Muscle Haem Content and Colour are Affected by Age Category and Muscle Type, but not by Exsanguination Method, in Sheep Meat

M.G. Kerr[A], S. Baud[B], R.D .Warner[A] and A.N. Naththarampatha[A]

[A]Department of Primary Industries, 600 Sneydes Road, Werribee, Vic 3030
[B] 220 Boyds Road, Mt Taylor Vic 3875

Fresh meat colour, and discolouration during display, are influenced by the concentration and chemical condition of the muscle pigment myoglobin (Mb), and to a lesser extent the presence of haemoglobin (Mancini & Hunt, 2005). Haemoglobin can remain in muscle tissue as residual blood and is influenced by the exsanguination process. Myoglobin content is known to vary with age of the animal and also the muscle. The aim of the experiment was to investigate the variation in haem pigment content (myoglobin and haemoglobin) and colour with animal age, exsanguination method and muscle in sheep carcasses.

Lamb (n=24) and mutton (n=24) carcasses (average weight=25.3 kg, SD=3.01) were used to investigate the effect of age category (lamb, mutton), exsanguination method (thoracic or normal) and muscle (loin, M. *longissimus lumborum* or silverside, M. *semitendosus*) on muscle haem pigment content and meat colour. Reflectance spectra were measured on the muscle surface at 24 hrs post-slaughter using an ASD Lab Spec Pro instrument with an optical probe attachment. Reflectance (R) values were converted to absorption (A) values according to the formula A= log 1/R. Absorption values at specific wavelengths were used to estimate total myoglobin (AMb = A525nm-A730nm) and total haem pigment (myoglobin and haemoglobin, AMb+Hb = A550nm-A730nm) (Krzywicki, 1979). Surface meat colour (L*, a*, b*) was measured objectively with a Hunter lab instrument (Hunterlab Miniscan, TM XE Plus 45/10, with glass nose cone and light source set to D65/10) at 24 hours post slaughter ,after a 30 min bloom at 3^{o}C.

Table 1. Effects of age category, exsanguination method and muscle on myoglobin content (AMb), total haem pigment content (AMb+Hb) and surface colour (L*, a*, b*).

		AMb	AMb+Hb	L *	a *
Age category	Lamb	0.528[a]	0.707[a]	35.8[a]	6.25[a]
	mutton	0.603[b]	0.784[b]	33.3[b]	8.20[b]
	SED	0.009	0.011	0.44	0.31
Exsanguination method	Normal	0.560	0.738	34.6	7.32
	thoracic	0.571	0.752	34.5	7.13
	SED	0.009	0.010	0.42	0.29
Muscle	loin	0.621[b]	0.773[b]	30.6[a]	7.73[b]
	silverside	0.479[a]	0.656[a]	36.5[b]	5.63[a]
	SED	0.008	0.012	0.44	0.25

[ab] Values within a column and treatment with different superscripts are significantly different (P<0.001)

Mutton had higher muscle myoglobin and total haem pigment content and meat with a darker (higher L*) and more red (higher a*) surface, compared to lamb muscles. The silverside had a lower myoglobin and total pigment content and a less red and lighter meat surface relative to the loin. The lack of difference in residual blood (indicated by AMb+Hb) in the muscles between exsanguination methods explains the lack of difference in meat colour. The higher values for total haem pigment (AMb+Hb) relative to myoglobin (AMb) indicate that there was residual haemglobin in all muscles measured. It was hypothesised that the thoracic exsanguination method would provide more efficient bleeding at slaughter, but the lack of difference in total haem pigment between exsanguination methods did not support this. In conclusion, the darker colour of mutton and of the loin muscle, relative to lamb and the silverside respectively, can be attributed to the higher myoglobin content.

Mancini, R.A. and Hunt, M.C. (2005) *Meat Science* **71**, 100.
Krzywicki, K. (1979) *Meat Science* **3**, 1.

Email: matthew.kerr@dpi.vic.gov.au