American Angus Association vice-president Joe Hampton explained how his organisation was developing genomically assisted EPDs during the National Angus Conference.

DNA test pushes the boundaries

THE beef industry's ability to identify high-performing seedstock animals made another quantum leap last week with the official launch of Pfizer's new high-density 50,000-marker DNA selection tool.

Illustrating the breakneck pace of progress being made in the global genomics industry, Pfizer's new test replaces a 56-marker panel released only 15 months ago – almost a thousand-fold expansion over the earlier technology. At this point, the new high-density 50K-marker test is released for use within Angus cattle only; however, plans are in place to extend it into other Bos Taurus and Indicus breeds as further research is carried out.

Pfizer Animal Genetics' senior R&D director Dr Gerard Davis unveiled the new test and the prospects it offers the Australian beef industry during the Angus National Conference in Albury last week. He said the new Angus test provided molecular value predictions (MVPs) for 13 economically important traits, covering calving, growth, carcase and feed efficiency.

MVPs are numeric values derived from the overall sum of different gene-marker effects in the animal's genotype for each specific trait of interest.

Some of these difficult-to-measure traits, including average daily gain, dry matter intake, net feed intake and tenderness are not available as Breedplan EBVs.

Other traits measured as MVPs will complement and enhance existing EBV calculations, include calving ease, birth weight, weaning weight, milk, carcase weight, fat depth, eye muscle area and marbling score. Ultimately, the predictions on genetic merit made using MVPs are likely to be integrated with Breedplan EBVs to create more powerful marker-assisted EBVs.

Research in this area is already well advanced.

Dr Davis said the new HD 50K test offered:

- Early identification of those calves with potential to become superior performers.
- More genetic progress on economically important traits that are difficult to record.
- Increased accuracy, providing more comprehensive and more reliable information, allowing users to make better selection decisions.

Correlations between MVPs and EBVs calculated for an independent population of almost 900 animals averaged 0.33, ranging from 0.11 to 0.50.

> We can now start to impact on genetic gain significantly.

Dr Davis said the new test could help deliver high-accuracy genomically enhanced EBVs on very young Angus cattle at levels that had not been achieved until an animal reached about five years of age.

The percentage of genetic variation accounted for by the new test was much higher than ever seen before. Some traits still provided challenges; however, feed efficiency, for example, still had a lower proportion of genetic variation, largely due to a lack of currently available data.

"Having these predictions means we can now start to impact on genetic gain significantly, and from a number of areas of the equation – the generation interval, the intensity of selection and the accuracy of selection," Dr Davis said.

Additionally, the test was easily expandable to include other traits currently under scrutiny, including additional maternal performance traits, health aspects like susceptibility to respiratory disease, environmental adaptation such as heat stress or parasite resistance, and the nutritional value of beef to consumers.

"The 50K chip provides not only an assessment of traits today, but also a platform that enables us to add further traits without additional testing."

The HD 50K test was developed and validated in the US using 5100 heavy evaluated Angus cattle, using proprietary analysis technology endorsed by independent leading genetic scientists in the US. Further validation was carried out in Australia and New Zealand using high- accuracy AI sires and animals from the Trangie Progeny test program.

Another conference speaker, Joe Hampton, the American Angus Association's vice-president, said his organisation had already started publishing genomic enhanced EPDs (North America's equivalent of Breedplan EBVs) and indexes.

Mr Hampton said performance recording had advanced dramatically in the 25 years since it was introduced as a basic tool, providing average daily gain data. "We then advanced to within-herd ratios, expected progeny differences, dollar index values right through to the current genomic enhanced EPDs and selection indexes," he said.

The initial genomic data came from Merial's Ingenity test, but that was not an exclusive long-term arrangement, and other providers of HD 50K data were likely to contribute to the AAA database in the future. America's first genomic-enhanced EPDs were released last September, and later this year all carcase EPDs are expected to be genomically enhanced.

High-density testing hailed

SEEDSTOCK producers attending the Angus National Conference greeted the launch of the new Angus high-density DNA test with enthusiasm, identifying a range of advantages over earlier GeneStar tests.

Mark Gubbins, from Coolana Angus, north of Mortlake in western Victoria, said the new product was "exciting stuff for the seedstock sector", with enormous potential to take the beef industry forward.

"I see it as being the future of the herd-recording industry, but probably not at the complete expense of Breedplan-type objective measurement. The way the US appears to be using the technology – merging the test into their EPD results – really showed up that that is probably the most sensible way to go about it," he said.

"It would be nice to simply pluck a hair and be able to tick all the boxes in terms of an animal's genetic potential, without having to use Breedplan-type objective measurement, but I'm not sure that will happen in my lifetime. But having said that, things are moving quickly – already there are 300,000 marker panels being used in the dairy industry.

"The old 56-marker GeneStar panel was only introduced 18 months ago."

Mr Gubbins said while the new technology would not be cheap to adopt, he anticipated the cost would reduce with greater uptake.

LEFT: Mark Gubbins.

RIGHT: David Raff.

"To us, one of the biggest attractions is the speed of discovery and the ability to isolate younger females to bring into our donor program more quickly, as well as better identifying elite bulls – both to sell and to use in our own breeding programs."

Southern Queensland Angus bull producer David Raff also saw some big plusses in the new test. "The first is that it takes the human element and the environmental factors out of the performance-recording equation. It's all about the individual animal – it takes all of the inference and pedigree aspect away and represents a big plus for the industry."

Mr Raff also saw huge longer term potential for the test (once extended beyond Angus) in northern Australia.

"The uptake of Breedplan in the north has been slow, largely because of the logistics of collecting data such as birth dates and birth weights across larger herds. In some cases, the new markers may not be incorporated into marker-assisted EBVs, but replace EBVs altogether as a stand-alone selection tool.

"In that sense, the new HG test could provide a significant advantage to Bos Indicus seedstock breeders, particularly in hard to measure traits," Mr Raff said.

There was also the longer term potential to add additional measurable traits such as heat tolerance or respiratory disease resistance. "The sky's the limit with genetic gain over the next 10 to 20 years," he said.

"The new test means we can identify superior breeding stock far earlier, so the generation improvement is going to be huge."