# Meat quality traits of crossbred lamb loins sired by high and low muscle density rams (as measured by computer tomography)


**Summary:** *(Your summary (Times New Roman 10) must use Body text style and must not be longer than this box)*

**Implications** The use of *in-vivo* muscle density as a selection criteria, can cause differences in saturation, redness and yellowness of meat colour traits in crossbred lamb loins.

**Introduction** Muscle density as assessed by computer tomography (CT) has a negative genetic correlation with intramuscular fat (Karamichou *et al*., 2006). The aim of this study was to evaluate the meat quality of lambs sired by rams selected for extremes (high and low) of muscle density.

**Material and Methods** CT scanning was carried out to select five high and five low muscle density Abermax™ (Innovis bred F1 Texel x Charollais) rams out of a sample of 120 ram lambs; these differed by 3 standard deviations. Semen from these rams was used to inseminate 230 North Country Mule ewes, which lambed over a 10 day period (2012). Slaughter lambs were selected on commercial criteria (target carcass weight: 18-21kg and fat class 2-3L). Lambs were reared on grass and weaning occurred at 22 weeks (mean age 154d ± 0.08 se). Ultimate pH was taken at 48h post slaughter on the *M. longissimuis dorsi* at the fourth lumbar vertebrae location. Right lamb loin (lumbar vertebra region) and whole left loin samples were excised and aged for 7 days post mortem and were subsequently frozen. Right rear loin were defrosted for 16 hours and cooked via water bath method until an internal temperature of 75°C was reached. These samples were then chilled overnight and measured for Shear Force (10 measurements per loin) using the MIRINZ tenderometer (Tenderscot). The left loin was analysed for colour, with the 9 steak pieces (2cm depth) left to bloom for 1h. Colour traits were determined using a Minolta Chroma Meter CR-400. Data were analysed in GENSTAT 15 using a REML model with sire as a random effect. Muscle density was fitted as a fixed effect along with sex, slaughter batch, dam age (2yr vs. older), rear type (single/twin/artificially reared), MyoMAX™ status (P<0.2) and slaughter weight as a covariate.

**Results** Low muscle density lamb loins tended to be lower in shear force (P=0.067; Table 1). Significant colour parameters included saturation, redness and yellowness. Low muscle density sired progeny had higher values in these colour measures.

**Table 1.** Meat quality trait results for progeny produced from high and low muscle density Abermax™ rams

| | | Sire muscle density group | | | |
|---|---|---|---|---|---|
| Trait | n | Low | High | s.e.d | P-Value. |
| Shear Force (N) | 200 | 29.64 | 31.97 | 1.100 | 0.067 |
| Ultimate pH (LV4) | 205 | 5.71 | 5.69 | 0.011 | 0.162 |
| Colour - Saturation (C*) | 178 | 17.76 | 17.12 | 0.204 | 0.012 |
| Lightness (Log L*) | 181 | 43.45 (1.64) | 43.15 (1.64) | 0.003 | 0.290 |
| Redness (Log a*) | 178 | 16.22 (1.21) | 15.70 (1.20) | 0.005 | 0.012 |
| Yellowness (b*) | 178 | 6.80 | 6.49 | 0.122 | 0.033 |

Logarithm values in parentheses

**Conclusion** Low muscle density progeny had a tendency for lower shear force (P=0.067). Karamichou *et al*., (2006) found muscle density was negatively correlated with shear force. Low muscle density lamb loins had significantly increased colour saturation, redness and yellowness. High muscle density sired lambs have increased lean tissue (Price *et al*., 2013). Bünger *et al*., (2009) found that Texel sheep compared to Scottish Blackface sheep have higher muscle density, total fibre number and an increase in fast, glycolytic (white) fibres in combination with a strong decrease in slow, oxidative (red) fibres. Selection for increased lean or muscle density may influence meat quality colour traits, possibly via a difference in fibre type and therefore cause an effect in meat quality.



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