Quality of boars, barrows and gilts

Preventive measures like feeding, breeding and housing are effective in reducing boar taint

Quality assurance and quality improvement are important to maintain market share or achieve higher prices. It is expected that the relative importance of quality will only continue to increase in the future. Pork quality may refer to slaughter quality, quality of meat and on hygienic quality. Slaughter quality is about meat percentage, carcass type and ratio of meat/fat and meat/bone. Meat quality is about sensory quality (color, water binding capacity) and eating quality (tenderness, juiciness, taste and smell).

Photo: Marcel Bekken

Fig. 1: Sensitive people can smell boar taint when pork is heated.

By Gé Backus

In recent years, most Dutch pig farmers switched to raising boars. Although it is more profitable and efficient to produce entire males due to their enhanced feed conversion and higher proportion of lean meat on their carcasses, it is recognized that the quality of meat from some entire males is negatively influenced by odor and taste, referred to as boar taint. These off-flavor compounds in meat render the meat less suitable for human consumption (Lundström et al., 2009).

Boar taint has been described as "animal", "urine", "faecal" and/or "sweat" like odor. Sensitive people can smell this odor (and taste) when the meat is heated (Fig. 1) , i.e. in the pan. Accurate online detection of boar tainted carcasses prevents the consumer being faced with boar taint.

The Dutch retail market has fully converted to selling meat from entire male pigs, but abroad the developments are much slower. Still, questions remain about the acceptance of boar meat by marketing parties (Fig. 2).

Comparing the development of the consumption of pork in the Netherlands with that in other EU countries does not give reason to assume that producing entire male pigs created a problem on the Dutch domestic market. Nevertheless, the steering group

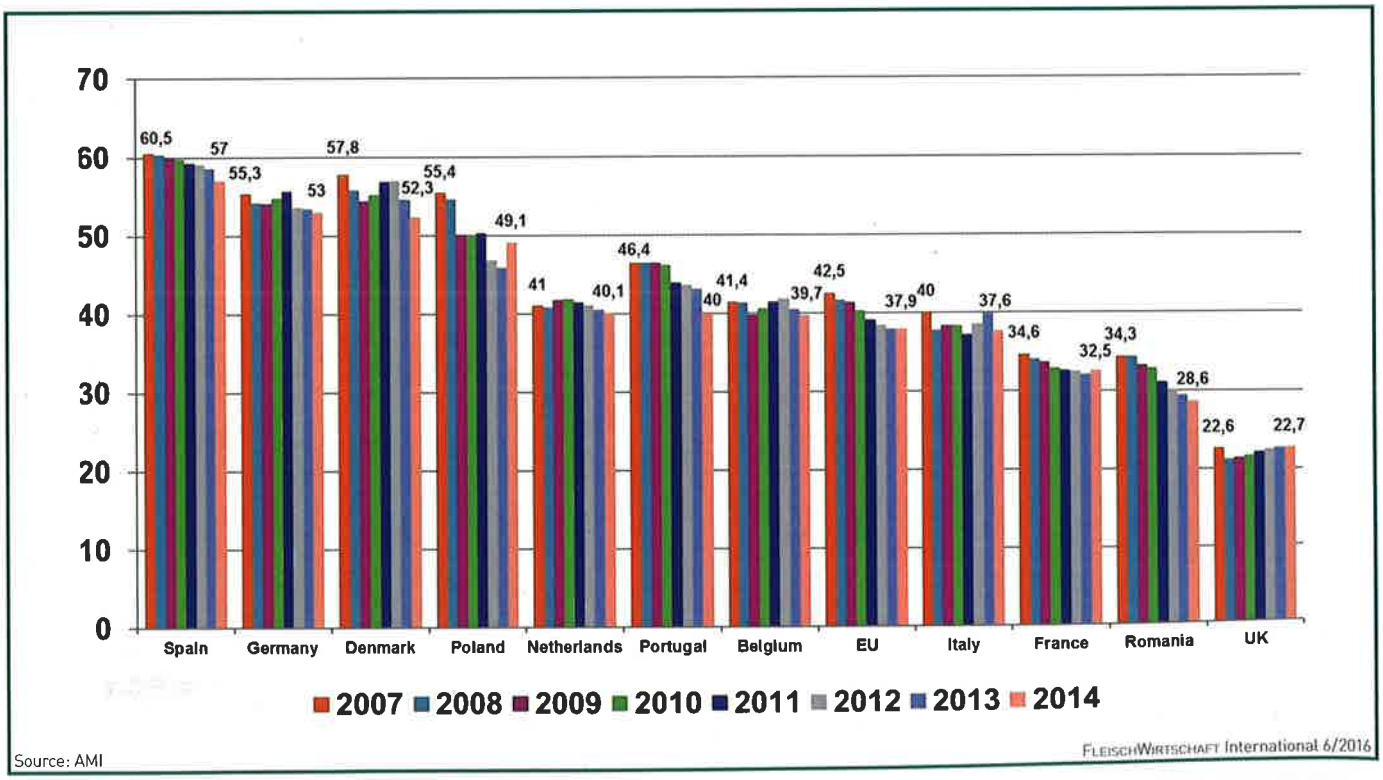

Fig. 2: Per capita consumption of pork meat: 2007–2014 (kg/year)

