

METABOLIC RESPONSES AND CHANGES IN BLOOD GROWTH HORMONE CONCENTRATION DURING INTERVAL EXERCISE IN NEONATAL LAMBS

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The greater vigour exhibited by crossbred lambs has been suggested as an advantage over purebred lambs in their ability to follow their mothers (Stevens et al. 1984), thereby increasing their chances of surviving the neonatal period. Although there is a large body of literature relating changes in oxygen uptake ( $V_{O_2}$ ) and blood metabolites during and after work, there is no similar information available on the energy metabolism during exercise in neonatal lambs. This study assesses the effects of brief periods of treadmill exercise on  $V_{O_2}$  and some blood constituents in Merino lambs.

Rates of  $V_{O_2}$  and venous concentrations of glucose, lactate, pyruvate, free fatty acids (FFA), total protein and growth hormone (GH) were determined in 2-day old lambs before, during three 5 min exercise bouts alternating with 3 min rest, and in the immediate 30 min recovery period. The treadmill was set at 0% grade, and at a speed of 1.0 m/s in 25°C ambient temperature.

	Rest	Interval exercise			Recovery (min)		
		1	2	3	5	15	30
Glucose mmol/l	5.08	5.14	4.92	4.94	4.91	5.11	5.33
Lactate mmol/l	1.21	1.68*	1.77*	1.85*	1.70*	1.43	1.20
Pyruvate mmol/l	0.075	0.095*	0.106*	0.110*	0.106*	0.082	0.070
FFA mmol/l	0.293	0.316	0.263	0.240**	0.217**	0.267*	0.254*
Protein mg/ml	78.93	77.51	79.07	81.74	76.99	82.55	80.57
GH ng/ml	12.28	57.18***	51.62***	46.06***	45.03***	41.43***	28.18*
$V_{O_2}$ ml/kg/s	0.317	0.750***	0.729***	0.661***			

Significantly different from rest values,  $P < 0.05^*$ ;  $P < 0.01^{**}$ ;  $P < 0.001^{***}$  (paired t test)  $n=12$ , except FFA where  $n=3$

Changes in blood glucose and plasma total protein levels were insignificant. Plasma FFA level increased during the first exercise bout, decreased during subsequent bouts and reached the lowest level at 5 min after the cessation of exercise. Blood lactate and pyruvate levels increased slightly but significantly during exercise, reaching maximum values during the last exercise bout. Levels decreased gradually during the recovery period, reaching rest values after 30 min. The highly significant increase in plasma GH levels during exercise and the first 15 min of the recovery period may be attributed partially to the treadmill procedure and open-flow system of measuring  $V_{O_2}$ , since the lambs were untrained. Oxygen uptake increased 2.4 fold to approximately 60% of maximal  $V_{O_2}$  during the first exercise bout, and remained significantly high during subsequent bouts. The slight changes in blood metabolite levels, and in particular, lactate and pyruvate, during the exercise suggest that the work was undertaken at submaximal levels, utilizing primarily aerobic pathways, with only a minor contribution from anaerobic pathways of metabolism.

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