EFFECTS OF CLENBUTEROL AND NEOSTIGMINE ON GROWTH, BODY COMPOSITION AND BLOOD FLOW TO SPLANCHNIC TISSUES AND HINDQUARTERS OF LAMBS

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Potent effects of sympathomimetic agents, such as β-adrenergic agonists, on partitioning of nutrients have been well documented in a number of species of farm animals (see Moloney et al. 1991). However, the mechanism by which β-adrenergic agonists bring about these effects is not well defined. While parasympathomimetic agents such as neostigmine are expected to oppose several effects of sympathomimetic drugs, a recent report by Mangan et al. (1993) that neostigmine stimulates the release of growth hormone-releasing hormone in sheep suggests that neostigmine may promote growth in lambs. We report the effects of clenbuterol, neostigmine, and clenbuterol in conbination with neostigmine on growth, carcass composition and blood flow to splanchnic and muscle tissues of lambs.

Twenty-four, 10-12 week-old cross-bred female lambs (24-28 kg liveweight) were randomly assigned to one of four treatments: control, clenbuterol (0.32 mg/kg feed), neostigmine (1.8 mg/kg feed) and clenbuterol plus neostigmine. All lambs were fed a mixture of good quality lucerne and barley (60:40) ad libitum. Feed intake was monitored daily and live weights were recorded weekly. After a period of six weeks, lambs were anaesthetized and the abdominal cavity opened to expose the portal vein and the external iliac artery. Blood flow in the portal vein and in the external iliac artery were measured using an ultrasonic flow probe and an ultrasonic blood flow meter (Transonic Inc.). Animals were killed immediately after blood flow measurements and weights of carcass and abdominal fat recorded. Results (mean ± SEM) are summarized in the table.

	Control	Clenbuterol	Neostigmine	Clenbuterol + Neostigmine
Initial live weight (kg)	27 ± 0.7	27 ± 0.9	26 ± 0.8	26 ± 1
Final live weight (kg)	35 ± 1.2	35 ± 1.1	34 ± 1.1	34 ± 1.6
Feed intake (kg/d)	1.4 ± 0.10	1.4 ± 0.53	1.4 ± 0.08	1.4 ± 0.06
Carcass weight (kg)	16 ± 0.6	18 ± 0.7*	16 ± 0.7	18 ± 0.9*
Abdominal fat (kg)	1.4 ± 0.11	1.2 ± 0.05*	1.3 ± 0.13	1.2 ± 0.14*
Portal blood flow (ml/min)	946 ± 126	668 ± 41*	899 ± 197	641 ± 39*
Hindquarter blood flow (ml/min)	511 ± 39	529 ± 65	596 ± 106	530 ± 59

* Significantly different from control ($P < 0.05$).

Although feed intake or liveweight gains were not affected by clenbuterol, carcass weight was increased 14% and abdominal fat was decreased by 16%. The marked decrease in portal blood flow without an accompanying change in blood flow to the hindquarters suggests that redistribution of cardiac output was at least partly responsible for the repartitioning of nutrients. Neostigmine did not affect growth or body composition of the lambs. It appears that the autonomic nervous system was not involved in the response to clenbuterol.

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