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Rate of pH and temperature decline in lamb carcases using mid-voltage electrical stimulation

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The temperature at which a carcase enters rigor (pH 6.0) can significantly affect meat quality. If the carcase temperature falls too fast before the carcase enters rigor then cold shortening may result and this can have adverse effects on meat tenderness (Tornberg 1996). The Sheep Meat Eating Quality program identified various temperature ranges to achieve a pH of 6.0 for optimal eating quality depending on the market for the product. It was concluded that the target temperature range is 18–25ºC for short aged meat destined for the domestic market (Thompson et al. 2005). Recently a number of domestic abattoirs within Australia have adopted a new electrical stimulation system so they can comply with the target temperature/pH. This new system has a unique design that makes it cheaper to install than traditional high voltage systems and also safer for workers. We report here on work to optimise the settings of the system in the first domestic abattoir in NSW to install the new technology.

In total 120 lambs from 3 different consignments were assessed. The lambs in the different consignments were of varying backgrounds and breed. Each consignment was exposed to various levels (current and pulse width) and combinations of electricity using a post dressing mid voltage electrical stimulation unit. All treatments were applied for the same length of time (34 seconds). Carcase pH and temperature measurements were taken at regular intervals after slaughter and the carcases chilled at a mean temperature of 4ºC.

The proportion of carcases that fell in the desired pH/temperature window varied between treatments and consignments. This was also the case for the proportion that had a pH less than 6.0 at 25ºC and that had a pH greater than 6.0 at 18ºC. A setting of 800 milliamps with a pulse width of 1.0 msec provided the highest percentage of carcases that fell within the 18–25°C temperature range with a pH of 6.0; without stimulation no carcases met the target range. Without this technology only a small number of carcases will achieve the target. Seven abattoirs across Australia have now installed the technology and the number continues to increase. The Sheep CRC, in partnership with industry, is working to further optimise the settings.

Thompson, J. M., Hopkins, D. L., D'Souza, D. N., Walker, P. J., Baud S. R., Pethick, D. W., 2005. The impact of processing on sensory and objective measurements of sheep meat eating quality. Australian Journal of Experimental Agriculture 45, 561–573.

Tornberg, E., 1996. Biophysical aspects of meat tenderness. Meat Science 43, 175–191.