

EFFECTS OF GROWTH HORMONE ON NUTRIENT UTILISATION AND BLOOD FLOW
IN MUSCLE TISSUE OF GROWING CALVES

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Although it is known that growth hormone (GH) increases growth of muscle tissue (see Lindsay 1983), there are few data on the effects of exogenous GH on nutrient utilisation in muscle. We report here effects of GH on blood flow and arterio-venous differences of key energy-yielding metabolites across leg muscle tissue of growing calves.

Six dairy-breed heifers (3 Friesian, 3 Ayrshire; 160-220 kg liveweight) were tethered indoors and fed continuously rolled barley/pellets: chopped lucerne/pasture hay (70:30; 9.4 MJ ME and 128 g crude protein per kg dry matter) to meet calculated ME requirements. They were surgically prepared, as described previously to allow simultaneous collection of arterial blood (A) and venous blood draining leg muscle (L) and also measurement of muscle blood flow (McDowell et al. 1984; Oddy et al. 1984). Measurements were made on blood collected on the third day of successive 3 d periods when calves were given daily subcutaneous injections of saline (S) or GH (0.1 mg/kg liveweight; 1.4 U/mg). Results are presented in the following table.

Mean values for liveweight, blood flow, concentrations (A) and arterio-venous differences (A-L) across leg muscle of metabolites during treatment with S or GH. Values with different superscripts differ significantly (a,b - P < 0.10; A, B - P < 0.05)

	S	GH	S		S	GH	S
Liveweight	193	198 ^a	197 ^a	Plasma FFA	A 199 ^A	223 ^B	206 ^{AB}
L blood flow (ml/min/100 g)	7.25 ^A	8.98	7.13 ^A	(μ M)	A-L 6	-9	2
Plasma GH (ng/ml)	2.9 ^A	7.6	2.2 ^A	Blood lactate	A 476	465	438
Plasma glucose	A 4.94	5.07	5.11	(μ M)	A-L -36 ^{ab}	-73 ^a	-32 ^b
(mM)	A-L 0.17 ^A	0.06 ^B	0.12 ^{AB}	Blood 3-OH- butyrate (μ M)	A 797 ^a	814 ^a	586
				A-L	19 ^a	23 ^a	8

It is apparent that GH increased blood flow to leg muscle tissue - possibly reflecting increased cardiac output. Concentrations in arterial blood of glucose tended to increase and of FFA and 3-OH-butyrate increased significantly during GH treatment. These changes are consistent with the lipolytic and diabetogenic effects of GH. Nutrient utilisation in muscle tissue was affected by GH. There was a significant decrease in arterio-venous difference for glucose, lactate output increased significantly, there was a suggestion of an increased uptake of 3-OH-butyrate and an output of FFA. The data are consistent with GH affecting nutrient partition/utilisation.

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