

Reducing boar taint through breeding

Pork Quality



Boar taint is an off-flavour in meat of some entire male pigs caused primarily by high levels of two naturally occurring compounds. In this project the latest genomics tools were applied to identify the genetic mechanisms responsible for boar taint in entire male pigs with the ultimate aim of eliminating boar taint by breeding.

'Genomics accelerates reduction of boar taint by breeding. This reduces the need to castrate male piglets'

IPG

EU-15

- ◆ 213 Million finishing pigs/year
- ◆ 19 Million tonnes of pork produced/year
- ◆ Approximately 90 Million male piglets castrated/year

What affects boar taint?

Pork from a small proportion (5-15%) of male pigs develops an unpleasant odour and taste at frying or cooking. In many EU countries, male piglets are therefore castrated shortly after birth to avoid this boar taint.

The use of un-castrated pigs (boars) greatly improves the sustainability of pork production. Animal welfare would be improved if animals were not castrated. In addition, 2.25 Million tons of feed could be saved because boars produce leaner carcasses than castrated pigs and utilize feed more efficiently. However, the consumer needs to be sure that high quality pork

with good taste and odour is provided. The main compounds causing this boar taint in un-castrated males are called androstenone and skatole. Androstenone is a steroid hormone produced in the testis after onset of puberty and causes urine-like odour. Skatole is produced by bacteria in the hindgut and causes faecal odour. These substances are stored in fat if not cleared by the liver. The onset of boar taint is heritable and therefore avoiding the need for castration by breeding for animals with low levels of skatole and androstenone is a long-term sustainable solution to enable a ban on castration.

Research to reduce boar taint

The newest genomic tools were applied to identify the genetic mechanisms responsible for boar taint. Small defined genetic regions (QTL) for components of boar taint have been mapped. This makes selective breeding on these genetic regions a realistic alternative to castration

Genome-wide search

A genome-wide search for genetic markers (SNPs: single nucleotide polymorphisms) associated with androstenone or skatole has been carried out on different breeding lines of pigs using a recently developed SNP technique, the Illumina 60K Bead Chip. These genome-wide association analyses with SNPs spread across all chromosomes have been performed with more than 9000 animals from Danish Landrace, French Large-White, Duroc-based sire line and Landrace boars from Norway.

Skatole vs. Androstenone

The complex genetic mechanisms involved in the accumulation of skatole and androstenone were studied. There is a loose genetic relationship (0.27) between skatole and androstenone. This indicates that different genetic factors are responsible for the variation observed. Single SNP effects on skatole and androstenone have been identified that explain a large proportion of the genetic variance in different lines. Although these SNP effects differ between lines and breeds, they will help to identify those young piglets that inherit extremely high (or low) levels of androstenone or skatole (even before puberty).

Furthermore, these SNPs can be used to assign mature boars for production of offspring with a low risk of producing finishing pigs with boar taint.

Breeding tool

At the end of 2010 confirmation studies were initiated to investigate the effects in additional breeds. Herewith a dedicated and cost-effective SNP set for breeding has been developed. The consequences for breeding, especially in relation to production and fertility traits, will also be taken into account. Finally, some key genes should be identified primarily responsible for the major differences causing boar taint.

Successes

Discovering the genetic mechanisms responsible for boar taint in un-castrated male pigs contributed to:

- Breeding against boar taint accelerated with genetic markers
- Assigning boars for production of pork with reduced boar taint
- Identifying finishing pigs for specific markets
- Improving feed efficiency of entire versus castrated male pigs saves resources.



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