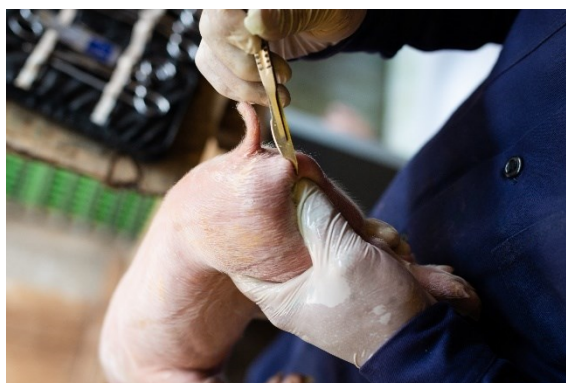


Avoiding surgical castration of boars – why, what and how?

1. Why is surgical castration a problem and why is it carried out?

In most countries, male piglets are routinely surgically castrated by incision of skin and direct removal of the testes, finished with cutting or tearing of the spermatic cord. The procedure is often done when the piglets are less than a week old without any anaesthesia and pain relief. Removing physical organs from the body without anaesthesia and analgesia causes tremendous pain and stress to the animal, and during the healing process infections and complications can occur which also puts the animal at a higher risk of antibiotic use and disease susceptibility. Surgical castration has been shown to decrease piglet's suckling and increase mortality. In addition, none of the available and practically applicable pain mitigation strategies have been shown to be effective in removing or adequately reducing pain for the duration experienced by pigs undergoing the procedure.



The main reasons that surgical castration is routinely carried out is to prevent boar taint and reduce aggression. Boar taint has an unpleasant odour and taste, and naturally occurs in a small percentage of entire (uncastrated) males,¹ while in many countries 100% of male piglets are castrated routinely. Androstenone and skatole are the main compounds of boar taint, that increase after puberty in entire males. There are many factors that affect the severity of boar taint:

Age of pig. Androstenone increases as boars reach sexual maturity, and the level gets higher in heavier pigs. As boars reach puberty, aggressive and mounting behaviour also become more common, which impairs welfare. Sending pigs to slaughter at a younger age and lighter weight can reduce the risk of boar taint and unwanted behaviours.

Housing environment. Studies have shown that pen hygiene affects the level of skatole. Clean housing environment ideally with bedding can avoid fighting, lesions and pigs getting dirty with manure to reduce skatole absorption via the skin.

Feed. Special feed to reduce boar taint has also been developed, evaluated and commercially patented. It has been shown to reduce the production of skatole and

¹ A Dutch study found that the average presence of boar taint detected by trained assessors was 3.31%. (Wageningen UR, 2018) <https://www.boarsontheway.com/>

androstenedione significantly. It is fed for 2-3 weeks before finishing and can be cost-effective as part of the solution for fresh pork markets accepting boars.

Genetics. There are breeds with low boar taint such as the Piétrain breeds and other selected genetic lines for reduced boar taint are also available. Semen from selected boars with lower boar taint is also available in some countries but with some additional cost at present.

Consumer perception. A third of consumers do not smell androstenedione while another third is very sensitive; most people are sensitive to high level of skatole. There is also a huge variation between countries, regions and individuals. For example, in the UK and Ireland, entire males are raised

until average slaughter weight as in many other European countries with castrated males. Some slaughterhouses in Europe are already equipped with on-line boar taint detection via human nose and equipment to isolate carcasses with a higher level of taint presence.

Global success: alternatives to surgical castration

Country	Solution
Brazil	65% of heavy male pigs vaccinated against boar taint
Columbia	More than 90% of male pigs vaccinated against boar taint
Australia	More than 42% of male pigs vaccinated against boar taint
Thailand	20% of male pigs vaccinated against boar taint
UK, Ireland	No castration practiced, all entire males
Spain, Portugal, Greece, the Netherlands	Majority of entire male production (10-30% surgical castration)
US/Canada/Russia/Czech/Norway/Poland/Romania/Spain/Sweden/Argentina/Mexico all increase use of vaccination	

2. What are the alternatives to surgical castration?

There are currently commercially available alternatives to surgical castration.

Raising entire male pigs. In the UK, Ireland, Portugal and Spain, entire male pigs are the majority and they have higher production efficiency. In Germany, some slaughterhouses accept pigs at a lower slaughter weight (up to 95 kg) to reduce the likelihood of boar taint. Important to note that the risk factors for the occurrence of boar taint include diet, the cleanliness of housing, and genetics as mentioned earlier. Aggression can also be reduced by better management (e.g. reduced mixing, intact litter, sufficient feeder space and enrichment).

Vaccination against boar taint. This is a commercially available series of vaccinations (aka. immunocastration) which induces antibodies against GnRH

(Gonadotrophin Releasing Factor). The antibodies can suppress the testicular functions for at least 10 weeks.

