Pork Quality Matters

Quantity versus quality

In most walks of life, quality and quantity are inextricably linked: as you increase one, the other inevitably decreases. You just don't get big and good.

Pork production is no exception. If you want bigger, more profitable carcases from male pigs then you have to finish them later and have a much higher risk of boar taint in the meat.

In most swine producing markets the desire to get bigger carcases, but without the risk of taint, has led to the almost universal use of piglet castration.

However, as you might expect, there is a price to pay. Castration not only reduces the risk of taint it also robs the boar of its normal growth patterns.

Castrates can increase in weight as much as a boar, but by laying down more fat and less lean than an equivalent boar. So, in many markets, the resulting carcase has less value.

In some markets, particularly in Europe, the age-old practice of castration is under pressure for animal welfare reasons.

Recently Colruyt, Belgium's largest retail chain, has announced that by the end of the year it will no longer sell pork from castrated animals in any of its outlets. So are Belgium consumers about to see a drop in the quality of their pork?

Not so. Swine producers who supply Colruyt will now be using the modern alternative to castration: vaccination.

Last year an innovative product was licensed by the EU authorities for the reduction in boar taint in male pigs.

Improvac, which is made by animal health company Pfizer, does indeed work in much the same way as many vaccines.

The first dose primes the pig's immune system, the second causes it to produce antibodies which block the activity of the testes and thus reduce the risk of taint compounds in the meat.

As the second dose is given about the time that the boar begins to mature sexually, vaccination also has the added benefit of reducing the normal male-like behaviour, such as mounting and fighting. Thus potentially reducing the risk of carcase damage and the need for extra trimming.

Of course, unlike castrates, the carcases from vaccinated pigs will still have testicles that will need to be removed – although these are generally smaller than those of unvaccinated boars.

Consumer panels have consistently shown that pork from vaccinated pigs is equivalent to pork from females and castrates in terms of eating quality, and superior to meat from boars.

Laboratory analysis of the meat has also confirmed that vaccination has no deleterious effect on the meat in terms of tenderness, colour or drip loss.

Vaccination is already approved for use in 56 countries worldwide, including Brazil, where it is used by large integrated pork producers.

Approvals in the USA, Canada and China are well advanced.

The benefits of a lean, high quality carcase from heavy males, but with no risk of boar taint is obviously too good to miss. Perhaps big and good is achievable after all.

Pork Quality Matters

When less is more

For many years the car hire company Avis has used the slogan 'We try harder' as a way of overcoming the fact that it is not the biggest player in its market. It's a sentiment that pig farmers in Cyprus can identify with. Although Cyprus may not be the biggest meat market in the world, slaughtering around 870,000 pigs each year, pork accounts for over half of all the meat sold in the country.

Demand for fresh meat increases enormously in the summer and falls off dramatically in the winter.

Like much of Europe, the farms are mostly family owned and run, but are in the process of becoming larger and fewer. However, unlike other EU states, the potential for Cyprus to achieve economy of scale by investing in huge production facilities is limited.

Since joining the EU in 2004, the pork industry has also had the added pressure of easy imports from other member states. Consequently, it relies heavily on excellent quality to maintain its market, with fat, taste and tenderness the critical factors for consumers and thus buyers. The majority of male pigs are raised as entires, and thus the risk of boar taint in the meat is a constant worry.

Over the last year or so, a number of Cypriot pig farmers have found a new way to improve the quality of the meat they produce and increase the efficiency of their operations, as farm manager Savvas Chrysostomou explains:

"We started castrating about 10 years ago and faced several problems, namely a high level of fat and a lack of uniformity in the product."

Panayotis Hadjikyriakos & Son Ltd sends about 29,000 pigs to slaughter each year and so was very interested when a new method of raising entires was announced about 18 months ago.

This new and innovative technology is a vaccine which enables entire males to be raised without a high risk of boar taint and without the losses associated with physical castration of piglets. The vaccine uses the pig's own immune system to block the action of the testes, thus reducing the level of boar taint compounds and typical boar-like behaviour, but still allowing normal boar-like growth for most of its life.

