

Which comes first: preventing boar taint or improvement in pig welfare through the abolition of castration?

By Stephen Fleischer

Introduction

Boar taint is the odour (especially noticeable during cooking) and taste present in non-castrates meat. It is especially prevalent in larger carcasses (FVE, 2001). It is widely agreed that higher concentrations of androstenone and skatole within the carcass cause boar taint. Surgical castration is routinely performed on entire male piglets, without anaesthetic or analgesia, to eliminate boar taint (Lundstrom & Zamaratskaia, 2006). However, it is uniformly agreed that surgical castration induces pain and stress that manifest as increased vocalisations, plasma stress hormones within the body and post-castration behaviour (Taylor & Weary, 2000; Prunier *et al.*, 2005; Taylor *et al.*, 2001). Castration without analgesia violates the five freedoms, compromising freedom from physical discomfort, pain, injuries, fear, distress and the ability to express normal behaviour.

Discussion

Hodgson (2006) studied the merits of isoflurane with an inexpensive, easy-to-use delivery system that provides short-term anaesthetic for piglets during surgical castration. An inhaler developed for the administration of isoflurane was tested on a random selection of piglets (n=57), the dose being calculated according to the piglet's weight and administered via a mask fitted over the piglet's nose. The castration process took approximately 260 seconds, from the piglet being picked up to its standing recovery. Experienced herdsmen commented that the process was notably quieter and less stressful than normal castration procedures. Reduced vocalisations by both piglets and neighbouring sows were significant. The cost of inhaler construction was \$US100 and the isoflurane cost 2 to 3 cents per piglet.

This study did not measure pain responses during or after the procedure. However, Hodgson cited another recent study (Haga & Ranheim, 2005) that had used lidocaine injections prior to castration under halothane anaesthesia; this study reported a decrease in nociceptive responses.

While Hodgson's (2006) innovation seems to offer an economically viable option that deploys cheap equipment to enhance the welfare of piglets during castration, it falls short in some respects. Although the cost of equipment and isoflurane appear low, the increased cost in labour was not accounted for. The study's castration process took 260±51 seconds per pig while a trained herdsman can perform castration in <30 seconds (approximately 800% increase in time). The procedure must be conducted or supervised by veterinary personnel as isoflurane is a sedative; without a gas evacuation system it can induce malignant hyperthermia in certain breeds of pigs (Prunier *et al.*, 2006) and can be dangerous for people. Isoflurane is currently not licensed for use in pigs reared for meat production in the European Union (EU). This has major implications for the practicality of implementing such a method, as the use of isoflurane would need to be reviewed, approved and incorporated into the council regulations for these countries.

Tajet *et al.* (2006) conducted a study on the inheritance of boar taint. They focused on a breeding population of Landrace and Duroc boars to determine whether it was possible to estimate the heritability of androstenone and skatole and if there is a genetic correlation between these components. The boars were culled at 100kg live weight and subcutaneous fat collected from the neck immediately after slaughter was analysed for skatole and androstenone. The result from this study demonstrates a heritability of skatole and androstenone. These results support previous studies by Xue *et al.* (1996) and Ducro-Steverink (2006).

Tajet *et al.* (2006) also showed that selection against taint alone reduces sexual maturation, so it may initially appear that genetic selection will disadvantage male breeding stock. The

study did not take into account evidence that boar taint can be influenced by nutritional, behavioural and environmental factors (Giersing *et al.*, 2006; Hansen *et al.*, 1994; Zamaratskaia *et al.*, 2005). Thus the reported level of skatole and androstenone within the carcasses may have been influenced by these factors. Also, Tajet *et al.* (2006) cited Sellier *et al.* (2000) that GBU size (an indicator of sexual maturation) can be increased, while levels of androstenone are maintained. Therefore, if genetic traits are correctly weighted, it should be possible to reduce boar taint without negative effect upon maturation, though this process will take longer than just selecting for reduced androstenone/skatole levels alone (Tajet *et al.*, 2006).

Although eliminating the need for castration via genetic selection may be a humane solution, the interactions of all factors must be understood before selection changes. Otherwise, production, employment and income losses (both to the pig industry and the country's economy) could devastate the industry.

Non-surgical castration was an option studied by Einarsson (2006), using Improvac™ to vaccinate against gonadotropin releasing hormone to reduce boar taint. The experiments conducted included: Improvac™ immunised pigs (n=100) compared with placebo immunised pigs (n=100) and surgically castrated pigs (barrows) (n=100) with each group being housed separately; and Improvac™ immunised pigs (n=270) and barrows (n=263) being housed in mixed pens. All immunised pigs were dosed in accordance with manufacturer's instructions. The reported level of androstenone and skatole of the boars immunised with Improvac™ was comparable with the barrows and there were indications that the percentage of lean meat was higher in immunised boars than in barrows. While the results of this study are promising, further research into the effect of Improvac™ on the end consumer and the long-term safety of this product is needed. Improvac™ is currently used in Australia but has not been authorised for the EU market (Prunier *et al.*, 2006). Further information is also needed on the cost of treatment and the welfare implications of its effect on the behaviour of treated pigs.

