POSTURAL EFFECTS ON MAMMARY BLOOD FLOW AND NUTRIENT UPTAKE

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Several studies have reported an increase in blood flow to the udder with lying (Metcalf et al. 1992; Rulquin and Caudal 1992). As blood flow is a major determinant of substrate supply and uptake, posture may have an effect on nutrient uptake and therefore milk production.

Four multiparous, midlactation Friesian cows were fitted with 16 mm ultrasonic blood flow probes (Transonic Systems Inc., Cornell, New York) around the right pudendal artery, and the right pudendal vein was ligated and severed. Catheters were placed in the right facial artery and right milk vein. Preliminary results for blood flow, D3-hydroxybutyrate (D3-HB) concentration, and oxygen content with standing or lying are shown in the Table below.

Parameter		Standing	Lying	P value
Blood flow	(L/min)	4.9	5.8	0.081
D3-HB artery	(mmol/L)	1.619	1.834	0.292
D3-HB vein	(mmol/L)	0.988	1.164	0.043
D3-HB uptake	(mmol/min)	2.986	3.416	0.318
D3-HB extgraction	(%)	39.187	35.899	0.134
Oxygen artery	(mL/L)	117.9	120.2	0.210
Oxygen vein	(mL/L)	82.4	87.4	0.038
Oxygen uptake	(mL/min)	164.4	169.4	0.569
Oxygen extraction	(%)	30.2	27.0	0.089

Lying resulted in an 18% increase in blood flow to the udder, however there was no significant difference in substrate uptake. A significant increase in venous oxygen and D3-HB concentration with lying suggests that mammary metabolism alters with posture to maintain a constant nutrient uptake. Analysis of other substrates such as glucose, acetate and amino acids will shed more light on this effect.

METCALF, J.A., ROBERTS, S.J. and SUTTON, J.D. (1992). Res. Vet. Sci. 53: 59.
RULQUIN, H. and CAUDAL, J.P. (1992). Ann. Zootech. 41: 101.

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