

## Genetic and non-genetic effects on ultimate meat pH of lamb meat

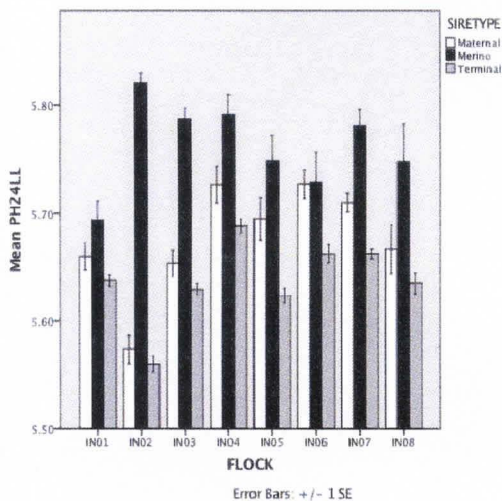
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**Introduction** The ultimate pH of meat (measured at approx. 24 hours post slaughter) is a key quality determinant of sensory attributes of sheep meat (Warner *et al* 2010). Between a pH of 5.4-5.7 sheep meat is tender, juicy and light in colour with better keeping qualities. Muscle glycogen levels at slaughter are governed by the quality of pre-slaughter nutrition and depletion results from stress and/or exercise prior to slaughter. Breed type may also play an important role, with Australian studies indicating that the Merino sheep breed has a higher incidence of elevated ultimate pH compared to first and second cross lambs (sired by Border Leicester and Poll Dorsets) (Hopkins *et al* 2005). This is attributed to a greater sensitivity to stress and therefore a greater glycogen depletion rate than crossbred lambs (Gardner *et al* 1999). The objectives of this study are to better quantify the genetic and non-genetic factors and relevant interactions influencing ultimate pH levels in pure merino and cross bred lambs representing diverse genetic backgrounds.

**Materials and methods** This experiment was completed as part of the CRC for Sheep Industry Innovation Information Nucleus flock (further details refer to van der Werf *et al* 2010). Briefly, approximately 2000 lambs were produced in 2009 from AI mating to Merino and crossbred ewes located at 8 research sites across Australia (Katanning WA, Trangie NSW, Cowra NSW, Kirby NSW, Struan SA, Turretfield SA, Hamilton VIC, and Rutherglen VIC) representing a broad cross section of Australian production systems. These lambs were the progeny of 93 key industry sires representative of the major production types in the Australian sheep industry. The sires can be classified by sire type as either merino, maternal or terminal resulting in either pure merino or crossbred lambs. Within each sire type there are a number of sire breeds of which merino and poll merino are included under the merino sire type and crossbred lambs would be under maternal and terminal type. At each of the 8 sites there are pure merino and cross bred lambs all being run under the same feeding and environmental conditions. Lambs were slaughtered at their target average carcass weight of 21.5kg. The pH and temperature of each carcass was measured about 19-24 hours after slaughter taken in the left portion of the m. *longissimus thoracis et lumborum* (loin or pH24LL) muscle at the 12<sup>th</sup> rib site (further details refer to Pearce *et al* 2010). A linear mixed effects model was used to analyse the data and included fixed effects (and their relevant interactions) for site, sex, birth type-rear type, sire type, dam breed within sire type, sire breed within sire type and date of kill. Sire and dam identification were included as random terms.



**Figure 1** Ultimate pH of the loin (pH24LL) for the different sire types across sites (mean  $\pm$  SE).

**Results** There were significant ( $P < 0.01$ ) main effects for site, kill date, sire type and sire breed within sire type effect. Within sire type the average ultimate pH for the merino sire breeds was 5.73 with a range of 5.65 to 5.90 (se of 0.013). For the maternal sire type the average ultimate pH across the sire breeds was 5.67 (Range of 5.63-5.72, SE of 0.024) and terminals the ultimate pH was 5.63 (range of 5.59-5.67, se of 0.03). Within each site there were marked differences between kill dates which varied by as much as 0.15 pH units with kills containing higher proportion of merinos having a higher ultimate pH. There was a significant variation in ultimate pH across sites with site IN02 having the lowest overall ultimate pH but the highest merino sire type ultimate pH. This finding reflects differences in finishing treatments between sites. Site IN07 had the highest ultimate pH overall which may be because these lambs were finished for slaughter on a maintenance ration, which resulted in lower muscle glycogen levels, and therefore a higher ultimate pH compared to other sites that were finished on above maintenance rations.

**Conclusions** This study has shown that despite similar finishing conditions within site, the ultimate pH of the loin is significantly different between sire types and sire breeds within sire type. The ultimate pH of loins from merino sire types was significantly higher than maternal and terminal sire type lambs. Maintaining sufficient levels of glycogen in merino lamb meat through adequate pre slaughter nutrition is essential to maintain the sensory appeal for consumers.

### References

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