Having trialled the vaccine, the unit has now switched to this new method of production.

"[The vaccine] is absolutely successful in what it aims to do because it improves the quality of the meat that ends up on the customer's plate," says farm owner Panayotis Chatzikyriakou.

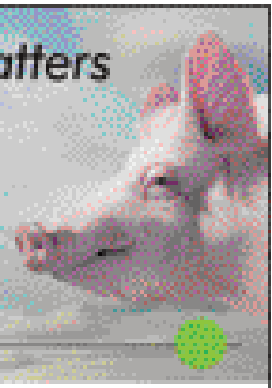
Producing a leaner and more uniform carcase was also behind the decision by Stelios Hadjimarcos to switch to the vaccine method on his 1,300 sow unit.

"Vaccinated pigs have just a bit more fat than normal [entire] male pigs – more or less the same as female pigs. They have no smell and the meat is excellent – just right for the Cyprus market."

It seems that Cyprus swine producers could have a slogan of their own: 'Being smaller means you have to work smarter'. The vaccine is already approved and being used by swine producers in many countries around the world including Australia, Brazil and Belgium.

Pork Quality Matters

Take the stress out of quality



The adverse effects of stress on carcase quality are well documented – not only during rearing but also during transportation and processing at the abattoir. Adult boars are particularly likely to experience stress because of their natural tendency for fighting and mounting behaviour. Currently, the vast majority of the 5.5 million boars slaughtered in Europe each year will have been physically castrated in the first week of life (to reduce boar taint) and thus behave more like gilts. However, the increasing pressure for producers to avoid castration on welfare grounds has led to greater interest in the rearing of entire males.

Although entire males bring the benefits of a leaner carcase with a higher proportion of unsaturated fatty acids compared to castrates, this has to be balanced against the ever-present risk of boar taint in the meat. It also has to be weighed against the drawbacks associated with boar behaviour, which not only have implications for meat quality but also for the safety of those involved in handling boars during unloading and processing at the slaughterhouse.

However, one method of raising entire boars without the usual boar like behaviour is officially approved in the EU and abroad: Improvac, the vaccine which was developed for the reduction of boar taint, results in boars which act like castrates or females.

Studies have confirmed that animals show significantly less aggressive and sexual behaviour when they are vaccinated with Improvac. They demonstrate behaviour similar to that of castrates or females. This considerably reduces the risk of bruises and other damage to carcases as a result of such behaviour. As well as reducing boar like behaviour, Improvac also drastically reduces the levels of boar taint compounds in the meat to guarantee consumer satisfaction, as confirmed by the numerous sensory panels and extensive commercial experience.

Calmer animals are not only easier and safer to handle during loading and unloading, they are also likely to be less stressed when slaughtered. This is evidenced by the high quality carcases that are obtained from vaccinated boars: with a high proportion of lean meat, good colour and excellent texture.

Producers who have already switched to Improvac have commented on the ease of handling, especially when animals are transported to slaughter.

"When loading the pigs, we noticed in particular that there was no difference between the females and the vaccinated males. They were just as calm as the others," said Chris Peeters, manager of the Wolkenhoeve farm near Antwerp in Belgium, talking about his first batch of vaccinated pigs.

The farm switched from castration to vaccination last year.

"The driver who came to pick them up was a bit reluctant to load the boars. He didn't like having that many boars in his truck. But after loading them, he had to admit that it had gone smoothly, and he noticed that they were all very calm."

Vaccination has already proved to be the answer to gaining boar-like growth performance but without the draw- backs of boar taint and boar like behaviour. Now we can bring heavyweights to the abattoir that are lean, but not so mean.

Pork Quality Matters

Is rapid taint testing realistic?

Boar taint remains a key quality issue for the global pork industry. Although both economic and welfare considerations are making the production of entire boars a potentially attractive option in many markets, the lack of an effective quality control (QC) system means that this potential cannot be fully realised.

