

Developments in welfare for beef cattle in abattoirs: post-lairage to slaughter

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Introduction

Processing through abattoirs is often stressful for beef cattle. Reducing or removing stressors in abattoirs improves the welfare of beef cattle, while meat quality can be maintained at appropriate standards. Recent research has used physiological parameters as indicators of stress, including concentrations of blood cortisol at slaughter and observations of cattle behaviour and physical events during processing. The following studies have sought to identify areas of greatest threat to meat quality and welfare and to make suggestions for improvement.

Discussion

In stressful situations, blood cortisol concentration increases and is accompanied by glycogen depletion in muscles (Colditz *et al.*, 2006). This results in decreased production of lactic acid post-mortem and elevated meat pH, which manifest as dark cutting meat (Mounier *et al.*, 2006). Deficits in meat quality also occur with bruising as sequelae to rough handling, slipping, or conspecific aggression during movement through yards and races (Nanni Costa *et al.*, 2006). Mounier *et al.* (2006) aimed to assess the effects of transfer conditions and animal history on reactions of bulls to transfer and resulting meat quality.

Grandin's (2006) aim was to review auditing procedures in slaughter plants in the U.S. and facilitate development of abattoir standards for accreditation as suppliers to large food chains. For example, the voluntary standard for vocalisation is 3%. Increased vocalisation was shown to be related to increased concentrations of blood cortisol. One plant was able to decrease their vocalisation score from 8% to 0% by introducing a light at a dark entrance, demonstrating that continuous movement without disruption can decrease stress.

Nanni Costa *et al.* (2006) sought to assess effects of bull handling and behaviour on the incidence of carcass bruising. Vocalisation was the most frequent response to delays in yards (57.27% of bulls), where bulls were mixed with unfamiliar conspecifics. If beasts are kept in their social groups and not mixed with unfamiliar animals, pH variation is limited and cortisol concentrations are not unduly increased (Mounier *et al.*, 2006).

Nanni Costa *et al.* (2006) found that rough handling increased the incidence of bruises on carcasses. Colditz *et al.* (2006), whose study investigated developments in new vaccines for feedlot cattle and determined stressors upon cattle in the weeks up to slaughter, reported acute stress in animals receiving six prods with an electric prodder 15 minutes before slaughter. This resulted in inferior quality meat with adversely affected water-holding properties. Grandin (2006) suggests minimal use of electric goaders to move cattle. Well-trained handlers should use the goad only on animals that refuse to move.

Electric prodder use can be reduced or prevented by ensuring that facilities are designed to promote cattle movement. Grandin (2006) advocates curved races with solid sides to remove distractions, modifying lighting to illuminate dark entrances, removing dangling chains that create distracting noises, cutting a small window in the front of the beef stun box to give the impression of a continuous walkway, preventing air from ventilation systems blowing on the faces of the cattle, and avoiding excessive pressure on head-holding devices and restraining instruments. Abattoirs are encouraged to use novel driving aids, such as flags or plastic bags on sticks. Non-slip floors that provide traction are recommended so beasts do not fall and bruise or injure themselves. Nanni Costa *et al.* (2006) identified slipping as the most frequent event in the wait period prior to stunning (in their study 27.70% of bulls slipped).

Colditz *et al.* (2006) recommend resting cattle after unloading for a minimum of two hours before slaughter after a transit time of less than six hours. Cattle travelling for longer should be rested for longer. Resting decreases exhaustion and stress, so potentially prevents deterioration of beef quality. That said, once cattle begin proceeding through the plant, fast line speeds do not necessarily mean poor welfare (Grandin, 2006). Stalling of the line increases the number of negative behavioural events that can result in reduction in meat quality due to carcass bruising and/or increases in cortisol concentrations (Nanni Costa *et al.*, 2006, Grandin, 2006).

Appropriate stunning methods were reviewed by Grandin (2006). Most abattoirs use captive bolt stunning. If performed correctly, this technique is effective. Reliability is an issue where captive bolts are not maintained correctly or personnel are not trained to appropriate standards. The same can be said for bleeding animals, where poor technique and improper placement of tongs can result in less than efficient exsanguination and a poor welfare outcome. Mounier *et al.* (2006) measured blood cortisol concentrations at the moment of slaughter (averaging around 21ng/mL) and acknowledged that increased concentrations could relate to stress from lairage, handling of the animal at slaughter, or both.

Conclusion

When considered together, these articles provide a well-rounded insight into issues affecting the welfare of beef cattle in abattoirs prior to slaughter. Grandin's (2006) paper might have benefited from some physiological measurements to give other objective data on responses to stress. Mounier *et al.* (2006) concentrated on issues faced during transport of cattle with a special focus on physiological parameters such as blood cortisol concentrations. More behavioural observations would have been useful, although extrapolations can be drawn from the data and applied to the abattoir experience. Colditz *et al.* (2006), while providing useful information on physiological parameters and behaviour, focussed more on feedlots than abattoirs. The brief report by Nanni Costa *et al.* (2006) could have presented more data, such as blood cortisol concentrations, resulting from bruising events.

Ultimately, we can identify areas of most consequence to the welfare of beef cattle in abattoirs. These include design of the abattoir, training of staff, animal interactions in the yards and time available for rest, appropriate use of aids for moving cattle, maintenance of stunning equipment, training of stunners, and continuous and appropriate auditing of abattoirs. Assessment of and improvement in these areas is something that the Australian beef industry and abattoirs should aim for. The positive welfare outcomes that can ensue will not only benefit the animals, but also producers and consumers, by improving the quality of the final product.

References

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