

Use of DXA for estimating changes in carcass composition of lambs given formaldehyde-treated sunflower meal and clenbuterol

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Clenbuterol, a β -adrenergic agonist, increases skeletal muscle deposition and reduces carcass fatness in lambs (1) but it is not known whether the increase in muscle would be enhanced by rumen-undegradable protein in the diet. Therefore, the first aim of this study was to determine whether dietary protein quality influences the repartitioning effect of clenbuterol in lambs. Since chemical analysis of carcass composition is a laborious and expensive procedure, the potential for using Dual Energy X-Ray Absorptiometry (DXA) for measuring carcass composition was also evaluated.

Thirty two second cross lambs (16 males and 16 females), 5-6 months old were allocated to four treatments on the basis of liveweight and sex (mean of treatments 31.8 ± 0.6 kg). In a 2×2 factorial design lambs were given either untreated sunflower meal (USM) or formaldehyde treated sunflower meal (FSM, Bypass Stockfeeds, NSW) with or without clenbuterol (0.32 mg/kg feed). All lambs were fed ad libitum a mixture of lucerne chaff:rolled barley:sunflower meal in the ratio of 60:10:30 for six weeks. Lambs were then slaughtered and carcass weight and non-carcass fat depot weights recorded. Carcasses were split down the middle and the semitendinosus (ST) muscle removed from one side of the carcass. The other half carcass was scanned with a Hologic QDR-1000/W (Waltham-MNA) densitometer using the standard whole body protocol (Ver 5.47).

	Control		Clenbuterol		Sed	Significance (P value)		
	USM	FSM	USM	FSM		C	P	CxP
Weight gain (kg)	6.1	7.4	7.8	8.7	0.8	0.014	0.059	0.795
¹ Carcass weight (kg)	17.3	17.4	18.4	18.1	0.4	0.005	0.793	0.473
² Semitendinosus (g)	100.7	96.3	110.7	112.4	3.1	0.000	0.549	0.175
² Abdominal fat (g)	452.5	550.4	288.4	287.8	98.1	0.005	0.490	0.483
² DXA: % lean	83.1	81.6	87.5	86.6	0.9	0.000	0.061	0.585
% fat	14.8	16.2	10.8	11.2	0.4	0.000	0.133	0.442

¹adjusted to common fasted weight of 37.7 kg; ²carcass weight of 17.8 kg; Clenbuterol (C) Protein (P)

Both clenbuterol and FSM increased weight gain without affecting intake. Lambs given clenbuterol had heavier carcasses (5.3%), increased ST weight (11.4%) and % carcass lean (5.7%) and decreased % carcass fat (29.0%) and abdominal (42.6%) fat which is consistent with previous studies (1). FSM had no significant affect on any of these parameters.

These results indicate that, while FSM in the diet increased the efficiency of weight gain, clenbuterol stimulation of skeletal muscle deposition in lambs is not enhanced by providing rumen-undegradable protein in the diet in the form of FSM. The study has also shown DXA to be a precise and convenient method for measuring changes in carcass composition. Its accuracy will need to be verified by comparison with chemical analysis, particularly taking account of the altered anatomy of the scanned material.

1. Warriss PD, Kestin SC, Brown SN. The effect of beta-adrenergic agonists on carcass and meat quality in sheep. Anim Prod 1989;48:385-92.