Conclusion

Undoubtedly, the growing interest in production-animal welfare and desire for organic products by the consumer will drive the evolution of intensive pig production toward a non-castrate drug-free product. While current studies provide welfare-enhancing alternatives to traditional castration practices, anaesthesia and immuno-castration should be used only in the interim since development of selective breeding in conjunction with husbandry practices are set to eliminate boar taint. In the long term, these developments/improvements will reduce the cost of pig farming as the need for castration disappears and the welfare of pigs is improved.

References

- Ducro-Steeverink, D. 2006, 'Selection against boar taint – A Simulation Study', *Acta Veterinaria Scandinavica*, vol. 48, Suppl 1, pp.42-43.
- Einarsson, S. 2006, 'Vaccination against GnRH: Pros and Cons', *Acta Veterinaria Scandinavica*, vol. 48, Suppl 1, pp.24-26.
- FVE, 2001. Federation of Veterinarians of Europe. Pig Castration. FVE/01/083. [Online] www.fve.org [Accessed 10 March 2007]
- Giersing, M., Lawewig, J. & Forkman, B. 2006, 'Animal Welfare Aspects of Preventing Boar Taint', *Acta Veterinaria Scandinavica*, vol 48, Suppl 1, pp.7-9.
- Haga, H.A. & Ranheim, B. 2005, 'Castration of piglets: the analgesic effects of intratesticular and intrafunicular lidocaine injection. *Veterinary Anaesthesia and Analgesia*, vol 32, Issue 1, pp.1-9.
- Hansen, L.L., Larsen, A.E., Jensen, B., Hansen-Møller, J. & Barton-Gade, P. 1994, 'Influence of stocking rate and faeces deposition in the pen at different temperatures on skatole concentration (boar taint) in subcutaneous fat', *Animal Production*, vol 59, no.1, pp.99-110.

- Hodgson, D.S. 2006, 'An inhaler device using liquid injection of isoflurane for short term anaesthesia in piglets', *Veterinary Anaesthesia and Analgesia*, vol 33, pp.207-213.
- Lundstrom, K. & Zamaratskaia, G. 2006, 'Moving towards taint-free pork – Alternatives to surgical castration', *Acta Veterinaria Scandinavica*, vol 48, Suppl 1, pp.1-4.
- Prunier, A., Mounier, A.M. & Hay, M. 2005, 'Effects of castration, tooth resection or tail docking on plasma metabolites', *Journal of Animal Science*, vol 83, pp.216-222.
- Prunier, A., Bonneau, M., von Borell, E.H., Cinott, S., Gunn, M., Fredriksen, B., Giersing, M., Morton, D.B., Tuytens, F.A. & Velarde, A. 2006, 'A review of the welfare consequences of surgical castration in piglets and the evaluation of non-surgical methods', *Animal Welfare*, vol 15, pp.277-289.
- Sellier, P., Le Roy, P., Fouilloux, M.N., Gruand, J. & Bonneau, M. 2000, 'Responses to restricted index selection and genetic parameters for fat androstenone level and sexual maturity status of young boars', *Livestock Production Science*, vol 63, Issue 3, pp.265-274.
- Tajet, H., Andresen, O. & The Meuwissen, 2006, 'Estimation of genetic parameters of boar taint; skatole and androstenone and their correlations with sexual maturation', *Acta Veterinaria Scandinavica*, vol 48, Suppl 1, pp.22-23
- Taylor, A.A. & Weary, D.M., 2000, 'Vocal responses of piglets to castration: identifying procedural sources of pain', *Applied Animal Behaviour Science*, vol 70, pp.17-26.
- Taylor, A.A., Weary, D.M., Lessard, M. & Braithwaite, L. 2001, 'Behavioural Responses of Piglets to Castration: The effect of piglet age', *Applied Animal Behaviour Science*, vol. 73, pp.35-43.
- Xue, J., Dial, G.D., Holton, E.E., Vickers, Z., Squires, E.J., Lou, Y., Godbout, D. & Morel, N. 1996, 'Breed Differences in Boar Taint: Relationship Between Tissues Levels of Boar Taint Compounds and Sensory Analysis of Taint', *Journal of Animal Science*, vol, 74, pp.2170-2177.
- Zamaratskaia, G., Babol, J., Andersson, H.K., Andersson, K. & Lundstrom, K. 2005, 'Effect of live weight and dietary supplement of raw potato starch on the levels of skatole, androstenone, testosterone and oestrone sulphate in entire male pigs', *Livestock Production Science*, vol 93, no.3, pp.235–243.