"Boars 2018" decided to carry out a survey on the quality of products of boars, barrows and gilts. To this end, data were collected from the literature and expert interviews were conducted with representatives from three slaughterhouses and two meat processing plants. In addition, practical experiments were conducted of which the results are presented.

Characteristics of boars, barrows and gilts

All male mammals develop at a later age than female mammals. Furthermore, a barrow will fatten faster than a boar. Gilts and boars are both leaner than barrows. It is an advantage that boars have less back fat. In addition, a boar has also less muscle compared to a gilt (Zomeno et al., 2015). Gilts have more ham and boars more shoulder. As for the boars one can also say that their carcasses have a flatter topside. The bottom part of the buttock is again more similar to that of gilts.

The cuts of a pig carcass go to different international markets: bacon to England, the fore end to the Eastern bloc, the middles (ribs and belly) to Japan, and the hams to Italy (Fig. 3). For a Coburg ham of 5.5 kg, a ham of minimal 13.5 kg is needed. With boars, there are less of these heavy hams. For Coburg hams of 4.5 kg, however, it does not matter.

Advantages and disadvantages of boars

An important point is that 20% of the boars are too skinny. The belly of them is more difficult to sell. The buyers actually would prefer slightly more fatty (intramuscular) boars.

For sales of bacon boars are very suitable, but for marketing bellies the opposite is true. According to field experts, this also varies with the selection of genetic lines. Previously the market just did not get such carcasses.

Marketing boars to Italy is fine when it comes to cooked hams. It can also be dry hams, but then the farm level payment scheme has to induce a minimum fat content. On the farm, this can be achieved by altering the feed composition and or a higher slaughter weight.

