P-02-31

Re-grading: A worthwhile strategy to reduce the incidence of dark cutting in grain fed beef? (#512)

Paula Gonzalez-Rivas[2], Cameron Steel[1], Robyn Warner[2], Fran Cowley[1], Frank Dunshea[2], Peter McGilchrist[1]

[1] University of New England, Department of Environmental and Rural Sciences, Armidale, Australia; [2] Melbourne University, Faculty of Veterinary and Agricultural sciences, Melbourne, Australia

Introduction

Dark cutting (DC) in beef carcasses is a complex multifactorial condition influenced by pre- and post-slaughter factors including abattoir management and processing. Meat Standards Australia classifies DC carcasses when the meat pH of the m. *longissimus thoracis* (LT) measured at the quartering site is greater than 5.70. Under current AUS-Meat guidelines, carcasses can be graded at 8 hours post-mortem if they have had some electrical stimulation. Previous studies have demonstrated that the LT muscle of beef carcasses chilled by traditional methods, does not reach ultimate pH until at least 18-24 h post slaughter (Murray, A. C. (1989). Factors affecting beef color at time of grading. *Canadian Journal of Animal Science, 69*(2), 347-355.)(Hughes, JM, Kearney, G, Warner, RD (2014) Improving beef meat colour scores at carcass grading. *Animal Production Science 54*, 422-429.) , and that differences in post-mortem muscle metabolic activity (eg. glycogen utilization rate) and mitochondrial metabolism are causative factors for high pH meat in grain-fed beef carcasses (Mahmood, S., Roy, B. C., Larsen, I. L., Aalhus, J. L., Dixon, W. T., & Bruce, H. L. (2017). Understanding the quality of typical and atypical dark cutting beef from heifers and steers. *Meat Science, 133*, 75-85.).

Therefore, the objective of this experiment was to determine whether the time from slaughter to grading influences the pH of grain-fed carcasses, and the viability of re-grading at later time intervals as a method to minimise the incidence of dark cutting carcasses in Australia. It was hypothesised that re-grading grain fed beef carcasses will reduce the percentage of carcasses initially graded as DC.

Methods

A total of 1,181 grain fed beef carcasses were assessed for re-grading at a beef processor in New South Wales, Australia. A TPS WP-80M pH meter (TPS Pty Ltd, Brendale, Queensland, Australia) was used to measure pH and temperature. The pH meter and electrode were calibrated at ambient temperature using buffers pH 4.00 and pH 7.00. Grading was conducted as per MSA standards and protocols by accredited MSA graders allowing least 30 minutes of blooming at the quartering site. Researchers followed the graders during grading and recorded pH and temperature at the time of grading. The carcasses were initially graded at 'normal' time of grading for the processor (12.6 ± 1.15 h post-slaughter) and were then re-graded before the time of boning (21.1 ± 1.15 h post-slaughter). Re-grading was conducted 8.6 ± 0.79 h after grading by an accredited grader on the opposite side of the carcass after at least 30 minutes of blooming, and simultaneously, research staff collected a pH and temperature measurement. The results for the two grading times were compared with a t test using GENSTAT 18.

Results

The re-grading analysis strongly supported the initial hypothesis. The results demonstrated that 32.3 % of carcasses that were initially high in pH at the initial grading (>5.70) became compliant in pH (≤5.70) at re-grading. Additionally, of the 1,181 carcasses re-graded at (~21 h post mortem), 77.7 % of re-graded carcasses showed a reduction of pH compared to the initial grading pH (Table 1).

The mean pH at initial grading was 5.59 ± 0.195 (min 5.36, max 6.79) which was significantly higher than the mean pH at regrading which was 5.52 ± 0.186 (min 5.29, max 6.81 t=7.95, d.f.=2080, P<0.001).

Conclusion

The grading and re-grading analysis demonstrated that re-grading carcasses can ensure carcasses are close to reaching ultimate pH, if not already at ultimate pH. This indicates that at the time of initial grading (~12 h post-slaughter) an ultimate pH had not been reached in 77.7 % of carcasses. The re-grading analysis demonstrated that 32.3 % of carcasses that were initially high in pH became compliant in pH after re-grading, confirming that re-grading or delaying the grading process until carcasses reach ultimate pH may substantially reduce the incidences of dark cutting.

A cost-benefit analysis should be conducted to determine the efficacy of implementing a re-grading strategy for processors to reduce the incidence of dark cutting. This would benefit the grain fed industry in Australia by preventing producers from accumulating discounts on carcasses that are not true dark cutters, as well as processors losses through not meeting target market specifications.

Notes

Characteristic at initial grading	N (%)	Decrease pHu at Re-grading (%)	Become Compliant pH if non-compliant at grading (%)
Total	1,181 (100)	77.7	2.71
High pH (>5.7)	100 (8.4)	82	32.3
Normal pH (≤5.7)	1,081 (91.5)	77.3	N/A

Table 1:
Regrading results from carcasses measured at ~8 hours after the initial (~12h) post slaught

Notes