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Quantifying the rate of pH and temperature decline in lamb carcases using mid-voltage electrical stimulation in an Australian abattoir

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The current study evaluated the effectiveness of a medium voltage post-dressing electrical stimulation unit at different current and pulse width settings on pH decline. The objective was to optimise these settings to ensure that a high proportion of carcases will reach pH 6 when the carcase is between 18–25°C according to the guidelines set by the Australian Sheep Meat Eating Quality (SMEQ) program (Thompson et al. 2005).

Three different current (400 mA, 700 mA and 1000 mA) and pulse width (1 ms, 2.5 ms and 5 ms) settings plus an unstimulated control (0mA and 0ms) were applied for 34 seconds at a frequency of 15 Hz with 7 sheep per treatment over 3 consignments (n=210 carcases). The pH temperature decline was evaluated for all carcases.

Forty-three percent of stimulated carcases reached a pH of 6 between 18–25°C, but despite this low percentage the stimulator is working as significant differences were observed between stimulated and unstimulated carcases. Twenty one percent of carcases reached a pH of 6 by 25°C and 36% did not reach a pH of 6 by 18°C. The abattoir in this study had a very fast chilling regime that will result in a lower temperature at which the carcase reaches pH 6 and accounts for the low number of carcases reaching a pH of 6 between 18–25°C.

There was no effect of different current and pulse widths (not including the unstimulated control) on rate of decline, temperature at pH 6 or initial pH that could be due to the late application of electrical stimulation post-mortem when muscle contraction is dependant on direct muscle stimulation (Morton and Newbold, 1982). The combination of 2.5ms and 1000mA was the best performing treatment with the highest percentage of carcases hitting the window (60%) and resulted in only 10% of carcases not reaching pH 6 by 18°C, making it the most suitable to an abattoir with a fast chilling regime. To compensate for the fast chilling regime other opportunities to increase the rate of muscle contraction and therefore the pH temperature decline will be further investigated.

Morton, H. C. and Newbold, R. P., 1982. Pathways of high and low voltage electrical stimulation in sheep carcasses. Meat Science 7, 285–297.

Thompson, J. M., Hopkins, D. L., D'Souza, D. N., Walker P. J., Baud S. R. and 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.