Matching carcase quality to meet market needs

by the technical team, Pfizer Animal Health.

The vaccination approach to reducing boar taint also provides a means to adjust swine carcase quality to match local needs.

"Jack Sprat could eat no fat,
His wife could eat no lean,
And so between them both, you see,
They licked the platter clean."

The old English nursery rhyme could well be used to describe today's global pork market: for some slaughterhouses, such as those serving the fresh market in Europe and Brazil, the leaner the better is the rule; in others, such as those serving the specialist ham producers in Spain or Italy, a significantly fatter carcase is required.

Swine producers have to match their end product to consumer preferences and processing needs by raising pigs of different types under different conditions, and using different rations.

Raising females, castrates or entire boars provides a very crude way of delivering carcases with different lean/fat composition.

However, there is an alternative production method which provides opportunities to adjust carcase quality between these extremes. Immunological castration of male pigs is being increasingly used around the world not only because it can reduce boar taint, but also because of its welfare benefits, feed conversion advantages, and animal behaviour modification.

What is less well known is that the same technology opens up management opportunities to adjust the lean/fat ratio to meet the exact needs of a particular processor or market.

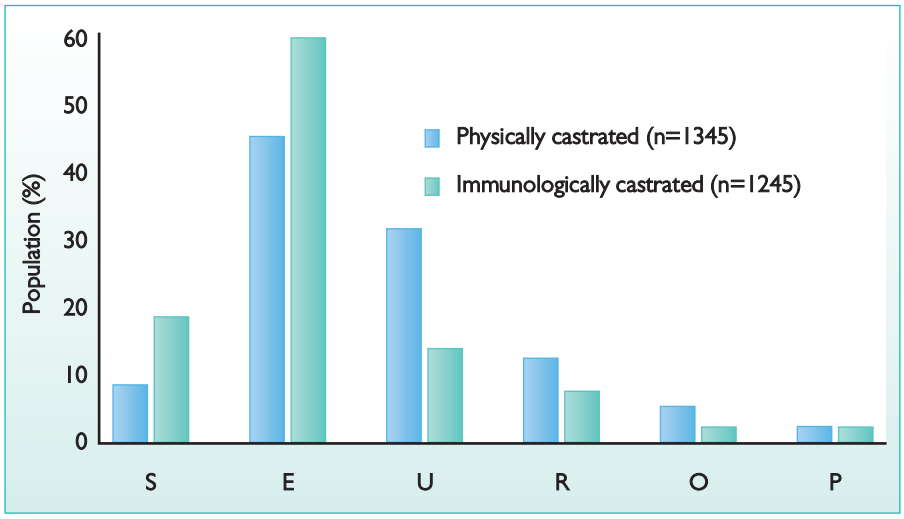
Improving carcase grade

In general, male pigs that are immunologically castrated produce a carcase with less fat than a castrate and less lean than an entire boar, often similar to that of a female.

Research presented at last year's International Congress of Meat Science and Technology (ICoMST) in Ghent, Belgium, compared carcase quality of physically castrated and immunologically castrated pigs using the SEUROP system.

This standardised grading system based on lean meat yield is used by some European processors to value carcases. Data from over 2,500 pigs, in 13 studies conducted in 10 European countries, showed that immunological castration produced a shift towards more superior grades (Fig. 1).

Fig. 1. Distribution of carcase grading against SEUROP system pooled from 13 studies from 10 European countries.



Around twice as many vaccinated pigs met the top grade ('S' – 60% or more lean meat) compared to castrates (16.5% vs 8.1%). Three quarters of vaccinated animals fell within the top two grades ('S' and 'E') compared to just half of the castrated pigs.

Fig. 1 combines results from multiple studies and therefore misses the fact that in many cases using the vaccination approach, rather than physical castration, also appears to result in less variation in carcase quality.

In one study, conducted by the Spanish research institute IRTA, back fat measurements revealed a mean value of 13.17mm in vaccinated pigs with a standard deviation (a measure of distribution) of ± 2.42mm.

For castrated animals the mean was 15.04mm back fat with a much wider standard deviation of ± 3.5mm (Fig. 2).

The carcase benefits result from the fact that using a vaccination approach allows the pig to grow like a normal boar for most of the fattening period.

The first dose of vaccine is given any time from eight or nine weeks of age (depending on local registration) and has no significant effect on the physiology of the pig: it simply primes the pig's immune system.

It is only after the second dose of vaccine is administered, a few weeks before slaughter, that testicular function is suppressed and the animal adopts metabolic and behavioural characteristics that are more like those of a castrate.

Flexibility

What many producers are now realising is that by varying the time between the second dose of vaccine and slaughter they can fine tune the carcase quality.

A shorter gap produces a leaner, less fatty carcase as the animal lives longer as a boar; a longer gap produces a slightly less lean, fatter carcase.

There are limits to this approach: the second dose must be given at least three or four weeks (depending on local registration) before slaughter, in order to provide enough time for boar taint compounds to be eliminated successfully.

In addition, the effect of vaccination is only temporary, so normally pigs are given the

second dose four to six weeks before slaughter, in order to avoid the possibility of testicular function (and boar taint) returning.

The maximum period between the second dose and slaughter is 10 weeks. The potential issue that this creates for producers raising heavyweight pigs in specialist systems, where full vaccination may need to be performed more than 10 weeks prior to slaughter to avoid fighting and other behavioural problems between boars that may be six months of age or more, has been addressed in some regions, such as Europe, where the use of a third dose of vaccine has been authorised.

