Muscle is a Better Descriptor of Beef Eating Quality than Collagen Content

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Variable eating quality is a major driver of declining beef consumption (Polkinghorne *et al* 2008). One factor impacting on beef tenderness is collagen content, described as either soluble or insoluble, with the insoluble collagen thought to more closely reflect that remaining after the cooking process. Both shear force and "trained taste-panel" data has previously shown a link between increasing insoluble collagen and decreasing tenderness in the *m. longissimus thoracis* (Chriki *et al* 2012), with similar relationships also demonstrated across other cuts in the carcass (Jurie *et al* 2007). Therefore, we hypothesis that insoluble collagen will have a negative impact on eating quality within individual cuts as scored by untrained consumers.

Insoluble, total, and soluble collagen (soluble = total-insoluble) was determined (Listrat and Hoquette 2004) for 6 muscles, (*biceps femoris*, *semimembranosus*, *longissimus thoracis*, *gluteus medius*, *infraspinatus* and *psoas major*) from 36 Australian and French cattle. Untrained consumer scores for tenderness, juiciness, flavour, and overall liking were weighted (0.3, 0.1, 0.3, 0.3) and combined into a quality score termed MQ4. This was analysed using a linear mixed effects model with fixed effects for cut and source country by *post-mortem* ageing period fitted within doneness. Animal ID was used as a random term. Collagen measurements were included separately as covariates. The same models were then run without including cut.

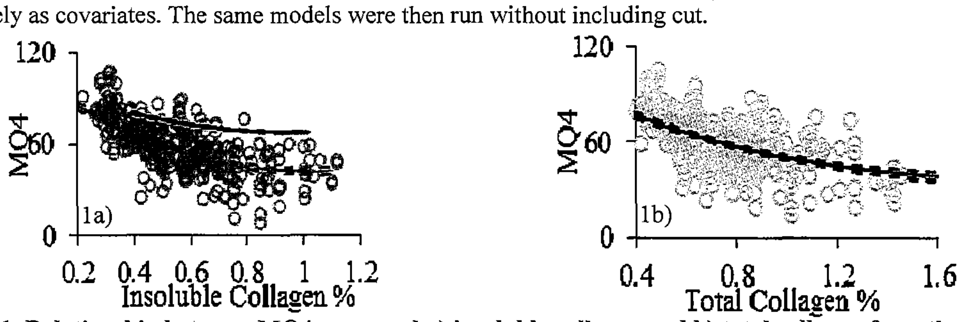

Figure 1. Relationship between MQ4 score and a) insoluble collagen and b) total collagen from the model excluding cut. Lines represent predicted mean ± SE. Points represents residuals from the predicted mean.

When cut was not included in the model insoluble collagen and total collagen % (Figure 1a and 1b) demonstrated a negative curve linear relationship ($P < 0.01$) with MQ4 score which decreased by 54.6 and 47.6 units across the range of collagen data. This relationship was not evident when cut was included in the model. Soluble collagen had no effect.

There was a negative relationship between insoluble collagen and MQ4, however contrary to our hypothesis this was not evident when cut was included in the model. Hence, collagen describes eating quality differences between cuts, but provides little information within cuts. This contrasts with work by Chriki *et al* (2012) who demonstrated a negative relationship (r = -0.15 to -0.20) within cuts between insoluble collagen and trained panel sensory scores. However, this effect was likely too small to be detected using untrained consumer scores. Soluble collagen failed to have any relationship with MQ4, aligning well with previous work (Chriki *et al* 2012). As such, the impact of total collagen simply reflects the impact of the insoluble component. Therefore collagen measurements are unlikely to improve the prediction of eating quality in an industry model that includes identification of cut.

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Chriki S., Gardner, G.E., Jurie, C., Picard, B., Micol, D., Brun, J.P., Journaux, L. and Hocquette, J.F. (2012). *BMC Biochem* **13,** 29.
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