KANGAROO TOTAL MUSCLE COLLAGEN AS INFLUENCED BY CARCASS WEIGHT AND MUSCLE

A.J.W. BEATON[A,B]*, N.B. SPIEGEL*[A,B]*, J.M. THOMPSON*[A] *and P.C. WYNN*[B]

[A] Division of Animal Science, University of New England, Armidale, NSW 2351
[B] Faculty of Veterinary Science, University of Sydney, NSW 2006

The collagen within muscle forms the structural framework around which muscular structure and function is based, allowing for the translation of myofibrillar contraction into movement, and the maintenance of muscle conformation. Total intramuscular collagen measurement can be a valuable indicator of meat quality. This paper illustrates the effects of carcass weight and muscle on total collagen content of kangaroo meat.

Fifty male Eastern Grey (*Macropus giganteus*) kangaroos, commercially harvested over 10 nights from north-west NSW, were sampled at the extremes in body size to produce low (mean weight 13.3 kg, range 10-15 kg) and high (mean weight 40.8, range 36-48 kg) weight groups. Animals from both treatments were collected each night to reduce harvest night bias. The muscles investigated were the *M. adductor* (topside), *M. biceps femoris* (silverside) and *M. longissimus dorsi* (loin fillet).

Carcasses were suspended by the tail. Ambient conditions were mild to cool (night temperature range 5-15ºC). Carcasses were kept at ambient temperature for a minimum of 4 h before being placed in a chiller at 1^{o}C. At 24 h *post mortem*, the 3 muscles were excised from both sides of the carcass. They were trimmed of the epimysium, and multiple sub-samples were collected from each muscle, bulked, homogenised and subsequently stored at -20ºC. Total intramuscular collagen was estimated by assay of hydroxyproline (ISO 1994).

Table 1. Effect of dressed weight on total muscle collagen (% dried muscle (s.e. of mean)) in several muscles.

	M. adductor (topside)	*M. biceps femoris* (silverside)	*M. l. dorsi* (loin fillet)
Low dressed weight	1.87^{a} (0.13)	1.94^{a} (0.13)	1.33^{c} (0.13)
High dressed weight	3.09^{b} (0.13)	2.83^{b} (0.13)	1.52^{c} (0.13)

Values in rows and columns with different letters are significantly different (P<0.01)

The results (Table 1) show that as dressed weight increased, total collagen content increased in the leg muscles, but not in the loin muscle. It can be assumed that the heavier animals were also older, although under field conditions, this could not be measured. The physical strength of the connective tissue matrix within live muscle facilitates efficient maintenance of integrity and function. It is hypothesised that the higher proportion of collagen in leg muscles was a response to the need for greater structural resilience in locomotory muscles of the leg, particularly during hopping, which would be of greater magnitude with increasing weight. In contrast, the loin, which is a postural muscle, showed no significant relationship between collagen content and dressed weight, despite the increased physical stress occurring due to locomotion as animals become heavier.

These results have important meat quality and industry implications. Increased tenderness of meat cuts has commonly been associated with lower collagen (or connective tissue) content of muscles, irrespective of species (Bailey and Light 1989). These results suggest that leg cuts derived from lighter, younger male animals should be of higher eating quality, whereas the quality of the loin fillet should be independent of age. Total intramuscular collagen provides a good indication of the impact that collagen will have upon ultimate muscle tenderness. Further investigations of collagen fibre cross-linkages (affecting solubility) and fibre morphology are currently in progress, and will provide further insight into the contribution of this important component to the quality of kangaroo meat.

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ISO (1994). 'Meat and Meat Products - Determination of Hydroxyproline Content.' ISO3496:1994(E).

Email: abeaton@metz.une.edu.au