Boar taint reduction is achieved by two vaccinations, within two weeks after the second injection. The scrotum is retained but testes are around 55% smaller.

Behaviour benefits include reduced aggression, mounting, tail manipulation and skin lesion.

Improved production efficiency of vaccinated males has been shown to surpass even entire males. Feed efficiency is improved, on average by 7% compared to surgically castrated males. Castration-related infections are eliminated and mortality reduced. These benefits usually more than compensate for the cost of vaccination. Lower carbon footprint is associated with better feed efficiency, reported as equivalent to a 3.7% reduction in global warming potential per kg of liveweight.

Meat quality can be better than surgically castrated males with higher percentage lean and good water holding ability for storage and cooking, also superior to entire males in terms of intramuscular fat for tenderness.

Vaccination against boar taint is safe for animals and consumers, with no residues of concern. The vaccine is legally available in more than 60 countries with a zero-day withdrawal period.

Sexed semen. Using sorted semen to produce female only offspring is another alternative, however, the technology is not yet commercially viable. Furthermore, studies showed that the intrauterine artificial insemination method and the subsequent pregnancy using sexed semen can cause welfare issues for sows.²

Successful business case: ALIAR S.A., Colombia

- Largest pig producer in Columbia
- Use vaccination against boar taint for 10 years
- Avoid stress for piglets due to handling and surgery, reduce piglet mortality, save time, achieve better meat quality, become more cost-efficient, improve worker's welfare
- Full training and certification for professional workers



² Giersing, M., Ladewig, J. and Forkman, B., 2006. Animal welfare aspects of preventing boar taint. Acta Veterinaria Scandinavica, 48(S1), p.S3.

3. How to move towards phasing out surgical castration?

- Understanding consumer reactions to surgical castration, possibly exploring their attitude after providing information about vaccination against boar taint and entire males, and their perception of boar taint itself

In many countries where surgical castration is routinely carried out, little is known about the consumer's perception of boar taint, and the consumer's attitude towards different alternatives. Some studies showed that consumer's preference for alternatives to surgical castration increased when information of this painful procedure is provided.

- Understanding the meat quality interests and benefits of rearing entire males and using immuno-vaccination³

	Entire male	Immuno-Vaccination	Surgical castration
Feed efficiency	higher	high	low
Backfat thickness	low	medium	high
Lean meat %	high	medium	low
Intramuscular fat	low	high	
Drip loss	low	higher	
Loin weight	same		
Ham weight	higher	higher	low
Shoulder weight	higher	higher	low
Belly weight	low	medium	high
pH	slightly higher	slightly lower	

- Addressing issues surrounding heavy pig production

3-dose vaccination, even in female pigs, can perform as well as surgical castration in terms of prevention of boar taint, ham quality and subsequent processing. There are also positive cases using 2-dose vaccination for Duroc pigs raised until 140 kg live weight (30-31 weeks) for dry-cured ham production and 2- or 3-dose in heavy pig (42-43 weeks) production. Worker safety can be improved by thorough training on animal handling and vaccination protocol.

³ Based on fact sheets for Pork production with entire males and immunocastrates, from EU COST Action IPEMA <http://www.ca-ipema.eu/papers>; Batorek, N., Čandek-Potokar, M., Bonneau, M. and Van Milgen, J., 2012. Meta-analysis of the effect of immunocastration on production performance, reproductive organs and boar taint compounds in pigs. *Animal*, 6(8), pp.1330-1338.

- ☑ Employing a quality control mechanism is important. Reporting and declaring 100% full vaccination of male pigs (where relevant) or at the slaughter line to ensure tainted product is detected.

Ensuring a process for reporting complete vaccination of all male pigs delivered the slaughterhouse is key. An officially accepted declaration has worked well especially in Latin America and the US. In addition, clear communication along the production and processing chain is important – so that everyone is aware of the process and expectations. Vaccinated males have a significant reduction in testicular size, but still retain a scrotum. This is easily identified and should be clearly communicated and expected by traders and slaughter staff.



Testicular size is reduced for vaccinated males (Left) compared to entire (Right) males at the slaughter line.

Boar taint detection methods are a key part of the solution in many markets. They can be implemented at the slaughter line to ensure any affected carcasses are separated. Research to compare the human nose method of boar taint detection with other methods has shown comparable or better results. However manual boar taint detection by human nose is still preferred in some markets. Latest research from Denmark and Belgium is developing and trialling rapid, reliable, and automated carcass taint detection methods.

For detailed commercial case studies of companies raising entire males, immuno-vaccinated pigs and retailer demands, see [Sharing Success – the global business case for higher welfare for pigs raised for meat.](#)

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