

LOW VOLTAGE STIMULATION CAN IMPROVE THE TENDERNESS OF BEEF LOINS

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It is recommended that for effective low-voltage electrical stimulation (LV-ES) of beef carcasses the current pathway is via an electrode inserted into the nostril and one other electrode (Powell *et al.* 1986). The other electrode may be a rubbing bar that makes contact with the hindquarter of the body. With the rubbing bar electrode, any intermittent contact may lead to bouncing of the carcass and possibly to ineffective stimulation. Using the shackle as the hindquarter electrode could overcome that disadvantage but has been reported to produce ineffective stimulation (Powell *et al.* 1986). However, the effectiveness of a particular ES system depends not only on the electrode system but also on the electrical parameters of the stimulator and the completion of the electrical path between the carcass, rail and stimulator. Thus it is possible that, with a suitable stimulator, nostril-shackle systems could produce effective stimulation.

A trial of a low voltage stimulation system was conducted at a domestic beef abattoir. The stimulator was a Koch-Britton LV-ES unit. A nostril electrode was used with a shackle forming the other electrode. Carcasses were subjected to a peak voltage of 48V for 40 seconds with three seconds on and one second off.

Ten carcasses were stimulated using a nostril probe-shackle earth current pathway and ten carcasses were unstimulated controls. The mean side weight of the stimulated group was 110.3 kg and for the control group 111.5 kg. Surface and deep butt temperatures were monitored in several sides. After overnight chilling, the striploins (*longissimus dorsi*) were removed for meat quality evaluation.

Table 1. The effect of low voltage electrical stimulation on meat quality of the beef loin

	Control	Shackle	s.e.d.	Significance (P)
pH at 1 hour post mortem	6.2	5.8	0.06	<0.001
Ultimate pH	5.6	5.5	0.04	n.s.
Warner-Bratzler Peak shear force (kg)	9.89	6.03	1.13	<0.001
Sarcomere length (mm)	1.67	1.75	0.05	n.s.

The pH values at one hour post mortem and the Warner-Bratzler peak shear force values were significantly different between stimulated carcasses and the controls. Stimulation resulted in lower shear force values (more tender) than the control group. Chilling rates for both treatments indicated rapid chilling with deep butt temperatures reaching 20°C within 12 hours. The sarcomere length was also higher for the stimulation carcasses, suggesting that the increase in tenderness was due to the prevention of cold shortening. There was a statistically significant improvement in tenderness as a result of stimulation, but the overall tenderness of the stimulated group in the trial was not optimal. If the cuts were to be sold without further ageing, it is likely that consumers would regard some of them as tough. Huffman *et al.* (1996) suggested that beef steaks should have a W-B shear value of 4.1 kg or less to ensure high levels (98%) of consumer acceptability. In conclusion, it was demonstrated that LV-ES using a shackle earth can be an efficient system to improve the tenderness of beef, as measured by Warner Bratzler shear force.

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