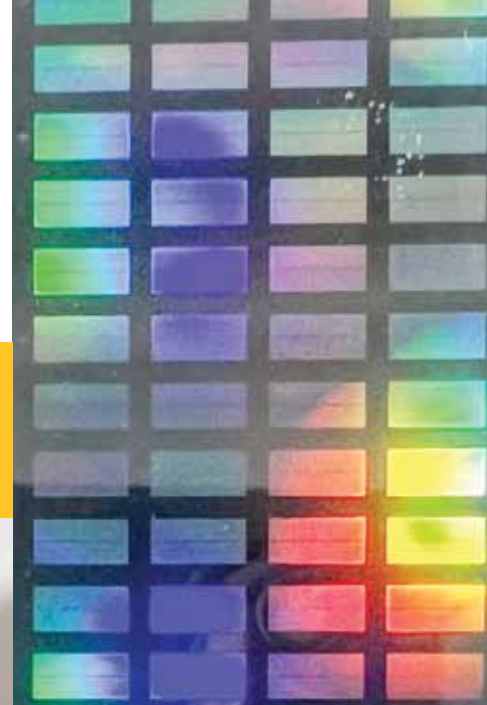# DataGene
Solutions for Herd Development

Annual Update 2022

DataGene is an independent, industry-owned organisation that delivers world-class herd improvement products and services to Australian dairy farmers and their service providers. Our members include leading herd improvement service providers, genetics suppliers, breed associations and peak dairy industry organisations.

Dairy Australia

Australian Dairy Farmers

NHIA — National Herd Improvement Association of Australia Inc.

ABRI

ABS

AGRI-GENE

Apiam animal health

Aussie Reds — Australian Red Dairy Breed

Brown Swiss Australia

Cobden Artificial Breeders Co-op. Ltd.

Farm West

Genetics Australia — Breeding better Australian herds

Hico — Herd Improvement Co-operative Australia Ltd

Holstein Australia

Jersey Australia

Livestock and Business Centre Limited

LIC — Livestock Improvement

Neogen Australasia

NHD — National Herd Development

Nu-Genes — Herd Improvement Specialists

Semex

TasHerd — Tasmania's Herd Improvers

Viking Genetics

Wellbred Genetics

Yarram Herd Services

zoetis

Contents

Abbreviations

ABRI	Australian Business Research Institute	FVI	Forage Value Index
ABV	Australian Breeding Value	HWI	Health Weighted Index
ADF	Australian Dairy Farmers	iDDEN	International Dairy Data Exchange Network
AGBU	Animal Genetics and Breeding Unit	IT	Information technology
BPI	Balanced Performance Index	MIR	Mid infrared
CDCB	Council on Dairy Cattle Breeding (USA)	NASIS	National AI Sire Identification System
CDR	Central Data Repository	NHD	National Herd Development
DPC	data processing centre (e.g. herd test centre)	NHIA	National Herd Improvement Association of Australia

Chair's Report

Ross Joblin
Chair
DataGene

It seems like only yesterday that I was writing my first report in 2017 and now here we are in 2022 and I am writing my final report as the Chair of DataGene before I step down at the AGM in November. The world has certainly changed over this time: inside DataGene, within the herd improvement industry, across the dairy industry and indeed across society as a whole. Last year I wrote about some of the significant achievements of DataGene's first five years. The CEO has written about the achievements in our sixth year, 2021/22. I thought I would take this opportunity to reflect on what I have observed over time and offer some personal perspectives on DataGene and its future.

The financial position of the company at 30 June 2022 was very sound and sets us up to invest in key priorities in 2022/23: data connections and the redevelopment of DataGene Centre that provides service to herd test centres and others. The budget for the financial year predicted a positive Earnings Before Interest, Tax, Depreciation and Amortisation and then a deficit after we account for the amortisation of the significant investment in the core databases and our genetic evaluation system. Our actual surplus for the year was just under $100,000 and demonstrates our ability to control costs while increasing revenue.

One thing I was very passionate about when we established DataGene was to imbed good governance into the DNA of the organisation. I feel strongly that the foundation of DataGene rests on strong governance, appropriate policies and procedures, and a clear culture of respect and stakeholder engagement, to make sure everything we do benefits Australian dairy farmers. These things are interrelated, and organisations can fail if one is missing. I am proud of the work the Board, management and staff have done to make sure that DataGene delivers on its promise to the industry.

