

Oz scientists expand genetic horizons

Australia's geneticists are leading the world in expanding the horizons of genetic selection of dairy cattle.

What do you achieve if you take a team of clever geneticists, give them state-of-the-art research facilities and supply them with exceptional herd performance records? The result is world-leading advancements in breeding tools for dairy farmers, says Dr Matt Shaffer, CEO of DataGene, the organisation responsible for driving genetic gain and herd improvement in the Australian dairy industry.

“Australia was the first country in the world to release tools nationally that enables all dairy farmers to breed for improved feed efficiency and heat tolerance. DairyBio's scientists are working at the cutting edge of genetic technologies. And there's more exciting tools in the pipeline,” Dr Shaffer said.

DairyBio was formed to bring science and industry together to create practical tools for farmers. It is a joint initiative between Agriculture Victoria, Dairy Australia and the Gardiner Dairy Foundation. The team works in purpose-built facilities at the AgriBio Centre for AgriBioscience in Bundoora. With molecular and quantitative geneticists in the same building, it is one of the few integrated genetic research facilities in the world. It's also home to industry organisations like DataGene, Holstein Australia, Jersey Australia and NHIA.

“It's very powerful having science and industry co-located. Amazing things are possible when you combine a real-world perspective with great scientific minds and the latest technologies,” Dr Shaffer said.

Summary

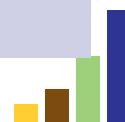
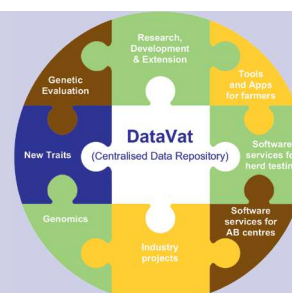
A combination of world leading scientists, cutting edge genomics and access to herd performance data is giving Australian farmers access world genetic evaluation tools ahead of overseas farmers.



DataGene CEO Dr Matt Shaffer says Australia's geneticists are leading the world in expanding the horizons of genetic selection of dairy cattle.

About DataGene

DataGene is an independent, industry-owned organisation responsible for driving genetic gain and herd improvement in the Australian dairy industry. It is an initiative of Dairy Australia and industry. DataGene performs many pre-competitive herd improvement functions, such as genetic evaluation, herd testing and herd improvement software development and data systems.



“Molecular geneticists extract the DNA from hair and skin samples while quantitative geneticists analyse the data. There’s very few places in the world where these teams work so closely together.

“Ultimately their work is about identifying and linking gene variations to the traits that dairy farmers want to improve in their herds, like improved milk production, fertility or mastitis resistance. The outcome is genomic Australian Breeding Values – ABVs.”.

“The combination of genomic technologies and herd performance data has enabled DairyBio scientists to develop ABVs for traits that are difficult to measure, such as heat tolerance, feed efficiency and health.

The complete sequencing of the bovine genome, the development of cost-effective and reliable methods to DNA test large numbers of animals, access to increased computing power and investment in research are all playing a part in these developments.

Big data

Developing genomic ABVs relies on access to performance data from Australian dairy herds. Herd records allow geneticists to link specific genes to animal performance for specific traits.

Collected from herd testing, pedigree, conformation,

health, fertility and management records, this data is mapped to DNA markers for the associated genes.

A group of dairy herds with exceptional records plays a special role Australia’s genetic evaluation system. Collectively known as Ginfo herds (short for Genetic Information), their animals are DNA tested so they can be crossmatched with performance records. Ginfo currently consists of detailed records from about 150 dairy herds, with Holstein, Jersey, Aussie Red and cross breeds located across Australia’s eight dairying regions.

Linking differences in cow performance to genetic markers is a challenge given the very large data sets involved.

“We are talking about ‘big data’; for example, Australia’s genetic evaluation system has 193 million test day records plus we exchange data with overseas industries.”

Adding to the complexity is the fact that most traits are influenced by multiple genes. For example, fertility is thought to be influenced by 1000-5000 separate genes.

“Advances in computing power give us the capacity to process massive volumes of data. We are privileged to have some of the best brains in the world in the DairyBio team. Combine that with a healthy dose of practical perspective and we have the ingredients for a world leading genetic evaluation system,” Dr Shaffer said.



The AgriBio Centre for AgriBioscience is one of the few integrated genetic research facilities in the world. It’s also home to industry organisations like DataGene, Holstein Australia, Jersey Australia and NHIA.

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