

Minimisation of pain in cattle castration with respect to method, age and pain relief

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Castration in cattle is traditionally performed for docility and enhanced carcass quality, as well as to prevent unwanted breeding. Methods for this procedure (reviewed by Nielson and Thamsborg, 2005) include:

- Physical: surgical removal of testes and epididymis, rubber-ring castration, the crushing of spermatic cords (Burdizzo method);
- Hormonal: immunisation against gonadotrophin-releasing hormone (GnRH);
- Chemical: injection of toxic substance into testes.

Physical castration is the most invasive yet most widely used. Welfare concerns are driving research into minimising its side effects. Recent studies have addressed the different methods of castration, the age of calves at castration, and the role of analgesics in minimising castration-associated pain.

Stafford and Mellor (2005) discussed pain associated with the various methods. Pain can be classified as physiological, occurring during or following the procedure, or pathological, commonly from tissue or nerve damage triggering sensitisation, disinhibition and structural reorganisation inside the central nervous system (Anderson and Muir, 2005).

Behaviour is an apparent indicator of pain (Stafford and Mellor, 2005). Calves surgically castrated often thrash and kick with their hind-limbs during the operation as opposed to those castrated with rubber-rings (Stafford and Mellor, 2005). This could be because rubber-ring castration is a rapid procedure and pain-associated behaviour would surface only after placement of the rings. In a study of control calves, surgically castrated calves, rubber-ring castrated calves, calves castrated by the Burdizzo method and chemically castrated calves, those castrated by rubber-rings, the Burdizzo technique and surgically displayed substantial behavioural patterns pinpointing marked pain within 3 hours post castration (Stafford and Mellor, 2005). Surgically castrated bulls were observed to stamp their hind-feet, swish their tails and graze the least (Stafford and Mellor, 2005). While some may interpret this as surgically castrated cattle appearing quieter post-operation, it could actually be pathological pain that would be aggravated by excessive locomotion. Rubber-ring castrated calves, on the other hand, assumed various stances and tried all means to reach their testicles to remove the agent of irritation for weeks post-castration (Stafford and Mellor, 2005).

Cortisol responses were also found to signify pain (Stafford and Mellor, 2005; Nielsen and Thamsborg, 2005; Bretschneider, 2005). Stafford and Mellor (2005) discovered that when Lignocaine was administered to calves prior to surgical or Burdizzo castrations while monitoring the animals' plasma cortisol responses (PCR), their PCR drastically declined within the drug-effective first 1.5-hour period. This establishes PCR as an index of nociception and supports the theory of post-castration pain. In that regard, Nielsen and Thamsborg (2005) have illustrated in a study of 6-month-old calves that the Burdizzo

method caused the least stress, with increased cortisol levels after surgical castration (lasting 6 hours) and the Burdizzo method (lasting 1.5 hours). This corresponds with Stafford and Mellor's (2005) findings that at 6 hours post-procedure, surgically castrated calves had considerably higher plasma cortisol levels than those Burdizzo castrated. They added that the PCR for rubber-ring and surgical castrations were similar.

Although cattle variably display behaviour depicting stress induced by the different types of physical castrations, Nielsen and Thamsborg (2005) and Bretschneider (2005) deduced from trials that there were no major welfare variations between the methods, because they all result in comparable situations involving pain. However, judging from the PCR in the previously mentioned study, the Burdizzo method could be the preferred option. Even though hormonal and chemical techniques are available, they have proved inefficient. First, immunisation against GnRH requires repeat bi-annual administration (Stafford and Mellor, 2005); causing stress linked with extra handling, consumer concerns, and increased costs (Petherick, 2005). Chemical castration on the other hand tends to have a 25% failure rate, with bulls still going on to reproduce post-castration (Stafford and Mellor, 2005). Therefore, physical castration still seems the best choice.

Nielsen and Thamsborg (2005) and Bretschneider (2005) have both acknowledged that the age at which castrations are performed affects PCR. The former supported this with lower post-castration cortisol concentration findings in calves at 2.5 months rather than 5.5 months. Bretschneider (2005) agrees with them but adds that in most production systems, calves are regularly castrated at weaning, between 6 and 9 months. Weaning is already a stressful stage for calves because of alterations in management. Castration at this time further predisposes these calves to cortisol-mediated immune-suppression (Bretschneider, 2005). In Bretschneider's (2005) paper, data from 19 separate studies that recorded the PCR of beef cattle castrated surgically or by the rubber-ring technique at various ages demonstrated calves castrated at ≤ 6 months tend to have lower PCR than those castrated at >6 months. As blood cortisol concentrations increase relative to the degree of the stressor, it is evident that castration at an early age would reduce stress linked with castration and also weaning. This would enrich the welfare of calves.

The use of analgesics alongside castration is logical. Petherick (2005) states that the use of pain relief in cattle castrations is currently limited because of the costs involved and increased time needed to complete the procedure. The author argues that using such drugs would imply longer restraint periods, extra handling, and consequently greater discomfort to cattle. All of this amounts to amplified welfare implications. However, not using these drugs means pain, a more significant drawback. In their 2005 paper, Stafford and Mellor discussed the merit of using pain relief. They illustrated a study conducted on 2 to 4-month-old calves, during which Lignocaine was injected into their testes and scrotum 15-20 minutes before rubber-ring castration. The PCR was practically eradicated during the procedure, suggesting pain elimination. This justifies the use of local anaesthetic and its function in castrations.

In conclusion, physical castration is found to be the most successful. However, its detrimental side effect, pain, poses a welfare concern that must be tackled. The

aforementioned authors have concluded that calf age and analgesics play a beneficial role in physical castrations. Although farmers may find using pain relief economically impractical and older calf castrations more convenient, continuous research in this area would increase awareness. Hopefully, in the future, age limits (≤ 6 months) and the use of pain relief will be mandatory in cattle castrations.

References

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