I take great pride in our launch of the new genetic evaluation software in 2019 and again this year when CDCB launched WebConnect. These two events mark the culmination of significant multiyear efforts of teams spread across geographies. Our new evaluation system has enabled us to move to weekly runs and set ourselves up to deliver improving service for the next decade. In my mind, WebConnect demonstrates the power of collaboration and the advances that different organisations achieve by working together but also DataGene's ability to utilise its capability and diversify its revenue base.

Not everything has gone entirely according to plan however. The big challenge for us remains connecting data sources into the Central Data Repository (CDR). We have made improvements over the years and more advances are occurring this year, but there is still more to do. DataGene is redoubling its efforts to deliver single-entry, multi-use data for farmers and we will continue to engage with other industry stakeholders to overcome the many hurdles we have faced. Not the least of which has been the complexity of collaborating with data collectors. The industry must work together to crack this nut through collaboration and incentives. Our farmers rightly demand this of us.

I look forward to following the development of DataGene with great interest and it will be a very proud day when we can all say that we have connected the majority of the data pipes and allowed data to drive better decisions on farm. This will be most evident in the work DataGene and the industry need to undertake around ensuring a sustainable future for our farmers. This is the generational challenge we must all face and the first step for us has been the release of the Sustainability Index in August 2022. Genetics, and the herds these genetics create, are a key component to addressing the social licensing challenges confronting the industry. DataGene is well placed to contribute to this future.

I would like to thank Dr Matt Shaffer and his staff who have worked hard to deliver for our stakeholders through yet another year of disruptions and challenges. Their hard work and commitment mean I am confident they will continue to deliver for you. Over my tenure on the board, it has been a pleasure to work with the directors, all of them focused on providing outcomes for our members and stakeholders. Their considered approach, thorough understanding of the issues facing DataGene, and respect for the roles of management and board have been, and will continue to be, critical to the success of the organisation. While the AGM represents a bittersweet milestone for me, I am extremely proud to leave a strong organisation in very capable hands.

Finally, I would like to thank all of our stakeholders who continue to collaborate and work with us. Without your support, we could not deliver for our industry.

CEO's Report

Matt Shaffer
Chief Executive Officer
DataGene

As I write, the August Australian Breeding Values (ABVs) release is just behind us, and we are receiving strong support for the newly released Sustainability Index. Australia is among the first countries to release a genetic tool for improving the sustainability of their systems (the UK having released the EnviroCow Index in 2021). It's also reassuring that while the Sustainability Index fast tracks genetic gain for reduced emissions intensity, the trade-off for profit-related traits is minimal. For Holsteins, selection on the basis of the Sustainability Index is expected to reduce greenhouse gas emission intensity by 6% by 2050, with BPI trade-off of 27 units (5.5%).

The Sustainability Index is an example of the new generation of breeding tools for traits made possible by genomics and, in Australia's case, by Ginfo, our genomic reference population. We are immensely grateful for the more than 150 herds with excellent records who collectively make up the reference population. During the year Ginfo received an injection of 11,000 genotypes. This translated to improvements in the reliability of ABVs, with the biggest improvements for Holstein Fertility ABV (0.7% increase) and Jersey Overall Type ABV (2% increase).

While DataGene manages Ginfo on behalf of industry, it is our world-leading researchers at DairyBio who provided the scientific engine to build the Sustainability Index. We are fortunate to have such a collaborative relationship with DairyBio, which itself is underpinned by co-funding from Dairy Australia, Agriculture Victoria and the Gardiner Dairy Foundation.

Genomics has been a game-changing technology world-wide, and I am delighted to report that testing in Australia is accelerating. This year record numbers of females and males were tested on the Australian genomic evaluation system, translating to faster genetic gain in the national herd (see page 9). Genomic breeding values for Red Breeds have been published since August 2021. Further work is underway to provide a within-herd ranking of animals across all breeds which will be particularly useful for cross-bred and mixed herds.

We have also been working closely with our colleagues at DairyBio on the MIR Conception tool. This is a world first in terms of using MIR technology (in modern herd test centre equipment) to provide a *predictive* tool for fertility. This multi-year project is now ready to be rolled out to industry.

Collaboration will also be the key to addressing the challenge of falling herd testing and of capturing data from inline metering. The multi-year collaboration between herd test centres, ABRI and DataGene delivered HerdPlatform to help farmers interact with their data live online.

