

# Boar Taint - Can we breed it away or do we cut it away?

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## Introduction

One objection against the use of entire male pigs in pig meat production is the possibility of boar odour especially in the cooked meat. Research has been concentrating on consumers' acceptance and on causes responsible for boar taint. It is common knowledge that the production of entire male pigs has benefits as well as disadvantages. The advantages to the producers must be weighted against any disadvantages for the consumer and the meat industry. One possibility to get around any complains from consumers could be the selection of carcasses in the abattoir for meat showing boar taint or not. The new EC fresh meat directive that came into force in January 1993 gives provision for inter-community trade in fresh meat from entire male pig carcasses with special conditions relating to the carcass weight. The new rules permit inter-community trade of meat from entire male pig carcasses with a carcass weight (cold weight of carcass without head and feed) below 80 kg. Carcasses above this limit have to be examined for taint with an objective method and tainted carcasses have to be marked with a boar stamp. This EC-directive has become in force although there is no objective method available that could be used in abattoirs and Danish experience gained during the last 15 years confirms that the 80 kg weight limit on its own cannot ensure reliable selection of tainted entire carcasses.

## Background for production of entire male pigs

In some countries male slaughter pigs are not castrated, either because it traditionally has never been done or because the practice has ceased at some point in time. In several countries where male slaughter pigs are castrated there has been a keen interest in being able to produce and slaughter entire male pigs. As a result, considerable research has taken place in the areas of causes of boar taint and advantages in the production of entire male pigs. It has been known for some time that the use of entire males would result in both advantages and disadvantages.

Concerning the advantages in the production of entire male pigs the research in all countries concluded in similar results, which can briefly be described as follows.

1. Higher lean meat content (2 to 4%) and less backfat (4 to 7 mm)
2. Better feed conversion ratio (7 to 15%)
3. Quicker growth at the same level of feed intake

Concerning the growth and carcass traits there are no significant disadvantages in using entire males for production. But there is the great problem of possible boar taint.

## What is boar taint?

Meat from uncastrated males exhibits an unpleasant odour when heated. This so called boar taint mainly comes from fat and connective tissue. The percentage of carcasses with boar taint is highly dependant on the carcass weight. In Danish experiments with an average carcass weight of only 74 kg about 5 per cent of carcasses of entire males would be classified with boar taint. German experiment with carcass weights around 80 kg show more than 50% carcasses with boar taint.

Table 1. Variation in perception of boar taint

No of people	Perception level in%				Source
	no	weak	average	high	
286	25.0	23.5	33.5	18.0	Elsley, 1968
301	27.5	?	?	17.5	Griffith, Patterson, 1970
618	26.2	22.2	27.0	24.6	Claus, 1991

There is no scientific definition of boar taint but it is known that the level of androstenone (a pheromone) and the levels of skatole (a metabolite of tryptophane) are highly correlated to boar taint. The smell of skatole is described as faecal while the smell of androstenone is described as urinous. It is known that there is a high variation in the perception for boar taint. Different experiments (see table 1) show that about 25% of all tested people do not recognise boar taint at all while 20 to 25% of tested people are highly sensitive to boar taint. In the following table 2 the level of androstenone in castrates and entire males are shown as well as the results of a sensoric assessment are shown.

Table 2. Level of androstenone and occurrence of boar taint in castrates and entire males

Androstenone in ppm	Castrates	boars	sensoric assessment
0 – 0.3	100%	12.9%	no perception
0.31 – 0.5	0%	0%	occasional perception
0.51 – 1.0	0%	59.0%	increasing perception
> 1.0	0%	28.1%	regular perception

In Germany and other European countries investigations show high correlations between the level of androstenone and boar taint while Danish experiences lead to the conclusion that the boar taint in meat from entire males is mainly caused by skatole. This seems to be an interaction between the cause of boar taint and the age of animals or the carcass weight. The Danish industry has therefore decided that all carcasses of entire male pigs will be analysed for boar taint with the skatole method. This skatole method allows to measure up to 200 carcasses per hour and the time delay from sampling to availability of the analysis result in less than 12 minutes. This method has been developed by the Danish meat Research Institute and is used in Danish abattoirs. Meat from entire male pig carcasses with a skatole concentration in the backfat above 0.25 ppm may not be used as fresh pork. This meat must be used as raw material for manufactured meat products that are not heated by the consumer e.g. cooked ham or salami. The limit of 0.25 ppm skatole was fixed by comparison of the skatole concentrations in pork samples determined by the analysis equipment with organoleptic assessment of the same sample by a trained sensoric panel.

Within the experiment shown in table 1 the skatole concentration was also measured. The results show that with the Danish limit of .25 ppm skatole 10% of castrates and 49% of boars would have been sorted out because of possible boar taint. It is known that also sows could show skatole levels above the .25 ppm limit. The skatole level in all sexes could be influenced by feeding and housing. Using a level of .3 ppm of androstenone no castrates but more than 85% of boars would have been defined as contaminated meat.

With higher carcass weights androstenone seem to be the major cause of boar taint. So far there is no objective measurement of androstenone concentration available that could be used in normal abattoirs at a reasonable price.

## Genetics of boar taint

In Danish and German investigations it could be shown that there is a high additive genetic effect on boar taint that results in heritabilities between 30 and 60 per cent. With this high heritability selection against boar taint seems to be possible. Animals from a considerable number of breeds have been investigated, but no breed differences have been demonstrated. Selection experiments have clearly shown that after 3 generations there was a significant difference in androstenone level between the high and the low level selection line. It could also be shown that within these few generations of selection there was no negative correlated response in growth and in male fertility performance. Within the low level selection line there was a correlated response in the testosterone level that indicates that the selection response is mainly a result of a delay of puberty in this line. It is well known that the androstenone and the testosterone level are highly correlated. The decreasing level of testosterone and the delay in age of puberty will reduce the economic advantage of a pig production with entire male pigs. Further investigations are necessary to investigate libido, in particular in low level boars and the possible undesirable reaction of growth and feed conversion ratio.

## Conclusions

The controversial discussion about the components of boar taint between Danish and other investigations lead to the conclusion that at carcass weights below 80 kg skatole could be the major cause of boar taint while at higher weights androstenone becomes the important component. For skatole the Danish Meat Research Institute has developed a practical method to select carcasses in the abattoir. A selection within the abattoir based on a practical method to measure the level of androstenone is not available so far.

To avoid a further decrease in pig meat consumption the European meat industry could not afford to use meat showing boar taint to be sold as fresh meat. To make use of the advantages in growth rate and feed efficiency in the production with uncastrated animals there has to be a selection in the abattoir between fresh meat without boar taint and contaminated meat for further processing.

Selection against boar taint is possible but with unknown correlated responses in male fertility and in growth and carcass traits. Because of the high correlation between androstenone and testosterone there seems to be no possibility in reducing the level of androsterone (reducing boar taint) and maintaining the testosterone level (responsible for higher growth rates and better feed conversion).

Within the processing of pig meat a certain amount of contaminated meat could be used in special products like salami or cooked ham where even sensitive consumers would hardly recognise boar taint.