

Science fact – not fiction

Genetic profiling has a positive impact on UK herds

Just how far has genetic profiling moved on during the past 12 months, how is it influencing young bull and breeding stock selection and how are dairy producers set to benefit? We spoke to British, Dutch and US experts to find out more.

Imagine a time when genetic profiling replaces lengthy progeny testing and when it is possible to select bulls that will definitely produce daughters with good longevity. AI companies and breeders could save millions of pounds and producers would milk heifers and cows with long, productive lives – considerably longer than today. Sounds like science fiction?

Well it's not. As gene marker technology continues to evolve it could become fact within the next five years, according to Stewart Bauck, head of strategic development for IGENITY's Atlanta-based office.

"As the power of the genetic profiling increases, it is entirely likely that it will, at some point, be able to completely replace progeny test programmes for young bulls and improve the efficiency of

breeding genetically superior replacement heifers."

It is already being used to aid the selection of young sires for progeny testing.

Reliable estimate

"If you have two similar bulls, say they are 'flush mates' and both with promising pedigrees, genetic profiling can tell you which one is the superior bull and more likely to come through and sire genetically superior daughters with greater longevity, for example. If you add the genetic profile to the parents' performance data, you can get a more reliable estimate of the eventual PTA for that bull."

Genetic markers are also being used in the Netherlands for young bull and bull dam selection. Working closely with world-renowned geneticist Michel Georges, from Belgium's Liege University, CRV –

Genetic profiling can add £193 extra margin per cow

Dairy producers can now boost margins by up to £193 per cow by using a genetic profiling tool. Merial's IGENITY has identified that the difference in potential longevity between cattle can be as much as 8.3 months, following the addition of new gene markers to the DNA profile. "For a 110-cow herd, an extra 8.3 months of productive life equates to £193 additional profit per cow," explains independent consultant Dick Esslemont. "That's after all variable and fixed costs, and is based on the current milk price and input costs."

A cow's potential longevity is scored between one and 10 and it is the difference between a cow scoring one

and a cow scoring 10 that equates to 8.3 months' of additional productive life.

"For a typical 110-cow herd, the margin increase for one point of difference in genetic improvement is up to £2,125," calculates Dr Esslemont. "It's a great advantage to be able to select the cows which have the longest productive lifetime and, in doing so, reduce the herd's culling rate," adds Dr Esslemont.

"Historically, selection for longevity has been difficult as heritability is low and cannot be easily measured until late in the cow's life," explains the director of IGENITY for Europe, Nigel Otter.

"But producers who are able to evaluate their cows when they are still young

heifers can make confident breeding and management decisions at a much earlier stage.

"So, simply by analysing a hair sample, producers can confidently select those heifers and cows that contribute to improved longevity."

The profiling kit, offering the basic diagnostic panel, costs £30 and contains all that is needed for producers to submit samples and obtain a report of their cows' potential. This highlights the animals 'dairyness' and includes information on several traits, including body condition score, fertility and longevity, as well as others connected with milk yield and quality.



Alfred de Vries: "We're looking for 'green flags' in the DNA profile

the parent company of Holland Genetics – has set out to dramatically increase the rate of success for the young bulls entering its testing programme by using genetic profiling.

"We're screening animals from contracted breeders as well as those from our own nucleus herd," explains CRV's manager of breeding development Alfred de Vries. "We take a blood sample soon after birth and this is analysed in Liege University's lab. We're looking for points or 'flags' in the DNA. There are good 'green' flags and not-so-good 'red' flags and we're obviously looking for as many green ones as possible."

Between 30 and 40 individual traits are examined and from these the geneticists are able to estimate a breeding value. And using this breeding value, they are able to select bulls most likely to succeed in the testing programme.

Genetic differences

"Genomic selection allows us to identify the differences between two animals and goes some way to explaining the variation in traits such as milk production and fertility," says Mr de Vries. "Two full brothers will have the same pedigree index on paper, but there will be genetic differences between them. This technology allows us to sort the wheat from the chaff, so to speak, and should lead to improved bull testing programme success.

"Genetic progress will also be greater, by between 30% and 40%. In terms of index points within a herd, if the usual rate of progress is the equivalent of 10 index points a year then we're looking at an increase of between 13 and 14 index points.

"It would also be possible to test fewer bulls if we knew the success rate was going to be higher, but so far we have decided to test the same number of bulls. This way we will be able to offer our customers a wider portfolio," adds Mr de Vries.

Looking further to the future, he says that at some stage – maybe in five or 10 years time – young bulls may not need to be tested at all as genomic selection alone will be sufficient. "But the market will decide on that. It's new technology and we need to be cautious and producers need time to adjust.

More efficient

"We also need to continue with the testing programme as we need the data from that to keep the genomic selection 'system' updated. At the moment there's a bit of a 'chicken and egg' scenario – we need to establish a relationship between the two systems as they are still dependent upon each other."

For now though there's no doubt that CRV's bull testing programme will be more efficient from now on, thanks to genomic selection. "And not only will we see more bulls succeeding, but these bulls will also be better able to meet specific needs within individual dairy herds. We're going to provide a wider choice of bulls for dairy producers."

Genetic profiling is also highly relevant as far as replacement heifers are concerned, according to Stewart Bauck. "Today, for just £30, producers can test heifers and get a good assessment of their genetic merit from Merial's IGENITY profile," he says.

"This cost is just a fraction of the average cost of rearing a heifer and helps the producer decide which heifers to sell and which to keep.

"Using the genetic marker technology is one way to ensure that you're breeding daughters from your very best heifers before they've any production records to prove their genetic merit."

Rachael Porter