DataGene has been a member of iDDEN, an international consortium to negotiate data exchange between farm equipment and software systems and national databases. This too has been a multi-year project and the first data connections are now occurring in Europe and North America, with Australia expected to connect by the end of the calendar year, thanks to support from Dairy Australia, the National Herd Improvement Association and Holstein Australia.

Our most recent collaboration – with Dairy UP – is breaking new ground to connect data collected from diverse sources and software systems. It will create opportunities for novel approaches to research, data interrogation and analysis.

This year a major collaborative project with CDCB, DataGene's counterpart in the US, was completed. The project created an interactive web portal for delivering genetic evaluation and other reports to the US dairy industry. This has been a fantastic opportunity to partner with the world's largest dairy genetic evaluation unit and continue to develop our expertise in working with large data sets and complex projects.

We added another tool in the sustainability kit with the launch of the Select Dry Cow Therapy Tool, available via HerdPlatform. This enables farmers and their advisers to confidently use antibiotics only on cows that most need it rather than a blanket treatment. This saves the farmer money and improves anti-microbial stewardship.

It's been an exciting and productive year but none of this would have been possible without our amazing people. I am constantly amazed at the dedication of the team, including those based in Australia and overseas. It is indeed a privilege to be a member of this team. On behalf of all of us, I thank Ross for his support and wise counsel over the past six years. Both your tough questions and your kind words have helped to set us on our path.

Solutions for herd development

About DataGene

DataGene is responsible for driving genetic gain and herd improvement in the Australian dairy industry. Its key activities are research, development and extension. DataGene performs many pre-competitive herd improvement operations, including genetic services, software development, herd testing, herd recording and data systems. DataGene is owned by industry. Its foundation members were Dairy Australia, Australian Dairy Farmers and the National Herd Improvement Association of Australia (NHIA). Members include herd test centres, genetics companies, genomic service providers, breed associations and animal health companies (see inside front cover).

Vision

DataGene enables farmers and industry to maximise profit through data-driven decisions.

Mission

DataGene delivers world-class genetic evaluation, software and decision-making tools to enable Australian farmers to improve their herds and maximise their profit through data-driven decisions and innovative industry services.

Strategic relationships

DataGene has six key strategic relationships:

1. Dairy Australia is the primary funder and a founding member of DataGene. Dairy Australia also operates as a client of DataGene in the development of software solutions such as the updates to the Fertility and Mastitis Focus Reports.

2. Australian Dairy Farmers (ADF) has a key role in ensuring that DataGene's priorities and activities reflect the priorities of the dairy farmer community. DataGene relies on ADF to be publicly supportive of, and a strong advocate for, herd improvement. DataGene also has a direct relationship with farmers through its products, services, extension and communications.

3. National Herd Improvement Association (NHIA) is a founding member of DataGene. DataGene also has direct relationships with NHIA members, who are also members of DataGene.

4. DataGene has relationships with non-NHIA members such as Zoetis, Neogen and Apiam for the delivery of DataGene products and services and the development pipeline for new products and services. Zoetis and Neogen deliver genomic services and Apiam provides software to the veterinary industry and is key collaborator for data and data services with DataVat.

Solutions for herd development

5. Agriculture Victoria/DairyBio is a DataGene collaborator for certain projects. It is also an in-kind contributor to DataGene in terms of supporting overhead costs for some in the Genetic Evaluation team. It uses DataGene data and it is a strategic partner in providing research outputs to industry (see page 22).

6. International collaborators, such as the International Committee on Animal Recording (ICAR), Interbull, International Dairy Data Exchange Network (iDDEN) and the Council on Dairy Cattle Breeding (CDCB) work with DataGene on a range of projects. These are key relationships that enable DataGene to deliver better services in the Australian market and to connect knowledge from around the world to applications in Australia.

DataGene's activities are managed within four strategic priorities.

Pages 12-20 present achievements in each Strategic Pillar.