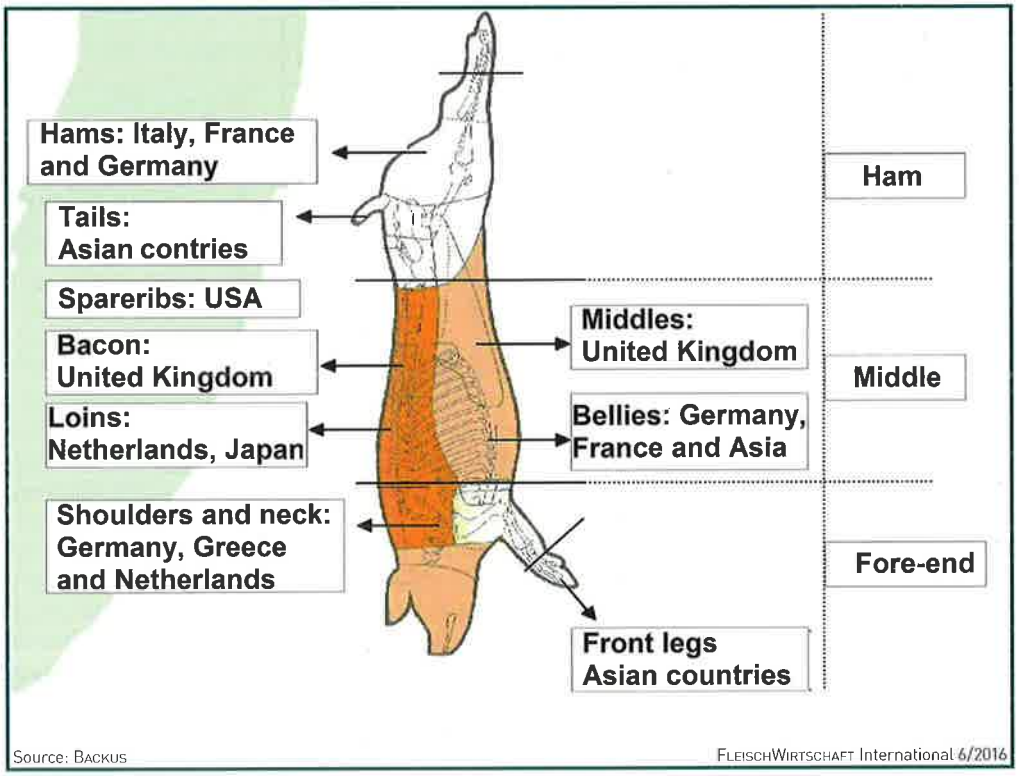

Fig. 3: Export destination of carcass cuts

Intramuscular fat has a positive effect on eating quality. But it must be a fairly high rate, for the consumer to experience a better taste. However at significantly higher rates there is – because of the appearance – the risk of a negative impact on the purchase intention of a group of consumers (the so-called lean loin lovers). If the intramuscular fat is visible, "marbling" is the term used in the meat industry (Harper and Pethick, 2004). Certain breeds have more capacity to encourage intra-muscular fat than others. Duroc pigs are an example of this (Hocquette et al., 2010).

Slaughterhouses report different percentages of odor deviating carcasses, ranging from 1–2% to 3–4%. As to whether or not complaints are used as judgment criterion, caution is advised. In situations with unpleasant experiences a butcher (who is often known personally) may be called, but large retail store managers often not.

The pH is an important quality attribute, because it has an effect on the water binding capacity of meat and thus on the suitability for processing into meat products. Boars are suitable for processed meat because of the increased water-binding capacity; a higher ultimate pH has a positive impact on consumer acceptance (Fig. 4).

Fat quality

To be able to sell boar meat (especially bacon and dry hams) fat boars and firm fat are needed. Market problems with the so-called "weak bellies" are related to the (too soft) fat of lean animals. Boars have relatively much lean products. Fatter pigs have harder fat. Fat quality is measured by the iodine value, this should not exceed 74. This can be realized by using feed with more saturated fats (e.g. less linoleic acid) (Tab. 1).

A practical experiment on twenty Dutch pig farms with 30 boars, 30 barrows and 30 gilts showed a wide farm level variation in average thickness of fat and fat composition. Boars are a little less fat. However, the overall effect of boars on the hardness of the fat is very low, compared to the variation between farms. Much greater effects are caused by differences in fat thickness (Fig. 5). With the same feed composition and with the same fat thickness, boars have a higher

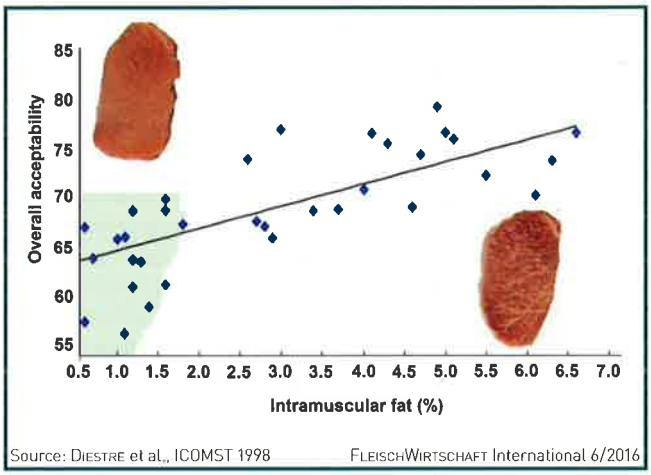

Fig. 4: Effect of intramuscular fat (%) on consumer evaluation

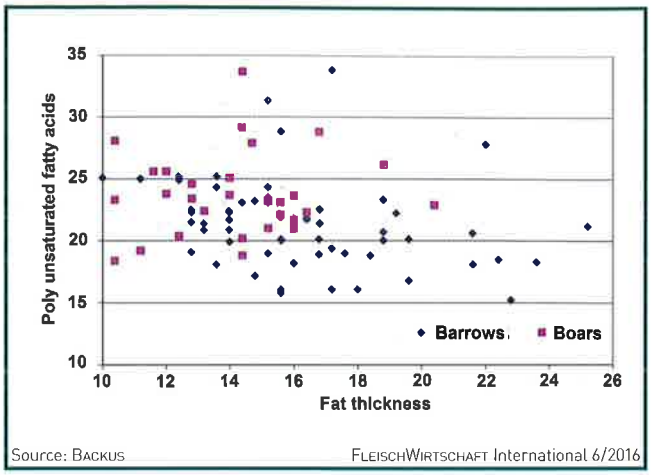

Fig. 5: Influence of backfat depth on fat quality

proportion of unsaturated fats. However, this difference is very small.

Meat quality

Factors that play a role in meat quality are: food deprivation, transport and rest times, stunning, cooling in the slaughterhouse, and the carcass composition.