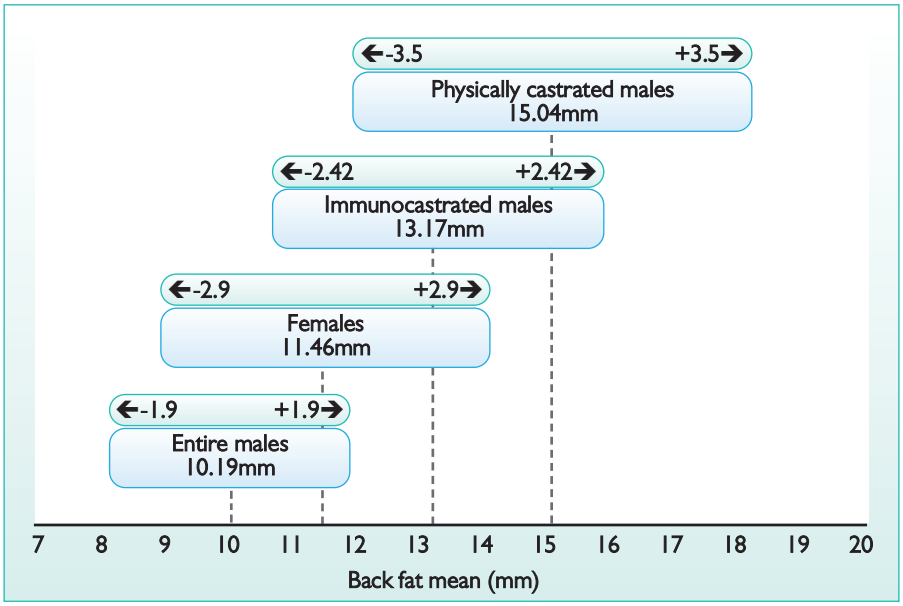


Fig. 2. Variation in back fat with different methods of production. The variation in back fat is expressed as the standard deviation (both positive and negative) from the mean.

Impact of nutrition

As with other types of pig, the carcase composition of immunologically castrated animals can be altered by different nutritional strategies.

Before the second dose of vaccine, the pig grows like an entire male and to optimise production the diet needs to support a high rate of lean tissue (protein) production from a feed intake that is typically lower than that of a physical castrate.

After the second dose, metabolism is more like that of a castrate with an associated increase in feed intake but with lower protein requirements. Lysine is often the amino acid which limits nutritional potential, and thus is used as a measure of dietary protein value.

The lysine to energy ratio of the feed during each phase will not only impact growth performance but also carcase composition.

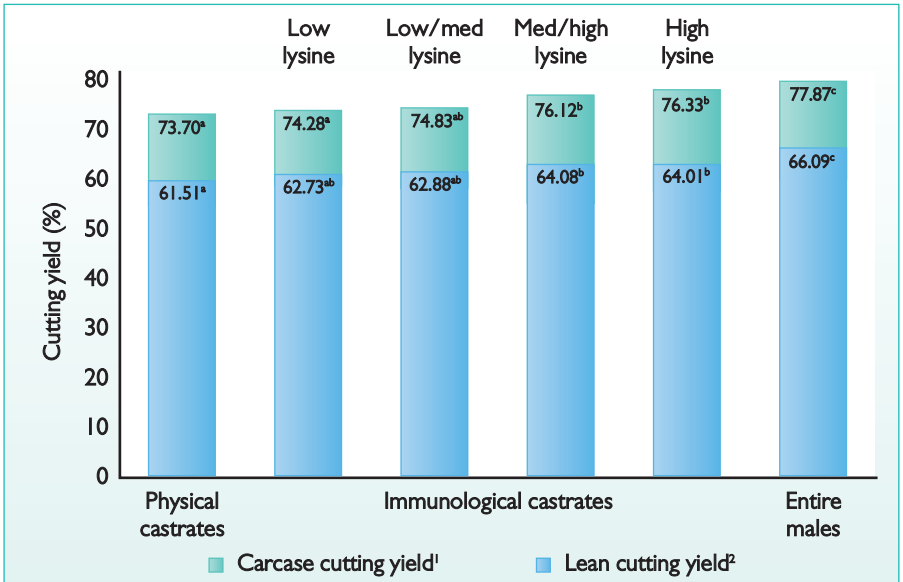
A study of the effect of increasing dietary lysine on immunologically castrated pigs found that lean cutting yields as well as carcase cutting yields both increased (see Fig. 3).

Immunologically castrated pigs fed diets with medium/high lysine content produced carcases with a cutting yield about 2.5 percentage points greater than those from physically castrated males.

There were no negative effects on pork quality parameters (tenderness, water-retention, ultimate pH or colour).

The researchers concluded that immunological castration could have a major economic impact on global pork production systems.

Fig. 3. Effect of immunocastration on cutting yields.



[1]Bone-in carcase cutting yield = ((lean cutting yield components + trimmed belly)/chilled side weight) x 100

[2]Bone-in lean cutting yield = ((trimmed ham + trimmed loin + Boston butt + picnic)/chilled side weight) x 100

[a-c]Groups without common superscripts differ significantly ($p<0.05$)

Summary

More than 1.25 million pigs are raised each month using vaccination to reduce boar taint. The fact that this technology is now being used in more than 60 countries around the world, from the US and Europe, to South America and Asia, is a testament to its ability to meet local consumer preferences by delivering a variety of carcase types from a variety of different production systems.

The natural result of using the vaccination approach is a pig with a carcase fat/lean ratio between that of a physical castrate and a boar, but management techniques can be used to adjust this within certain limits.

Using the technology may also produce a more consistent result from one carcase to the next, which is often an additional benefit to the cutting plant. ■

References

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