

Advances in the use of immunocastration as an alternative to surgical castration in male pigs

Discusses the use of immunocastration as a welfare-friendly alternative to surgical castration in order to reduce the risk of boar taint in male pigs.

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Word count: 993

Introduction

Surgical castration is used worldwide to prevent undesired breeding and other social behaviours, and to prevent boar taint (Rault *et al.*, 2011). Boar taint is an unpleasant flavour and odour present in the meat of some male pigs from the androstenone and skatole present in fat (Font-i-Furnois *et al.*, 2012; Einarsson *et al.*, 2011). It is indirectly related to testicular development and sexual maturity (Einarsson *et al.*, 2011). In NSW, male pigs may be surgically castrated without anaesthetic up to 21 days of age despite the pain it causes. This pain manifests as a significant cortisol response and the display of pain-related behaviours (Rault *et al.*, 2011; Burton, 2009). This paper focuses on the use of immunocastration (Improvac®) as a welfare-friendly alternative to surgical castration with added benefits to the producers.

Discussion

Improvac® is an immunocastration vaccination that stimulates an immune response to GnRH. This indirectly decreases testosterone production and testicular function. It involves two injections, which the manufacturer suggests are given at 16 and 20 weeks of age (Einarsson *et al.*, 2011).

Two studies conducted by Brunius *et al.* (2011) and Einarsson *et al.* (2011) compared early and standard vaccination with Improvac® and its effect on reproductive organs. Brunius *et al.* (2011) also compared its influence on boar taint using four groups (n=192) of cross-bred male pigs (Swedish Yorkshire dams X Swedish Landrace/Yorkshire sires). In the trial, one group was surgically castrated without anaesthetic. The second was vaccinated with Improvac® at 10 and 14 weeks of age and the third group was standardly vaccinated at 16 and 20 weeks of age. The fourth group was a control group of entire males. Einarsson *et al.* (2011) also studied the effect of early vaccinations at 10 and 14 weeks of age (n=8) against standard vaccination at 16 and 20 weeks of age (n=8), and unvaccinated pigs (n=8) using Swedish Yorkshire dams crossed with Swedish Landrace sires.

In both studies, it was found that the weight of the testes and the length of the bulbourethral glands were reduced in the vaccinated male pigs compared to intact male pigs (Brunius *et al.*, 2011; Einarsson *et al.*, 2011). Earlier vaccinated pigs had a more significant reduction in weight of the testes and length of the bulbourethral glands. However, the smallest bulbourethral glands were found in surgically castrated males (Brunius *et al.*, 2011).

Einarsson *et al.* (2011) tested the difference in testicular histology and the morphology of cauda epididymal spermatozoa between early vaccinated pigs, standard vaccinated pigs, and intact male pigs. Both types of vaccinated pigs had tubular diameters lower than that of intact males. The vaccination proved to disturb the morphology and reduce the number of sperm with the early vaccination schedule having the greatest effect (Einarsson *et al.*, 2011).

Brunius *et al.* (2011) investigated the impact of immunocastration vaccination to prevent boar taint. In the test, samples of adipose tissue were removed from the neck area of the pigs after slaughter. The androstenone and skatole were measured and it was found that none of the pigs from the vaccinated groups or surgically castrated group had concentrations above the threshold that can cause boar taint (Brunius *et al.*, 2011). Of the intact males, 66% were above the threshold (Font-i-Furnois *et al.*, 2012).

Font-i-Furnois *et al.* (2012) compared the use of immunocastrated male pigs, surgically castrated pigs, and female pigs through production characteristics, carcass and meat quality, boar taint, and composition of dry-cured ham. As well as its welfare concerns, surgical castration compromises some

production characteristics (such as feed conversion efficiency, average weight gain, and fat content) when compared with intact male pigs. In this study, 75 purebred Duroc pigs were divided into three groups. Male pigs in the first group (n=24) were surgically castrated before one week of age. Immunocastration, using Improvac®, was carried out on the second group, intact males (n=29), at 88 days and 172 days of age. The third group comprised females (n=22). The pigs were kept in commercial conditions in pens of nine pigs with *ad libitum* access to food and water (Font-i-Furnois *et al.*, 2012).

At the end of the treatment, one day before slaughter, immunocastrated pigs were 5.8kg heavier than the surgically castrated males and 6.1kg heavier than the female pigs (Font-i-Furnois *et al.*, 2012). The back fat depth was 3.9mm thicker in surgically castrated males than immunocastrated males with that of female pigs being in the middle. There was little difference between intramuscular fat in surgically castrated males and immunocastrated males, which is an important factor in the production of dry-cured ham (Font-i-Furnois *et al.*, 2012).

As in the study by Brunius *et al.* (2011), the study by Font-i-Furnois *et al.* (2012) showed that androstenone and skatole concentrations in the meat were below the threshold for boar taint. However, there was one immunocastrated male pig with a concentration above the threshold. It was possible that this resulted from poor vaccination technique or a failure of the pig to produce an immune response due to concurrent health problems (Font-i-Furnois *et al.*, 2012).

A limitation of these studies was that only a small variety of breeds were used: Landrace and Yorkshire crossbreeds and purebred Durocs. It would be interesting to compare the effects of immunocastration on other breeds common in the Australian Pork Industry, such as the Large White breed.

Conclusions

Immunocastration using Improvac® is a welfare-friendly alternative to surgical castration (Dunshea, 2010). Immunocastration caused significant reductions in the size of testes and bulbourethral glands in comparison to intact males (Brunius *et al.*, 2011; Einarsson *et al.*, 2011). There was also a disruption to the tubular diameter of the cauda epididymis and the number and morphology of sperm was greatly affected in vaccinated male pigs (Einarsson *et al.*, 2011). While these factors restrict the breeding ability of vaccinated male pigs, producers can also capitalise on the effects of the vaccination through improvements in meat quality and reduction in the risk of boar taint (Font-i-Furnois *et al.*, 2012). Therefore, immunocastration is a suitable alternative to surgical castration.

References

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