

# CONDITIONS USED FOR ELECTRICAL STUNNING OF PIGS IN AUSTRALIAN SLAUGHTER PLANTS: A SURVEY.

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## SUMMARY

The conditions used for the electrical stunning of pigs are important since stunning conditions affect both the humaneness of stunning and the quality of the resulting meat. The objective of this research was to use electrical stunning monitoring equipment, developed at this institute, to measure the stunning conditions used in seventeen Australian slaughter plants. Two types of equipment were used. The first device was used to monitor the current flow between the electrodes using a resistor that had a similar resistance to that of a pig's head. This device was used to measure the actual current at different settings on stunners with adjustable electrical outputs. The second device was used to monitor both the current and the duration of the stun while the animals were being stunned. The results showed that there was a large variation in both the mean stunning current (1.0 - 3.5 amp) and stunning time (1-10 sec) used to stun pigs in Australian slaughter plants. Also, there was considerable variation in the electrode configuration of the stunning device, the type of restraint used during stunning and the time from stunning to sticking.

## INTRODUCTION

The conditions used for the electrical stunning of pigs are important since stunning conditions affect both the humaneness of stunning and the quality of the resulting meat. Inhumane stunning occurs when the current applied to the animal is too low to render it insensible. The proposed EC regulation, though not applied in Australia, requires that a stunning current of at least 1.3 amp be used for stunning pigs of commercial slaughter weight (approximately 100kg). This recommendation is consistent based on findings of several independent studies (Hoenderken, 1978; Shutt-Abraham et al., 1983; Wyss, 1987; Gregory, 1988; and Anon, 1992).

On the other hand, the use of excessive stunning current, poor placement of electrodes, and multiple stunning can lead to meat quality problems (Tarrant, 1989). Some of the meat quality problems associated with poor stunning procedures include broken bones, blood splash and PSE (pale soft and exudative) meat.

The objective of this research was to use electrical stunning monitoring equipment to monitor the electrical stunning conditions used to stun pigs in seventeen Australian slaughter plants and to use the information obtained to help improve the stunning procedures.

## MATERIAL AND METHODS:

Two pieces of equipment were used to monitor stunning parameters. The two devices used were 1) a HETECH small stock electric stun-equipment tester (HE Technologies, P.O. Box 182 Springwood Qld 4127) and 2) a HOIKI clamp-on current transducer (Hoiki E.E. Corp., Japan) with output to an ABB single-channel flatbed recorder (ABB Goertz, Austria).

The HETECH tester was custom built for this investigation. It comprised a high wattage 185 ohm resistor, a digital ammeter and switching system.

The HETECH tester was designed so that any of the three types of stunning handpiece electrodes used in slaughter plants: 1) scissor tongs; 2) two electrode spikes; and 3) inverted Y, could be applied directly to metal plates on the instrument. A lead with two battery clips was used for testing head-to-back stun handpieces. The tester was designed to represent electrically and physically a pig's head and enabled testing of electrical stun equipment without the use of an animal. The HETECH tester was used to 1) to determine the actual voltage/current delivered at the different settings on electrical stun units and 2) to check the calibration of

the stunning monitoring system before and/or after measurements had been made from a group of stunned animals.

With the stunning monitoring system, at the slaughter plant the clamp-on current transducer was placed around a single lead carrying current to one electrode. The flatbed recorder was usually set so that maximum 300 mV DC output voltage from the transducer gave a full-scale deflection of 3 amp. Chart speed was normally set at 12cm/min but speeds of 30 and 60 cm/min were also used.

Stun current and stun time was monitored at 17 slaughter plants in different regions in Australia. The slaughter plants surveyed had various restrainer systems, stunning control boxes and stunner handpieces. Recordings were made from pigs in the 70-120 kg live weight range. The stunning parameters for between 50 and 120 pigs were evaluated at each slaughter plant.

## RESULTS AND DISCUSSION:

The results in Table 1. highlight the fact that, at many slaughter plants, the operators of the stunning units were not able to determine what stunning current they were using. In most plants, the output from the electric stun unit could be varied; however, there was no indication of what stunning current related to each setting. With several stun units, the settings possible were between 100 and 500 but there was no indication of what the units were. When evaluated with the HETECH device, it was found that these settings were the approximate output of the units in Volts. In some cases, in plant 2 for example, the difference between the setting and the actual voltage recorded was up to 44 Volts. Other units only had settings from either 1 to 3 or 1 to 5. These were even more confusing since in some cases (e.g., plant 4) a setting of 1 corresponded to the highest voltage/current output and in other cases (e.g., plant 5) a setting of 1 corresponded to the lowest setting. This fact caused major confusion in the stunning area (particularly in plants such as plant 4) since if the stun operator believed the pigs did not appear to be stunned correctly, the stun setting would be increased. In plants such as plant 4 this would result in the animals being stunned with a lower current rather than a higher current. The use of the HETECH device allowed operators to select a stun setting that would produce an effective stun.

The results in Table 2. illustrate the range of stunning equipment and stunning conditions used at the different slaughter plants. One of the important observations is the fact that seven of the 17 plants surveyed were not using sufficient current to effectively stun the pigs (i.e., at these plants a high percentage of the animals stunned received a stun current of less than 1.3 amp). As a result of the monitoring, recommendations were made to plants that were not effectively stunning, to increase the stunner settings so as to achieve a stun current of at least 1.3 amp. In all cases, the stunning equipment in the plants was capable of stunning at the recommended current level.

## CONCLUSION:

All Australian slaughter plants visited during this investigation were either using stunning currents in excess of 1.3 amp, or had stunning equipment that was capable of delivering 1.3 amp. The use of the stunning monitoring equipment allowed the stun operators to gain a better understanding of their stunning equipment and procedures.

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