Four strategic pillars 2019-24

Improved decision making from data

STRATEGIC PRIORITIES
- Develop and support new decision tools
- Expand and secure data
- Drive and support industry innovation

Increased farm profitability through herd improvement

STRATEGIC PRIORITIES
- Increase reliabilities
- Improve service delivery
- Increase farmer and industry service uptake
- Increase the number of genomically tested females

Improved animal performance from R&D

STRATEGIC PRIORITIES
- Deliver new health breeding values
- Use genomics and other technology
- MIR to predict future performance

Improved and diversified service offerings

STRATEGIC PRIORITIES
- Build and maintain DataGene and industry infrastructure
- Develop and maintain industry solutions
- Establish new revenue streams

Products and services

DataGene products and services are delivered to Australian dairy farmers either directly or via third parties. Fees are charged in specific cases where there is a direct economic benefit to the individual customer. Some products and services are not charged.
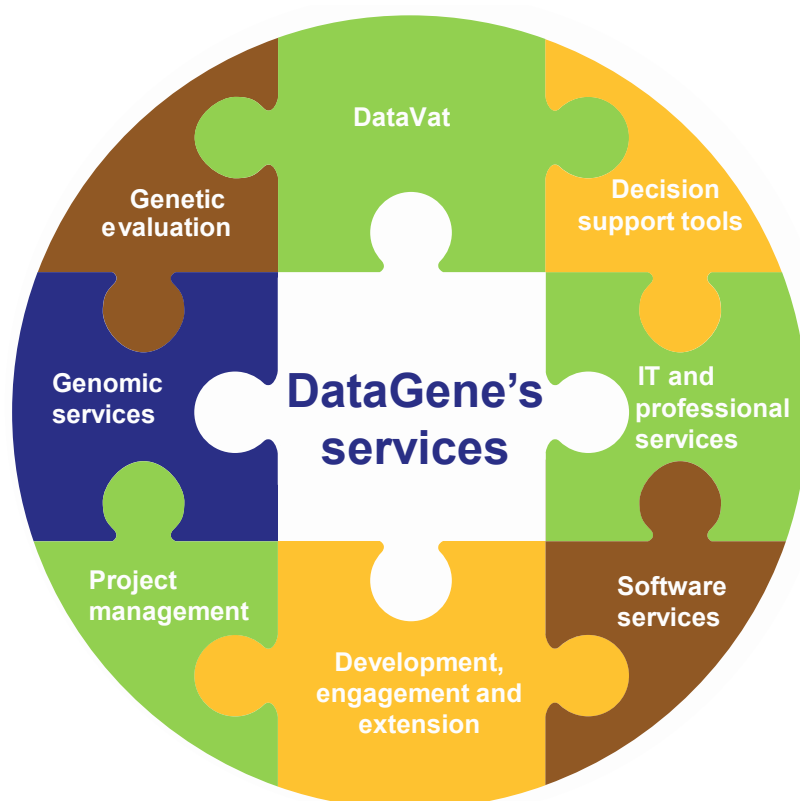
Products and services delivered directly	Fee for service
Good Bulls Guide and App	✕
Website (information and data)	✕
ABV(g) reports to genomic service providers	✓
Bull proofs to bull companies	✓
Project management services to industry organisations	✓
Centre and inventory software to service providers	✓
Software development services to industry	✓
NASIS	✓
Export heifer	✓

Products and services delivered through third parties	Fee for service
HerdData App (via herd test centres)	✓
HerdPlatform (via DataVat / herd test centres)	✓
Selective Dry Cow Tool	✓
Genetic Progress Report / Genetics Futures Report	✕
Extension messages	✕

Performance metrics

DataGene monitors a range of metrics to track performance. This report highlights six of the key performance metrics: Genetic trends, numbers of females genomically tested, number of cows in the CDR, numbers of bulls genomically tested, NASIS bull registrations and workability records.

Genetic trends

One of DataGene's key purposes is to provide tools and services to improve the rate of genetic gain in the Australian dairy herd. Genetic trends are tracked through the rate of genetic gain of sires of cows for BPI.

Target: long-term (10 years) average $30/year

Current: For Holsteins, the average rate of genetic gain for BPI in sires of cows over the past 10 years (2011-2021) is $29.06/cow/year. However, progress has accelerated in the most recent five years ($35.69/cow/year).

For Jerseys, the 10 year trend is $17.93/cow/year, with the most recent 5-year trend at $22.30/cow/year.