For many years researchers have been trying to develop a rapid QC system that can be incorporated into the slaughterhouse line to detect those carcases that have unacceptable levels of taint. However, the development of such a system that is suitable in the commercial setting is proving far from easy.

The first issue to be addressed is what compounds should be measured. It is generally accepted that androstenone and skatole are the two main compounds responsible for the adverse sensory experience in consumers.

Studies have suggested that skatole may enhance the sensory perception of androstenone and vice versa. So reliable and consistent measurement of both compounds is necessary.

The second point is that, presently, there is no standardisation or agreement on what constitutes an acceptable level of taint. The perception of boar taint varies from market to market and from person to person.

Currently, consumer acceptability in individual markets drives taint QC: there is no official benchmark. That said, generally, concentrations of androstenone above 1.0µg per g of fat are considered to give rise to taint in meat. The skatole threshold is normally considered to be around 0.20µg/g.

The lack of standardisation extends to the methodology for testing. Many different methods of testing have been and are being explored, but no one method has yet emerged as the 'gold standard'.

Whichever system is adopted, speed is essential. Detection systems must be able to cope with a high throughput, up to 1,000 carcases an hour on some lines.

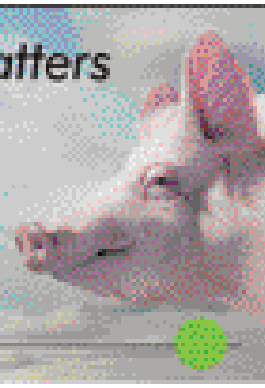
To complicate matters further, studies have shown that the amount of skatole and androstenone can vary depending on where the sample is taken from.

Two types of test are possible: based on either fat samples (solid phase testing) or the so-called 'fingerprinting' techniques (gas phase testing). The technology used has included chemical gas sensor arrays, spectroscopy, fast gas chromatography, colorimetry, infra red technology and biosensors. Commercial ultra-fast gas chromatographic systems have been recently developed, and electronic noses that use heat generation, conductivity, electrical polarisation, ionisation and magnetic properties have also been tested. So far, all of these QC tests carry a 5-20% level of false negatives, potentially allowing tainted carcases through to the consumer. Until the reliability and speed of tests improve significantly, their use in the commercial setting is not really an option.

For the foreseeable future, prevention at the farm level will remain the key to avoiding boar taint in the pork supply chain. With physical castration being phased out on welfare and/or economic grounds, the only commercially proven alternative is the use of vaccination (Improvac) to reduce boar taint.

Pork Quality Matters

Emerging quality



Established pork producing countries can no longer ignore the presence of emerging producers such as Brazil, Russia and China, because they do not produce enough pork to influence their markets. Equally, the days when they could defend their markets on the basis of safety or quality are also fast disappearing.

China, for example, now has over half of the world's population of pigs: around 47 million sows and a total headcount of 445 million animals.

The country has a number of large integrated companies that have very impressive facilities and a very progressive approach to their industry.

Producing a safe and high quality product have become top priorities in a market that has very discerning consumers and suffered recent major food safety crises.

Likewise, Brazil has a number of large integrators which continue to grow the pork industry year on year for both the domestic and export markets. Russia has decided to increase its production and aims to be self sufficient, making it less of a target for pork exporting countries in the near future.

Although these emerging markets are helping to drive demand for pork on a global scale, and thus enhance global trading, they are also putting more pressure on the established producers and exporters, notably in the US and the EU.

An increasing demand from their own consumers is undoubtedly helping to fuel the growth of emerging markets. In 1990 the average Chinese citizen consumed around 19kg of pork; 20 years later the figure has more than doubled to 39kg.

Being part of an emerging market means that new ideas and practices are much more readily adopted, on the basis that it is easier to create than to change.

These markets can take the best of the new and reject the worst of the old as they expand.

Established markets are more cautious or even conservative in their approach and less dynamic and flexible in their response to new ideas and technology.

