

## Quality assessment of longissimus and semitendinosus muscles from beef cattle subjected to non-penetrative and penetrative percussive stunning methods

### ABSTRACT

This study provides a comparative analysis of the effects of pre-slaughter penetrative and non-penetrative stunning and post-slaughter stunning on meat quality attributes in longissimus lumborum (LL) and semitendinosus (ST) muscles in heifers. Ten animals were assigned to each of four treatment groups: i) animals were subjected to conventional Halal slaughter (a clean incision through the structures at the front of the upper neck - the trachea, oesophagus, carotid arteries and jugular veins) and post-cut penetrating mechanical stun within 10 to 20 s of the neck cut (Unstunned; US); ii) high power non-penetrating mechanical stunning followed by the neck cut (HPNP); iii) low power non-penetrating mechanical stunning followed by the neck cut (LPNP); and iv) penetrative stunning using a captive bolt pistol followed by the neck cut (P). For each carcass, muscle samples were removed within 45 min of slaughter, portioned and analysed for pH, cooking loss, water holding capacity (WHC), tenderness (WBS), lipid oxidation (TBARS) and color, over a two week storage period. Stunning did not affect pH and cooking loss. Significant differences in water holding capacity, tenderness, lipid oxidation and color were present at different storage time points. HPNP stunning resulted in lower WHC and color values, particularly lightness (L\*), higher TBARS values and peak force values compared with those stunned using LPNP, P and US. These adverse effects on quality were mostly encountered in the ST muscle. In conclusion, the meat quality achieved using P, LPNP and US treatments was comparable, and no treatment stood out as considerably better than another.

**Keyword:** Cattle; Meat quality; Slaughter; Stunning; Welfare