flow measured by the uptake and output in milk of methionine were within the range previously reported by Davis and Bickerstaffe (1978).

Vein	Blood flow (ml 100 g ⁻¹ min ⁻¹)	
	Mean ± S.E.	Range
Recurrent tarsal (15)*	19.4 ± 2.38	9.7 - 33.1
Subcutaneous mammary (8)	41.9 ± 4.79	23.4 - 58.9
External pudendal (8)	22.7 ± 2.01	14.9 - 34.0

* Number of measurements.

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