Heterosis in the finishing herd – benefits and pitfalls

by Dr Grant Walling, director of research and genetics, JSR Genetics.

Over the last 12 months heterosis is a word that has re-entered the vocabulary of pig producers in the UK. Originally a term only familiar to geneticists (and genetics graduates trying to pass their finals!) it first surfaced within the pig industry in the 1960s when breeding companies began developing hybrid gilts.

Heterosis or hybrid vigour is the increased vigour and other superior qualities arising from crossing genetically different animals.

It is of particular interest to pig breeders because the traits that benefit the most are often those that are difficult to improve with conventional breeding, such as litter size or disease resistance, due to their low heritability.

It is because of the benefits to litter size that parent gilts are, typically, a first generation cross between two lines or breeds of different genetic origins.

However, while the benefits of heterosis are well known for parent gilts, producers are now applying this technology a tier further down the breeding pyramid to the slaughter pig, which is why the word has recently resurfaced.

Previously, a Large White x Landrace gilt was normally mated with a Large White sire line animal to produce slaughter progeny. So, while the mother exhibited high levels of heterosis, the progeny displayed only low levels of heterosis because the Large White breed is common to both sides of the cross.

Traditionally, this remained a minor concern as these animals were not destined to be used for breeding, so lack of heterosis for litter size traits remained unnoticed.

In addition, the high health status of the UK population meant that any reduced genetic benefit to the immune system did not impede the performance of the animals.

However, times have changed. The UK no longer basks in a high health environment for pig producers. Many have now noticed a downturn in production figures and, quite sensibly, have looked to their genetics to help. Populations affected by disease exhibit higher levels of mortality.

Individual animals that survive disease challenges typically suffer a major slow down or standstill in growth rate.

Animals undergoing periods of repressed growth also lay down more fat. The overall effect of increased mortality and fatness coupled with decreased growth and efficiency is economically very damaging.

Is the answer to these problems a third unrelated breed for the terminal sire? One answer is 'yes' but the decision is not quite so clear cut as some have made out. The heterotic benefits of this third breed on disease resistance and weaner survival can be high.

At JSR Genetics we estimate the subsequent benefit on growth to be up to 10%, with reduction in P2 backfat depth of 5%.

So, with more finished pigs growing faster and leaner surely everyone will be changing? Not exactly. The third breeds being introduced by some pig breeding companies as terminal sires are usually not as profitable as the traditional terminal sire lines.

Many have inferior growth rates or standards of efficiency below that being used in the UK industry over the last five years. Some third breeds, due to their more exotic genetic makeup, are more prone to producing coloured progeny that may acquire additional skinning costs at slaughter.

Very few of the new terminal sires offer additional benefits to the producer in addition to heterosis.

It is, therefore, vital that producers do not become too blinkered in their pursuit of the most suitable terminal sire for their system. Heterosis from the progeny of a terminal sire is not necessarily the Holy Grail some are making it out to be.

Producers should ask themselves the following questions before introducing a third breed terminal sire aimed at maximising heterosis:

- **Have I a below average health status or specific health problem?**

If the answer is no then any heterotic benefits from a terminal sire boar are likely to be minimal. Boars should be considered on their individual breed merits and not on their crossbreeding potential.

- **Does the proposed 'high heterosis' boar have nucleus purebred growth and carcase performance 10% or more below the standard boar?**

Although the answer will vary from farm to farm if the answer is 'yes' then the benefits of heterosis are likely to be outweighed by the inferior performance. The conventional boar is most likely to be the most profitable.

- **Does the change to the third breed incur additional costs?**

If the third breed is coloured, as they usually are, then skinning costs of coloured progeny at the abattoir may be up to £20 per pig. Some processors may even refuse to accept the new genetics, or any premium previously paid may be reduced. So it is important to ensure that any benefits of heterosis are not overtaken by these additional costs. This should be checked out with the abattoir.

- **Do the new terminal sire breeds offer new benefits?**

Changing to Pietrain sire lines will result in an increased killing out percentage with subsequent benefits on deadweight and, hence, average carcase value, as well as improved meat yields at the abattoir. The Duroc offers meat eating quality benefits that may attract higher carcase premiums. RN*- Hampshire (and only RN- Hampshire) animals also offer meat-eating quality benefits, albeit with reduced processing yields.

Producers who cannot answer all the questions favourably should ensure that any change in their terminal sire benefits the farm profitability as a whole, rather than one specific trait.

Those producers who can answer all the questions favourably may well be the next to benefit from heterosis in the slaughter generation. ■

**RN gene, the Rendement Napole gene, is controlled by differing versions known as alleles. All breeds of pig carry the normal rn+ version of the gene. However, 70% of Hampshires carry the alternative form RN-.*

The RN- version of this gene offers meat eating quality benefits among other features, but it does have some processing drawbacks such as increased drip loss. Producers should therefore always ensure any Hampshire stock is of the genotype they require.