

The metabolism of glycogen and ultimate pH of muscle in Merino, 1st cross and 2nd cross wether lambs as affected by stress at slaughter

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There is an industry perception that Merino lambs yield darker meat compared to cross bred lambs. However, the role of breed and the interactions with nutrition and stress have not been studied. The aim of this experiment was to compare the metabolism of muscle glycogen and ultimate pH (pHu) of muscle in Merino and cross bred lambs fed the same diet and receiving different levels of stress pre-slaughter.

Twenty five Merino, 24 1st cross (Merino dam and Poll Dorset sire (1X)) and 23 2nd cross (Border Leicester x Merino dam and Poll Dorset sire (2X)) lambs (6 months old and 30kg liveweight) were in pens of 7-9 animals, with 3 pens/breed. For 8 weeks the lambs were fed 1.3kg/d of a ration consisting of 30% lupin 29.65% cereal straw, 28% barley grain, 8% canola meal, 2% limestone, 1.35% mineral/vitamin mix, 0.5% salt, 0.5% gypsum and 100gm Rumensin/tonne (ME 10.8MJ/kg DM, protein 17.4% DM). At week 6, a muscle biopsy was taken from 5 lambs in each pen. At week 8, 5 animals from each breed were slaughtered at an experimental abattoir 10 minutes after removal from their pens (low stress slaughter). The

remaining lambs, kept in separate breed groups, were transported for 2 hours and slaughtered after 24 hours lairage at a commercial abattoir. Muscle samples taken by biopsy and at slaughter were assayed for glycogen (corrected for lactate concentration). The pHu of muscle was measured 48 hours post slaughter.

Muscle tissues of lambs undergoing the low stress slaughter had higher post mortem muscle glycogen concentrations, lower pHu and no significant loss of glycogen between pen and slaughter. Breed had no effect on any of the parameters measured under low stress slaughter conditions, or at the muscle biopsy. In contrast, under commercial slaughter conditions, the muscle of Merino lambs had the lowest post mortem glycogen concentration, the highest pHu and greatest loss of glycogen between pen and slaughter. We conclude that an increasing proportion of Merino genetics is associated with a greater sensitivity to stress in lambs destined for slaughter.

Table 1 Glycogen concentration (% w/w) and pHu of muscle in Merino and cross bred sheep.

Muscle ^b	Low stress slaughter			Commercial stress slaughter				Slaughter	Significance of effects(P) ^a	
	Merino	1X	2X	Merino	1X	2X	SEM		Breed	
								Low stress	Commercial	
Glycogen concentration PM ^c										
SM	1.95	1.72	1.77	1.24	1.51	1.59	0.10	***	ns	***
ST	1.28	1.29	1.51	0.76	1.11	1.12	0.09	***	ns	***
Glycogen concentration Biopsy-PM										
SM	-0.26	0.18	0.08	0.63	0.37	0.17	0.12	***	ns	**
ST	-0.01	0.02	-0.07	0.64	0.41	0.03	0.12	***	ns	***

^a ns - not significant; * - p<0.05; ** - p<0.01; *** - p<0.001; ^b SM - m. semimembranosus, ST - m. semitendinosus and LD - m.