# THE EFFECT OF DIFFERENT CATTLE MARKETING ALTERNATIVES ON THE EATING QUALITY OF BEEF

Peter McGilchrist<sup>1\*</sup>, Emma Lynch<sup>1</sup>, Rod P. Polkinghorne<sup>1,2</sup>, Holly Cuthbertson<sup>1,2</sup>, Nipa R.

# Sarker<sup>1</sup>

<sup>1</sup> School of Environmental and Rural Science, University of New England, Armidale, NSW, 2350, Australia.

<sup>2</sup> Birkenwood International, 45 Church Street, Hawthorn, VIC 3122, Australia

\*Corresponding author email: peter.mcgilchrist@une.edu.au

## I. INTRODUCTION

Eating quality is becoming progressively important in the competitive protein marketplace as consumers are increasingly educated and meticulous in their selection [1] particularly with animal welfare credentials. Beef saleyards are a favoured marketing method in the Australian supply chain offering producers the ability to sell varying numbers and classes of cattle, contract agents to sell cattle on their behalf and providing competitive pricing [2]. However concerns regarding the impact of increased stressors and stimulation in the selling environment on eating quality and production has led to a higher proportion of cattle being sold through more direct pathways such as direct consignment [3]. Acute and chronic production stress has been found to adversely impact meat quality attributes including tenderness and ultimate pH [4, 5]. There is evidence that a resting or refeeding period prior to slaughter may assist is dissipating adverse eating quality effects caused by stress exposure throughout the supply chain [6]. The objective was to quantify the eating quality impact of alternative cattle marketing practices between four different saleyard treatments compared to direct consignment control cattle.

### II. MATERIALS AND METHODS

The design utilised 5 treatment groups (n = 120) of mixed sex cattle of different breeds that were balanced within treatment from 4 different properties (2 supplied steers and 2 supplied heifers). The control treatment group (n = 24) were directly consigned to the abattoir (6 from each property), while the cattle for the other 4 treatment groups (24 from each property) were all penned with their property contemporary group during a livestock auction. The saleyard treatments were i) current Meat Standards Australia (MSA) saleyard pathway (36 hours from farm to knocking box, not mixed & water only), ii) 72 hours, iii) 7 days re-feeding and iv) 14 days re-feeding post sale. The 72 hour, 7 day and 14 day groups were mixed contemporary groups post-sale with access to total mixed ration and water. The impact of treatment on meat quality score (MQ4 = tenderness \* 0.3, juiciness \* 0.1, flavour \* 0.3 and overall liking \* 0.3) was measured using 400 untrained Australian consumers for grilled *M. longissimus lumborum* (Striploin) and *M. Semitendinosus* (eye round) aged for 7 days post-mortem. The effect of muscle, treatment group and their interaction on MQ4 score were analysed in a linear mixed effect model in R with animal within producer used as the random term.

# III. RESULTS AND DISCUSSION

The 7 and 14 day refeeding treatments had adverse effects on MQ4 score by 6.4 and 5.94 points when compared to the directly consigned treatment (P < 0.01, Figure 1). The 48 hour treatment also tended to have a lower MQ4 score by 4.17 points (P = 0.055, Figure 1) compared to the direct consignment control. No significant differences in consumer eating quality factors were observed between the directly consigned group and the 72 hour treatment. Cut had a significant 16.19 point impact on MQ4 score with the striploin consistently higher than the eye round across all treatment groups. Hump height was the only carcass characteristic found to significantly impact consumer

sensory eating quality attributes. An 60mm increase in hump height from 40 to 100mm resulted in a 13 point reduction in MQ4 score in both the STR045 and EYE075 muscles.



Figure 1. The estimated marginal means with 95% confidence intervals for eating quality score (MQ4) score for the M. semitendinosus (EYE075) and M. *longissimus lumborum* (STR045) combined for each marketing pathway. Different letters <sup>(a,b)</sup> indicate significant differences.

## IV. CONCLUSION

This experiment identified that marketing method significantly impacted the intrinsic eating quality of beef for the consumer. Re-feeding cattle for a period of 7 or 14 days post saleyard exposure had a negative effect on eating quality. However extending the saleyard pathway out to 72 hours with access to feed did not negatively impact eating quality in this cohort. Further replication and research should aim to determine the extent of stress experienced by animals during the onsite re-feeding of cattle at saleyards to detect additional stressors during this time which may adversely impact eating quality.

### ACKNOWLEDGEMENTS

The authors would like to thank Regional Livestock Exchange and Meat & Livestock Australia for funding the reserach along with the supplier of cattle and Coles for the meat samples plus JBS Scone for processing the cattle and staff at RLX Tamworth and UNE for assitance with the experiment.

### REFERENCES

- 1. Henchion, M., M. McCarthy, V.C. Resconi, and D. Troy, *Meat consumption: Trends and quality matters.* Meat science, 2014. **98**(3): p. 561-568.
- 2. Driedonks, C., S. Gregor, A. Wassenaar, and A. Wassenaar, *Economic and social analysis of the adoption of B2B electronic marketplaces: A case study in the Australian beef industry.* International Journal of Electronic Commerce, 2005. **9**(3): p. 49-72.
- 3. Ferguson, D., R. Warner, P. Walker, and B. Knee, *Effect of cattle marketing method on beef quality and palatability.* Australian Journal of Experimental Agriculture, 2007. **47**(7): p. 774-781.
- 4. Knowles, G., *A review of the road transport of cattle*. Veterinary record, 1999. **144**(8): p. 197-201.
- 5. Ferguson, D. and R.D. Warner, *Have we underestimated the impact of pre-slaughter stress on meat quality in ruminants?* Meat science, 2008. **80**(1): p. 12-19.
- 6. Loudon, K.M., G. Tarr, I.J. Lean, R. Polkinghorne, P. McGilchrist, F.R. Dunshea, G.E. Gardner, and D.W. Pethick, *The impact of pre-slaughter stress on beef eating quality.* Animals, 2019. **9**(9): p. 612.