



International 58th Meat Industry Conference “Meat Safety and Quality: Where it goes?”

## Raising entire males or immunocastrates – outlook on meat quality

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### Abstract

European pig production faces a big challenge in the near future due to a strong initiative to abandon surgical castration of piglets. However, prior to ending of this widespread traditional practice in pig husbandry, a lot of potential problems need to be addressed in view of the adaptation of pig sector. It means that not only must boar taint issue be solved but also that meat technological quality will not be deteriorated. Two most viable alternatives to surgical castration will be reviewed with special emphasis on meat quality assurance.

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### 1. State-of-the-art in piglet castration

Surgical castration of male animals destined for fattening is routinely practiced in pig production. The aim is to prevent an unpleasant off-flavour (boar taint) which develops in meat of sexually mature entire males (EM). Such meat, when heated, develops an off-flavour rejected by the consumers<sup>1</sup>. Boar taint has been ascribed to the accumulation of two compounds in pig fat, androstenone and skatole with interrelated metabolism; skatole breakdown in the liver is hindered by androstenone<sup>2</sup>. Androstenone has a urine-like smell and is produced by Leydig cells in testes of sexually mature male pigs. Skatole has a faecal-like odour and is a by-product of microbial breakdown of tryptophan in large intestine, originating mainly from gut mucosa cell debris<sup>3</sup>. Preventive measures to

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reduce the incidence of unpleasant odours are strongly related to the “management” of the herd (genotype, nutrition, hygiene and health status). Androstenone is principally related to the sexual development which is largely under the genetic influence, whereas skatole levels in addition to genetic background and hormonal status of the pigs are also controlled by nutritional and environmental factors<sup>4</sup>.

According to EU legislation, castration of male piglets can be performed without anaesthesia/analgesia within the first 7 days of life and without tearing of the tissue. Nevertheless, this practice has been criticized from the animal welfare point of view<sup>5</sup>. It has already been forbidden in Norway and Switzerland, whereas the European Commission (EC) and the representatives of European farmers, meat industry, retailers, scientist, veterinarians and animal welfare NGO's committed (signed a declaration) to end surgical castration of pigs by January 1st, 2018 ([http://ec.europa.eu/food/animal/welfare/farm/initiatives\\_en.htm](http://ec.europa.eu/food/animal/welfare/farm/initiatives_en.htm); <http://boars2018.co/>). The initiative is presently voluntary; however, the EC strongly supports the actions taken by key stakeholders. Two projects were financed in the last decade (ALCASDE and PIGCAS), and some years ago, the EC issued a decision (2011/C 243/06 of 19 august 2011) adopting a work programme for financing activities of the Union on alternatives to surgical castration of pigs (<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2011:243:0005:0011:EN:PDF>). This work programme actually denotes the key points to be solved. If a ban on surgical castration as practiced nowadays is implemented, the consequences for pig meat sector will be immense. Some countries (CH, N) already demand the use of anaesthesia/analgesia at surgical castration, whereas others (e.g. Netherlands, Belgium) are gradually abandoning this practice. Moreover research on alternatives has been intensified, and presently considered are: a) application of anaesthesia/analgesia at surgery which is organizationally and technologically demanding, moreover it increases costs due to additional workload and the price of anaesthetics<sup>6</sup>; b) sexing of the sperm, which is not yet sufficiently advanced for practical use; c) immunocastration i.e. immunization against endogenous GnRH hormone which allows the exploitation of growth potential of the EM with minimal stress at vaccination<sup>5</sup> but with disadvantages such as risk of self-immunisation and low acceptability by the consumers<sup>6</sup>.

Two most viable alternatives for the sector, depending on the country and system of production, are fattening of EM and immunocastration, the latter in particular for production systems associated with special quality products (e.g. EU quality schemes) which demand raising pigs to higher age and weight. However, a lot of potential problems need to be considered and solved before abandoning of castration is implemented and a switch of pig production systems to EM or immunocastrates (IC) is sustainable.

## 2. Challenges related to meat quality if/when castration is omitted

Pork production with EM or IC needs a reconsideration of the whole system with adaptations at all levels of pork chain to assure product quality and sustainability. The challenges are many and span from adaptations in pig rearing, development of on-line methods for boar taint detection, to adaptations in processing related to masking the boar taint or dealing with the “new type” of meat.

### 2.1. Entire males

The occurrence of boar taint at commercial slaughter weights is very variable depending on breed, slaughter weight, rearing and management conditions. Although with fast growing modern genotypes (slaughtered at young age before sexual maturity) the incidence of boar taint is not very high, the production of EM would require screening and sorting of carcasses on the slaughter line. Currently there are only subjective methods that can be applied (cooking test and use of soldering iron applied on exposed backfat of the carcass<sup>7, 8</sup>), that require specially trained personnel, as the objective methods that would give immediate or quick result are either in development (electronic nose and mass spectrometry<sup>9,10</sup>; or detect only one component of boar taint (spectrophotometric method for skatole analysis and ELISA kit for androstenone analysis<sup>11,12</sup>). If detection of the tainted meat on the slaughter line and improved processing of tainted meat is provided, the rearing of EM can easily be applied.

With regard to meat quality, main challenges in pork production with EM concern firstly the reduction of boar taint and secondly altered meat technological properties. The improvements can be achieved with

- genetic approach (choice of breeds, lines with lower androstenone and skatole level, breeding selection),
- adjusting the nutrition of boars (to meet their requirements, avoid extreme leanness, reduce boar taint),

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