The use of vaccination to reduce boar taint is a case in point. This technology has been adopted by most of the large integrators in Brazil and is now being used in China following its recent approval by the licensing authority. Improved feed conversion, carcase and meat quality were all factored in and the decision to adopt this new way of producing pigs is a reflection of the focus of emerging markets on the quality as well as quantity of pork production.

Global pork output for 2011 is forecast to be a record 52.5 million metric tonnes, driven largely by increased efficiency in China, higher slaughter weights in the EU and strong demand from South Korea, China and the Ukraine.

The emerging markets are developing modern, efficient industries that can produce high volumes of affordable, safe and quality pork to meet their growing consumer demands but also the demand of the established producing countries.

Adopting a flexible and pro-active approach to new ideas and new technology will help the established markets to make the most of the opportunities that the growing global pork market will present over the next few years.

Pork Quality Matters

Acceptable meat

Consumer acceptability of meat products is built on three pillars: quality, safety and responsibility. The balance between these three factors varies from market to market and from consumer to consumer but, for the vast majority of consumers, safety is by far the most important consideration. The second most influential factor in consumer acceptance is quality. Some consumers are willing to compromise on quality in exchange for price – as long as the safety factor is met.

However, meat quality is still a fundamental consideration and basis for choice among consumers in developed markets.

The third pillar, responsibility, reflects the way in which the product is produced, particularly in terms of its environmental impact and animal welfare. It is a factor that is becoming more important to the meat industry as consumers increasingly question the practices used to produce the products they buy.

Chickens have already gone down the 'responsibility route' and many consumers are familiar with the demise of the 'battery hen' concept. Pork may be next on the responsibility menu.

One of the most emotive issues in pork production is the castration of piglets to reduce boar taint. High on the agenda at both EU and national level, this issue is a good example of where, in the past, meat quality has been maintained at the expense of responsibility. In the future, that balance is likely to be redressed judging by consumer studies carried out in recent years.

A recent study conducted by the Instituts für Demoskopie Allensbach in Germany found that twice as many consumers preferred vaccination to physical castration as the method to reduce boar taint in pork. The main driver for this preference among the 1,786 people questioned was the animal welfare benefits of vaccination: mainly the lack of pain and stress that animals do experience as a result of physical castration.

These results confirm those from previous studies among European consumers. One such study, published earlier this year by researchers at Ghent University, found that 69.6% of consumers surveyed in France, Germany, Belgium and the Netherlands preferred vaccination to castration with anaesthesia – irrespective of their motivation for purchasing pork.

Importantly for the industry, the authors also concluded that 'the adoption of the vaccine is unlikely to result in marketplace loss of any particular target market'. The impact of meat production on the environment, and its sustainability as a form of nutrition for a growing global population, is also becoming more of an issue for consumers. The recent lifecycle assessment which showed that pork produced using vaccination rather than physical castration has a smaller carbon footprint has added further weight to the argument for this newer technology to be adopted in place of castration.

It is clear that food produced in a responsible way with regard to animal welfare, sustainability and employee conditions is more acceptable to consumers, and that this will become an increasingly important driver of purchase decisions in the future. The meat industry – and in particular the pork sector – has to adapt to this changing dynamic if it is to maintain its position.

Pork Quality Matters

Going global

Pork is a global business. Rising demand and production capability in developing markets such as China means that global trade in pork and pork products has never been higher. Globalisation means that producers, packers and processors not only have to be aware of what their competitors down the road are doing, but also have to keep an eye on those across the sea. And, they have to be able to adapt quickly to changing market conditions.

A good example of this 'single market' in action is the adoption of Improvac, the immunological product that is replacing physical castration as the preferred means to reduce boar taint, and allowing non-castrating markets to raise heavier, more efficient pigs. Over the last few years, the product has been approved in all the major pork producing countries, including Brazil (2008), the EU (2009), China (2010) and the USA and Canada (2011).