Skin lesions on boars do occur, but that depends very much on housing as well as the climate in the truck and the waiting area. In a room with fresh air there is more calmness. If this is not the case, stress arises and risk of fighting increases. That could have a major negative impact.

In the Netherlands, the percentage of intramuscular fat is between 0.5% and 1.0%. For the effect on consumer appreciation to be noticeable, that percentage must rise above 2%. This gap is substantial.

Another important possibility to favorably influence the quality of meat is to raise the ultimate pH (measured on the day after slaughter). As a result, the water-binding capacity increases and the meat is juicier. The ultimate pH can be influenced by 12–16 hours of fasting before slaughter, and by the composition of the finishing feed. In an earlier study, the final pH was at 0, 16 and 24 hours of fasting equal to respectively; 5.70, 5.78; and 5.83 (Tab. 2).

The ultimate pH must not be too low and not too high. For cooked ham applies a lower limit to the pH, and for manufacturing dried (raw) hams an upper limit. Processing companies prefer to avoid meat with a low pH because then the weight after cooking decreases too sharply (technological yield). However, for dry hams a high pH is less suitable, because of the increased water-binding capacity (Font Y Furnols et al., 2015). In dry ham, the salt penetration decreases as the pH is higher.

The interviewed slaughterhouse experts do state that there is no proof of significantly poorer quality of boar meat in slaughter experiments and evaluations of meat quality in breeding, or in published research. The PSE parameters (L *, pH, drip loss) are not worse for boars.

Boars have more meat

Tab. 1: Fat quality of boars, barrows and gilts

	Boar	Barrow	Gilt
Meat (%)	56,6	54,2	55,9
Intramuscular fat (LD)	1,45	1,54	1,37
Saturated fatty acids (%)	41,46	42,75	41,68
Unsaturated fatty accids (%)	58,55	57,26	58,33

Source: Barton-Gade, 1987 FleischWirtschaft International 6/2016

The slaughterhouse perspective

In the Netherlands boars are produced under the so-called "Better Life Label" (BLK). This major domestic market segment has grown strongly in recent years and is still growing. Under the BLK scheme only boars and gilts are to be delivered. Besides this, abattoirs supply boars mainly to the United Kingdom and Greece. Preferences for specific product characteristics depend on the market segment. Some slaughterhouses have more difficulty selling meat from boars than others. The problem is most pronounced in slaughterhouses that obtain boars as byproducts from breeder farms. Hams to Italy is difficult. The carcass cut plays also an important role. For bacon, boars are ideal.

In terms of efficiency, the processing of boar carcasses – depending on the genetic line – is somewhat difficult in the sense that cutting is stiffer. But this does fall off with respect to the greater percentage of lean meat. And most workers get used to it reasonably fast. This cutting efficiency can make up for 2 € per pig.

As for boar taint, the slaughterhouses indicated that quality is more than just boar taint. It is also about aspects like water-binding capacity. For the latter, calm transport and sufficient resting time at the slaughterhouse is also of great importance.

Accurate detection of boar taint is, however, still an important condition to offer guarantees to market parties. Detection of boar taint plays the role of a safety net. The pressure which is put on this safety net, depends on the percentage of boar tainted carcasses. This can be reduced by preventive farm level measures: breeding, feeding and housing. Pig farmers, however, are not induced to apply these measures. That only happens if slaughterhouses penalize high farm level boar taint prevalences, and until now they do not. One slaughterhouse stated to implement boar taint penalties in their farm level payment scheme, if retail organisations include it in their delivery specifications.

The others stated to do it only if there is an alternative detection method available for the human nose as detection instrument. Otherwise, they fear that penalizing for boar taint will lead to acceptance problems with pig farmers that are penalized.

Most interviewed respondents indicated that the transition to producing and marketing boars is an irreversible process, whereby the market will set the pace. A slaughterhouse put it as follows: "Give it time to let the market do its work, but do not force it."

The perspective of the meat processor

Experiences with purchasing, processing and marketing of boar meat were discussed with two large meat-processing companies. Both companies produce more than 400 t of meat products per week. They source (boar) meat from any of three major Dutch slaughterhouses. The buyers have judged the detection systems in place as being accurate.

The pH influences the scoring

Tab. 2: Effect of ultimate pH on sensory characteristics by a consumer panel (higher score is better)

	pHu<5.60	pHu 5.60–5.75	pHu>5.75	P-value
Aroma like/dislike	3.14	3.22	3.23	0.33
Juiciness like/dislike	2.97[a]	3.14[b]	3.17[b]	0.04
Tenderness like/dislike	3.23[a]	3.35[ab]	3.49[b]	0.01
Flavor like/dislike	3.09	3.24	3.28	0.06
Overall taste like/dislike	3.09[a]	3.21[ab]	3.30[b]	0.05

Source: Klont, 2005

Regularly tasting sessions are organized with meat products. It occurs occasionally that the meat has a different smell or taste. But their impression is that this is not related to boar meat, as deviating smell can have many causes.

