

BACK TO THE FUTURE FIELD DAY

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DNA Science drives Raff Angus

by James Nason - Article & photographs courtesy of www.beefcentral.com



Five years after scientists mapped the bovine genome, the cutting edge science has moved out of the laboratory and into the paddock at Drillham in western Queensland. In an Australian first, the Raff family has tested its entire Angus seed-stock breeding herd with Pfizer Animal Genetics' HD50K tool for Angus cattle.

David and Andrew Raff say the DNA based science will help them to fast-track the rate of genetic gain in their breeding program by at least two years. Ultimately, they say,

it will help them and the broader cattle industry to select and breed cattle that consistently and efficiently produce higher quality beef.

Pfizer's new HD50K technology is a telling example of just how far genomic science has progressed since the bovine genome was mapped in 2006.

In that year scientists were able to identify 12 genetic markers for three commercial cattle traits.

Fast forward five years, and Pfizer's high-density HD50K platform - the most comprehensive of its type according to the company - allows geneticists to call on more than 50,000 markers to predict genetic performance for individual animals on 13 key traits. The traits measured cover areas of significant economic importance to the commercial cattle industry, ranging from calving and growth to feed conversion efficiency and carcase qualities, such as marbling and tenderness. Many of the traits were previously unmeasurable to this degree of accuracy, another reason why the technology is creating so much excitement and interest.

In practice the process involves sending tail hair samples from calves as young as four months of age to Pfizer for DNA testing with its HD50K platform. In return Pfizer provides "Molecular Value Predictions" (MVPs) for each animal that rank its genetic merit according to each of the 13 traits. A key attraction is the technology's ability to provide far more accurate predictions of the future breeding performance of young cattle.



Window into the Future

US-based Pfizer Animal Health geneticist Dr William Herring told a large crowd of commercial cattle producers at the Raff Angus field day that the HD50K platform effectively gives breeders a valuable window into the future.

“It gives you a chance to take a look at those young animals, and to give you an idea of what if they had already sired 10 or 15 offspring,” Dr Herring said.

“You take the DNA profile on those young, non-parent bulls and when it is all said and done it is like they have already produced progeny. For those bulls we already have an idea how they perform for those same type of traits.”

Last year the Ruffs signed a three year contract with Pfizer to develop the HD50K test for Angus cattle in Australia. Stud master Andrew Raff said the additional certainty offered by DNA-based tests was a major attraction for stud. Molecular Value Predictions provided an instant and absolutely factual record of an animal’s individual performance ability, he said.

“Genomics in no way can be manipulated by humans, are not affected by the environment, do not require progeny to be recorded for improved accuracy and do not need genetic linkage to allow accuracy to occur.”

While their enthusiasm for the technology is obvious, the Ruffs are also quick to emphasise the point that the HD50K information will only be used to fine tune selection decisions, and never as a replacement for visual or actual performance based criteria.

“We have no intention to use MVPs as a single selection tool... we will always use visual appraisal and pedigree merit first,” Mr Raff said. Dr Herring said similar DNA technology had already revolutionised the rate of genetic gain being achieved in the US dairy, pork and poultry industries. In a global agricultural marketplace where competition from other countries and from other industries for the same feedstuffs was fierce, the Australian beef industry faced a challenge to convert high priced inputs into kilograms of product as efficiently as its competitors.

“What this says is that if there is a technology that is cost effective and it works, then from a business perspective it is something you have to seriously consider,” Dr Herring said. Dr Herring said US seed-stock producers who had been trialling the HD50K technology planned to use it in three basic ways: to make trait information available to commercial buyers on sale bulls, to use HD50K genotyping information on heifers to assist with the selection of donors for embryo transfer programs, and to assist in the selection of replacement heifers that fall outside their ET program.

For commercial cattle producers, the technology meant they could spend their dollars with greater confidence that the bull they were buying would provide the traits they were looking for, he said.

Open Book into Selection



The field day served as an open book into the Raff's selection program as they walked dozens of breeding animals through their sale ring and explained how the HD50K test scores for each trait were being used to fine tune the stud's breeding decisions. Mr Raff said a key practical benefit of the technology was the ability it provided to measure cattle for efficiency. Efficiency was of critical importance, because for every steer that was sent away to slaughter, there was a sister that had to survive for the next 12 months to rear a calf.

The Ruffs challenged the industry consensus that low mature weight cattle were the most efficient.

"If a large frame animal that eats more can reach the desired weight and finish earlier than a smaller frame animal that eats less, the larger framed animal surely should be considered more efficient," Mr Raff said. "It is not how much feed an animal eats, but how much weight it gains for every kilogram of feed eaten to reach optimum weight and finish at the earliest age."

Breeding policies that pushed too hard towards low birthweight animals and which used heifer bulls (.e. younger, smaller bulls or bulls genetically identified as being likely to produce low birthweight calves) were likely to create an ever diminishing effect on size with each generation.

"If we breed animals that might be heavier at birth but were calved easily, and whose' daughters come from the MVP reporting scheme and can calve better than the average of the Angus breed, then that suits our program really well," Mr Raff said.