Australian genetic trends (Holstein)
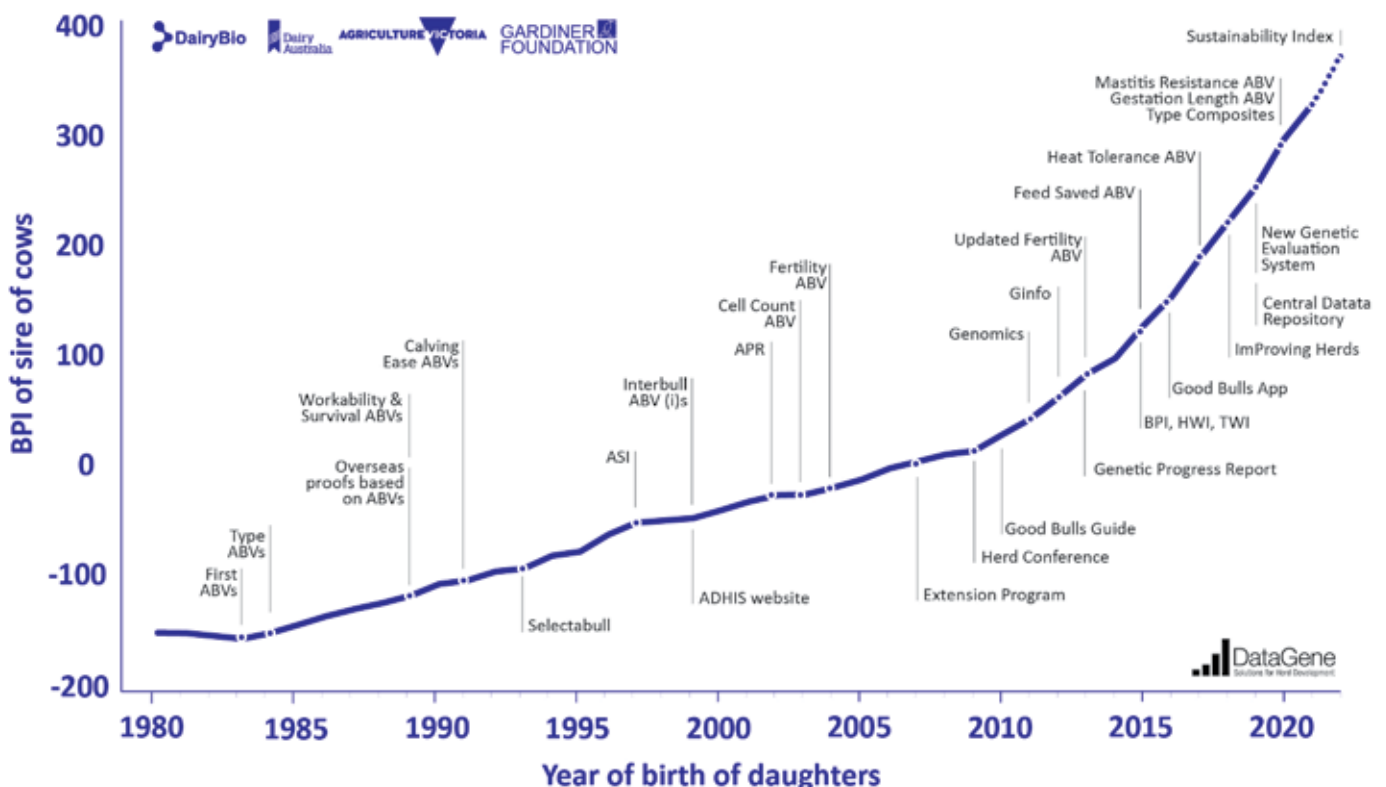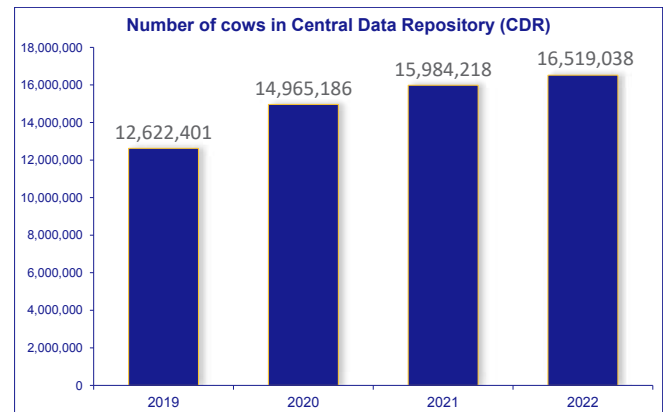
Performance metrics

Number of cows with phenotypes in CDR

DataVat's value will grow by expanding data sources beyond information from herd test centres. Tracking the number of cows in the CDR gives an indication of additional on-farm data sources connecting to DataGene.