The different carcass composition of boars results in an different composition of consumer products; more from one and less from the other consumer product. For the involved companies, however, this is not an issue. They do not include anything on this in their delivery specifications. One of the two companies stated that their foreign customers never talk about it. The other addresed the importance of which products are marketed. For some products boars are fine, and for other products boars are less suited.

Conclusions and recommendations

Based on discussions with experts, findings from related literature and results from own experiments it may be concluded that the question of whether or not to produce and market meat for entire male pigs is much broader than just boar taint.

It is also about the carcass quality and meat and fat quality. The eating quality of fresh pork is determined – next to preparation – by the water-binding capacity and the percentage of intramuscular fat. The water binding capacity can be favorably influenced by genetics, nutrition, and the slaughter process (including cooling). The content of intramuscular fat can be improved by genetics, nutrition, and the slaughter weight. It is important here to ensure sufficient saturated fat content.

The specific markets of individual slaughterhouses are important in the marketing of boars. For sales of bacon boars are very suitable, but for marketing bellies the opposite is true.

For the Dutch retail and meatpackers boar meat is no longer an issue. But for foreign buyers this is still different. Therefore, slaughterhouses are trying to limit an oversupply of entire male pigs with penalties. However, they do not induce pig farmers to deliver the required qualities (meat and fat quality, including boar taint). To further reduce the prevalence of boar taint deliveries with high percentages of boar taint should be penalized. So, instead of penalizing the supply of entire male pigs, the supply of entire male pigs with boar taint should be penalized. Then pig farmers will be particularly encouraged to apply preventive measures (feeding, breeding and housing) that are effective in reducing boar taint. Slaughterhouses, however, are reluctant to go on here.

References

1. Barton-Gade, P.A. (1987): Meat and fat quality in boars, castrates and gilts. Livestock Production Science 16, 187–196. – 2. Diestre, A. and J.M. Montfort (1998): Meat consumption and culture: congress proceedings 44th International congress of meat science and technology, August 30th – September 4th, 1998, Barcelona, Spain, 44th ICOMST, Spain, Volume 2. – 3. Eikelenboom, E. (1992): De vleeskwaliteit bij varkens. In: Den Hartog, L.A., D.L. Schumer and M.I. Visser-Reyneveld: Kwaliteitszorg in de varkenshouderij: van voer tot vlees. Pudoc Wageningen. – 4. Font y Furnols, M., M. Candek-Potokar, C. Maltin and M. Prevolnik Povše (2015): A handbook of reference methods for meat quality assessment. – 5. Harper, G.S. and D.W. Pethick (2004: How Might Marbling Begin? Australian Journal of Experimental Agriculture 44, 653–662. – 6. Hocquette, J.F., F. Gondret, E. Baéza, F. Médale, C. Jurie and D.W. Pethick (2010): Intramuscular fat content in meat producing animals: development, genetic and nutritional control, and identification of putative markers. Animal 4, 303–319. – 7. Klont, R. (2005): Influence of Ultimate pH on Meat Quality and Consumer Purchasing Decisions *http://www.thepigsite.com/articles/1506/influence-of-ultimate-ph-on-meat-quality-and-consumer-purchasing-decisions/* – 8. Lundström, K., K.R. Matthews and J.E. Haugen (2009): Pig meat quality from entire males. Animal 3, 1497–1507. – 9. Zomeño, C., M. Gispert, A. Carabús, A. Brun and M. Font Y Furnols (2015): Predicting the carcass chemical composition and describing its growth in live pigs of different sexes using computed tomography (accepted for publication). doi:10.1017/S1751731115001780.

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Rabobank

Pork surplus hinders prospects

Food and agricultural financial services provider Rabobank Food & Agribusiness Research and Advisory group has made its "Q4 Pork Quarterly" report available. The report includes a weak outlook for 2017 based on abundant supply, slaughter capacity constraints and slowing Chinese imports.

"This will result in a further decline of the Rabobank Five-Nation Hog Price Index in Q4, which turned unexpectedly in Q3," says Albert Vernooij, animal protein analyst at Rabobank. "Prospects for 2017 are weak, with global trade expected to stabilize and all main producers in expansion mode, making supply discipline key to the outlook."

Competition in the Chinese market will intensify as more companies and countries obtain export permits.

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