USDA-ARS-MWA Livestock Behavior Research Unit

Farm Animal Welfare Fact Sheet

Livestock Behavior Research Unit

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Castration-induced Pain in Pigs and Other Livestock

By Jean-Loup Rault, Dr. Donald C. Lay, Jr. and Dr. Jeremy N. Marchant-Forde

Background: Castration of male livestock is a routine agricultural practice performed by farmers of many countries, but this practice can be perceived as objectionable by the general public. Data on the exact prevalence of castration is lacking, but in swine, we know that 100% and 80% of male piglets are castrated in the United States and European Union, respectively. In cattle, about 88% of beef cattle in the U.S. are castrated. Castration of male livestock being reared for meat has long been practiced to prevent unwanted breeding, to improve meat quality, and to make management and handling easier and safer. However, castration is a painful procedure that is a concern of both producers and animal welfare groups. Currently, alternatives to this practice are limited.

Issues Related to Castration: Depending on the species, a number of different castration methods are available. Swine, because of their anatomy, are castrated using a surgical castration technique, characterized by surgical removal of the testes following scrotal incision. In sheep and cattle, other methods are also commonly used such as crushing the blood and nerve supply using clamps, rubber rings or latex bands.

The degree of pain experienced by the animal depends on the method used and the animal's age. In swine, castration is usually conducted within the first few days of life. In cattle and sheep, the age and methods of castration are more variable depending on rearing systems such as intensive or extensive conditions. The scientific measures used as pain indicators are subject to debate within the scientific community. Certain characteristics of vocalizations have been shown to be a particularly useful behavioral indicator of pain during castration in swine. A desynchronisation of group behavioral activity can also indicate pain. Physiological measures on the other hand lack specificity since they all increase in response to general arousal as well as pain.

Solutions and Alternatives: Usually, castration is performed without anaesthesia or post-operative analgesia, but their use could reduce the degree of pain experienced. Lidocaine is the most common local anaesthetic tested and has been found to reduce pain-related behaviors during surgery in both swine and cattle. However, it seems to have no pain-relieving effects post-surgery. The use of analgesics such as opioids or non-steroidal anti-inflammatory drugs to tackle chronic or long-lasting pain has not been thoroughly investigated. The use of anesthetics and analgesics also carry serious implications. They increase the duration of handling and distress, they need to be properly and safely used by competent people, they are costly and they can fall under legal or human health restrictions. Their effectiveness and feasibility at the production level needs to be evaluated.

Alternative methods to surgical castration are becoming available, such as the destruction of testicular tissue using chemicals or vaccination against reproductive hormones that control testicular function such as gonadotropin releasing hormone (often referred to as 'immuno-castration'). Too few studies have been conducted on chemical castration to warrant serious consideration. Immuno-castration displays clear welfare advantages, being relatively pain-free with only two injections and no tissue damage.

However, because immuno-castrated males act similarly to intact males until the second vaccination, more research is needed regarding the welfare implications of housing essentially intact males in large groups.

Strategies for raising intact animals should be assessed. Indeed, some countries such as the U.K. and Ireland do not castrate swine (0-2%), but slaughter at a younger age. However, meat from some intact male pigs is known to develop 'boar-taint', an unpleasant odor and flavor of the meat product mostly attributable to the presence of sex hormone derivatives (androstenone and skatole). This challenge could be addressed by slaughtering market hogs at a lighter weight, or by genetic selection and modification of nutrition to reduce the amount of androstenone and skatole produced.

Recommendation: The data indicate that in all species, castration is a painful procedure, regardless of age. New scientific measures to assess pain should be developed that are specific to pain and not just measures of general stimulation in order to more clearly identify procedures which are less painful. It is common belief that the younger the age at which the procedure is carried out, the lower the pain and distress suffered by the animal. Nonetheless, further research is warranted regarding the development of the neonate's nervous system to understand pain perception and possible increased pain sensitivity (hyperalgesia) later in life.

With a better understanding of pain related to castration, the use of analgesics deserves much greater attention. To be effective, both in adoption by the industry and in maximal pain relief for the animal, analgesics must be developed that combine an easy and safe route of administration with an efficacy that ideally covers the duration over which pain is likely to be experienced. However, it is important to consider that the use of analgesics generates an additional cost to the producer.

As alternatives, such as immuno-castration or the rearing of intact males, become more prevalent, the need for castration will diminish. Development of painless alternatives to castration would be a profound improvement to animal welfare in light of the ubiquitous nature of the practice.

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USDA-ARS-MWA
Livestock Behavior Research Unit

Poultry Science Building,
Purdue University,
125 S. Russell Street,
West Lafayette, IN 47907

Phone: 765-494-4604
Fax: 765-496-1993
E-mail: becky.atkinson-haley@ars.usda.gov

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