Target: increasing annually by 5%

Current: 16.5 million (3% increase)

The number of cows with phenotypes in the CDR is continuing to increase as new cows enter the milk-recorded herd. This metric will be a leading indicator of progress as other on-farm packages are connected to the CDR from non-milk recorded herds.

Number of cows in Central Data Repository (CDR)

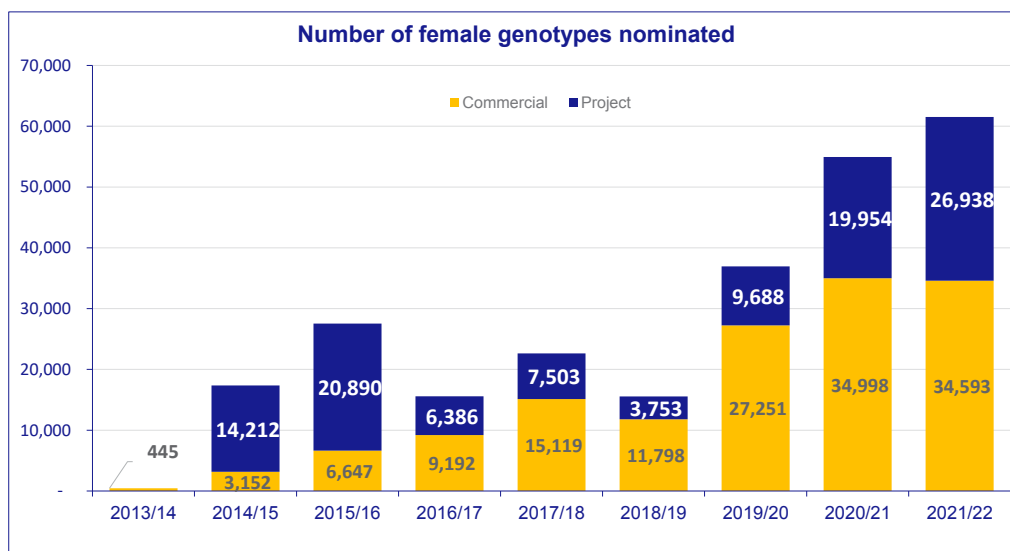| Year	Number of cows
2019	12,622,401
2020	14,965,186
2021	15,984,218
2022	16,519,038

Female genomic testing

Female genomic testing is a game-changing opportunity for Australian dairy farmers because it allows them to accurately identify the most profitable replacements soon after birth. By quantifying the invisible, genomic testing creates opportunities to fast-track herd genetic gain and productivity as well as diversifying income streams and enhancing business agility.

Target: 15% increase in numbers of females tested.

Current: 61,531 (13% increase)

This year was another record year for female genomic testing, though short of our aggressive goal of 83,244. Increasing Australian testing rates is a high priority for DataGene in the coming years through a major extension project in collaboration with Dairy Australia.

Number of female genotypes nominated

Legend: Commercial (yellow), Project (blue)

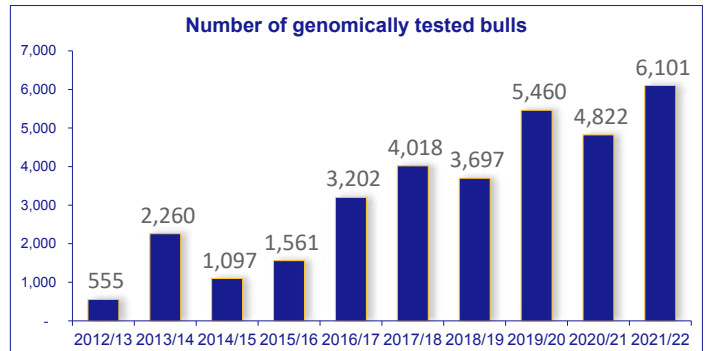| Year	Commercial	Project
2013/14		445
2014/15	3,152	14,212
2015/16	6,647	20,890
2016/17	9,192	6,386
2017/18	15,119	7,503
2018/19	11,798	3,753
2019/20	27,251	9,688
2020/21	34,998	19,954
2021/22	34,593	26,938

Performance metrics

Genomically tested bulls

Increasing the number of bulls that are genomically tested in the Australian genetic evaluation system gives farmers access to the best genetics available. By testing more bulls, the industry can find the best bulls, with the best combination of traits possible.