Strictly speaking, this technology is not new: it has been used commercially for more than a decade in Australia, where it was first developed. It was only when Pfizer Animal Health took over the product in 2004, and leveraged its global presence and experience, that the benefits of Improvac became known to a much wider audience. Currently, the product is approved in 61 countries and available under the trade names Improvac, Improvest, Innosure and Vivax.

In Brazil, the technology is used by many big integrators and accounts for 45% of the market. In Colombia some 55% of all pig farms use vaccination routinely. In China, big producers are already using the product, and vaccination rates are increasing by 25% each month. Over 20 million pigs have so far been vaccinated with Improvac, including over one million in Europe and 13 million in Brazil.

The global nature of the meat industry is also illustrated by the fact that many producers and processors are willing to travel to other regions in order to learn from the experiences of other markets. Pencheng, which processes some 8,000 carcases every day and is the biggest pork concern in Beijing, sent representatives to Brazil in 2009 to see how the vaccine was being used before initiating its own company trials. Likewise, members of the Spanish pork chain took a trip to South America to see what was being done.

Pork from Improvac vaccinated pigs is being traded on the international export market and consumed around the world. Consumer research carried out in a number of different populations, including taint sensitive markets such as Japan and Germany, has shown that the quality of pork produced in this way is highly acceptable and every bit as good as pork produced by castration.

Moves to outlaw castration across Europe in the next few years, combined with an increasingly vocal welfare lobby in other markets such as the USA and the Netherlands, mean that retailers may also be looking for their suppliers to adopt a more animal friendly approach. Perhaps the global pork market is seeing its first truly global brand.

Pork Quality Matters

Heavy weight champion

Ham production is one of the largest sectors of the European meat industry, especially in the Mediterranean region. Spain, for example, is the world's leading source of cured hams, producing 3.5 million tons in 2009 – 12% of the country's total farming output.

In Italy the quality of designated hams, such as Parma, is ensured by local consortia which lay down strict production rules. For example, pigs have to be at least nine months old and 160kg live weight at slaughter; back fat must be 20-30mm and total fat must not exceed 15%.

Producing pigs to these standards is not easy, especially if they are boars. Not only are these heavyweights difficult and potentially dangerous to handle, they also have a longer time and more capacity to accumulate fat-soluble boar taint compounds such as androstenone and skatole. In the past, these issues have been managed by castrating piglets. But with this practice rapidly falling out of favour in the EU, producers are having to look for alternative means to manage their animals.

Since May 2009, producers of 'standard' size pigs, have been able to vaccinate their animals to reduce boar-like behaviour and boar taint. The vaccine is given in two doses: the first primes the immune system and the second stimulates the production of antibodies which block the release of testosterone. However, it was well known that the effect of the second dose does begin to wear off over time, so the manufacturer recommended that pigs were sent to slaughter 4-6 weeks after the second injection and no later than 10 weeks, to ensure that boar taint was reduced.

With ham producers raising pigs to 28 weeks of age and beyond, the two dose vaccine did not last long enough to control male behaviour and boar taint from puberty right through to slaughter. However, in the last few months the European licensing authority has approved the use of a three dose vaccine schedule, which meets the needs of those raising heavier weight pigs.

A study of the three dose vaccine in heavy pig production found that two weeks after the third injection, testosterone levels were below measurable levels in 96% of the vaccinated pigs, and at slaughter this was still the case in 91%. At slaughter, 100% of vaccinated pigs had belly fat concentrations of both androstenone and skatole well below the recognised thresholds for the risk of boar taint (500-1,000ng/g and 200ng/g respectively). All pigs in the study were slaughtered five weeks after the third injection at 36 weeks of age.

As well as providing heavy pig producers with an effective alternative to castration, the three dose vaccine also provides other swine producers with an additional option in cases where slaughter is delayed due to unforeseen circumstances.

In Europe alone there are now over 20 products with internationally recognised designations of origin.

Now heavy weight swine producers have a practical means to control boar behaviour and avoid the risk of boar taint and thus safeguard the quality of the end product, whilst still complying with consumers' and legislators' desires for a more welfare friendly form of production.