The effect of a vascular rinse and chill on lamb carcase yield

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I. INTRODUCTION

The Rinse & Chill® Technology (RCT) uses an isotonic solution including water, dextrose, maltose and sodium phosphates as a method of vascular infusion to improve blood removal, lowering the internal carcase temperature more quickly and modifying carcase pH decline consequently, improving meat quality and safety [1]. While rinsing of lamb carcases has been previously shown to improve meat quality traits including tenderness with no difference on waterholding capacity of the loin [2], as yet no research has been conducted on the impact of RCT on carcase yield of lambs despite research in beef suggesting yield increases in the range of 5 – 6% are possible [1]. Therefore, the aim of this study was to assess the impact of RCT on lamb carcase yield.

II. MATERIALS AND METHODS

Over 5 days 1,450 carcases were randomly selected from a commercial lamb processing plant and included in the trial. Carcases were allocated via random block design to either RCT treated group or control group resulting in 664 treated carcases and 660 untreated controls as retained carcases were excluded from the trial (n = 126), resulting in a total of 1,324 observations. The RCT solution was infused based on 10% liveweight calculated using a pre-rinse weight for every individual carcase as per normal operating procedures. All other aspects of carcase processing remained as per standard industry practice.

Hot carcase weight (HCW) was recorded on entry to the chillers and GR Tissue Depth (110mm from the midline on the 12th rib) was also measured. At 24h post-mortem, 346 carcases were re-weighed to get a cold carcase weight (CCW). Linear models and ANOVA were used to calculate predicted means for HCW, CW and chiller shrink using kill as a fixed effect and pre- rinsed weight as a covariate using the 'lem4', 'asreml' and 'lmerTest' packages in R Core Software [3]. Given pre-rinse weight tended to be higher for control carcases, analysis was completed by adjusting the models to a mean pre-rinsed weight.

III. RESULTS AND DISCUSSION

Overall, this trial demonstrated HCW was increased by ~3% when RCT was used. While there is a paucity of research in lamb, this is consistent with research on beef carcases which has shown early post mortem changes to the muscle as a result of RCT causes an increase in carcase yield of between 2 – 4% [4] This is demonstrated by models as increased HCW by 700g (± s.e 0.048), with a predicted mean HCW of 22.65 kg (95% CL 22.56 – 22.74 kg) and the mean weight of control carcases was 21.97 kg (95% CL 21.88 – 22.74 kg) as shown in Fig. 1. Explaining 82% of the variation in HCW, this model left a residual standard deviation of 1.2kg. While HCW was significantly different between days of measurement, no interaction was found between treatment and day.

Similarly, CCW increased by 700g per carcase with RCT treatment resulting in a mean CCW of 22.4kgs (95% CL 22.2 – 22.5kgs) compared to a mean CW of 21.7kg (95% CL 21.5 – 21.8). The fitted

models explained 82% of the variation in CCW leaving a residual standard deviation of 1.1kgs. While the CCW also differed significantly between days, there was no interaction between day and treatment.

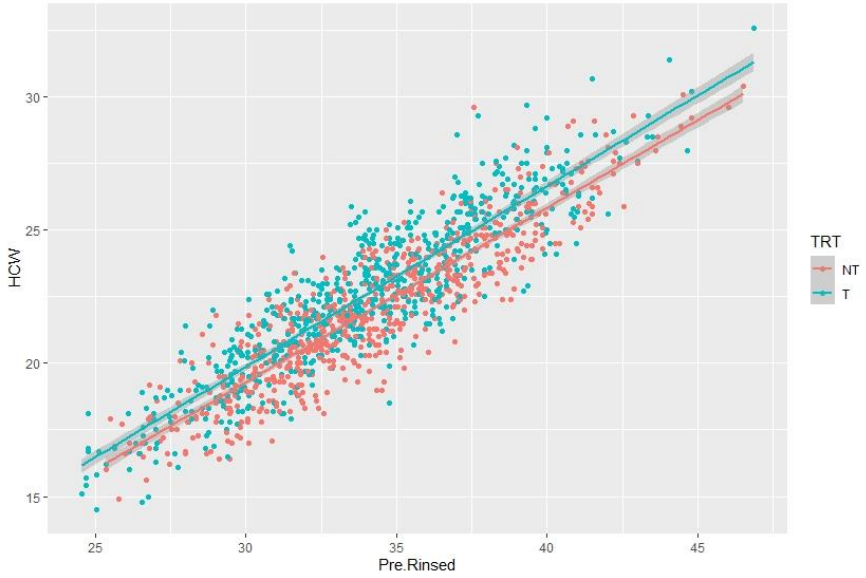

Figure 1. Pre-rinsed weight and hot carcase weight for RCT treated (T) and control (NT) carcases.

Although the reason behind the observed effect has not been described, Dikeman et al. [4] have hypothesised that increases in yield are the result of fluid retention which may have been achieved by altering the pH and temperature decline of carcases during the early post mortem period. It is postulated that metabolism of the solution by the muscle during the early post mortem period alters the myofilament lattice arrangement, denaturation of the myofilament heads and subsequently the extent of sarcomere shortening by altering the pH decline [5]. As a result, less water is pushed into the extracellular space and protein connections remain intact which prevents the shrinkage of the muscle during rigor being translated from the myofibrils to the whole muscle causing water loss. However, further work on the mechanisms is required.

IV. CONCLUSION

Overall, this study demonstrated treatment of lamb carcases with Rinse & Chill resulted in a significant increase of lamb yield, which is retained through chilling.

ACKNOWLEDGEMENTS

The authors would like to acknowledge and thank Meat & Livestock Australia for funding the research, Brad Wilesmith (MPSC), Andre Lenko (MPSC), John Marlette (MPSC), Adam Tainui (MPSC), Scott Mitchell (MPSC) and Matt Kerr (NSW DPI) for their assistance with data collection, sample analysis and sample processing.

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