Target: >3,000/year

Current: 6,101 (26% increase)

This year the number of genomic results for bulls broke 6,000 for the first time, demonstrating the considerable effort by industry supported by DataGene to find the best bulls from around the world for Australian dairy farmers.
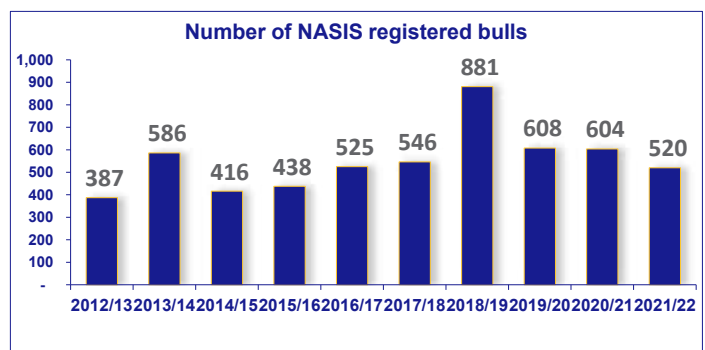
Number of genomically tested bulls

Year	Number
2012/13	555
2013/14	2,260
2014/15	1,097
2015/16	1,561
2016/17	3,202
2017/18	4,018
2018/19	3,697
2019/20	5,460
2020/21	4,822
2021/22	6,101

NASIS-registered bulls

Many NASIS-registered bulls means dairy farmers have more choice and better quality bulls to select from.

Target: Maintain a minimum of 500 new bulls registered on NASIS each year.

Current: 520

NASIS registrations this year were consistent with long-term average levels. The peak in 2019 was due to an administrative catch up (companies were encouraged to enter NASIS details of bulls already in the system with their NASIS field empty). In coming years, the number of new NASIS registrations each year is expected to taper off as companies select fewer young bulls for their programs. Genomics enables them to accurately target young bull selection to their market needs.

Number of NASIS registered bulls

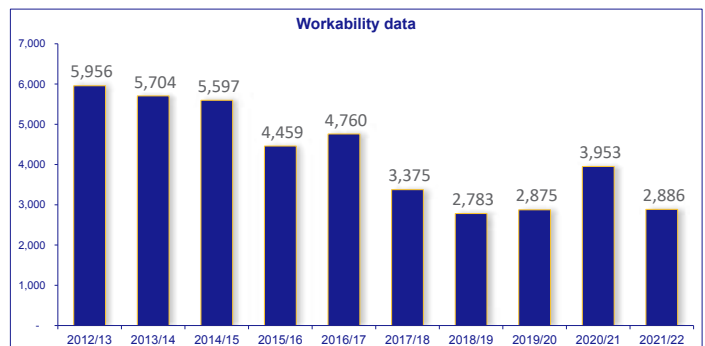| Year	Number
2012/13	387
2013/14	586
2014/15	416
2015/16	438
2016/17	525
2017/18	546
2018/19	881
2019/20	608
2020/21	604
2021/22	520

Workability

DataGene needs a minimum number of workability reports to calculate reliable ABVs for Milking Speed, Temperament and Likeability ABVs (and these traits are included in the BPI and HWI).

Farmers are asked to report workability scores on all 2-year-old heifers via their herd management software (Easy Dairy, Mistro Farm) or their herd test centre.

Target: 3,000/year

Current: 2,886

This year's workability numbers are consistent with long term trends. The peak in 2020/21 was a result of changes in Easy Dairy to automate transfer of workability data to herd test centres.

Workability data

Year	Number
2012/13	5,956
2013/14	5,704
2014/15	5,597
2015/16	4,459
2016/17	4,760
2017/18	3,375
2018/19	2,783
2019/20	2,875
2020/21	3,953
2021/22	2,886

Highlights 2021/22

Strategic Pillar 1: Data-driven decisions

DataGene manages the Central Data Repository (CDR) and DataVat on behalf of the Australian dairy industry. Combined, they offer new opportunities for improved decision-making based on data.

Priorities for 2019-2024 include:

- Develop and support new decision tools
- Expand and secure data from a variety of sources
- Drive and support industry innovation

DataVat

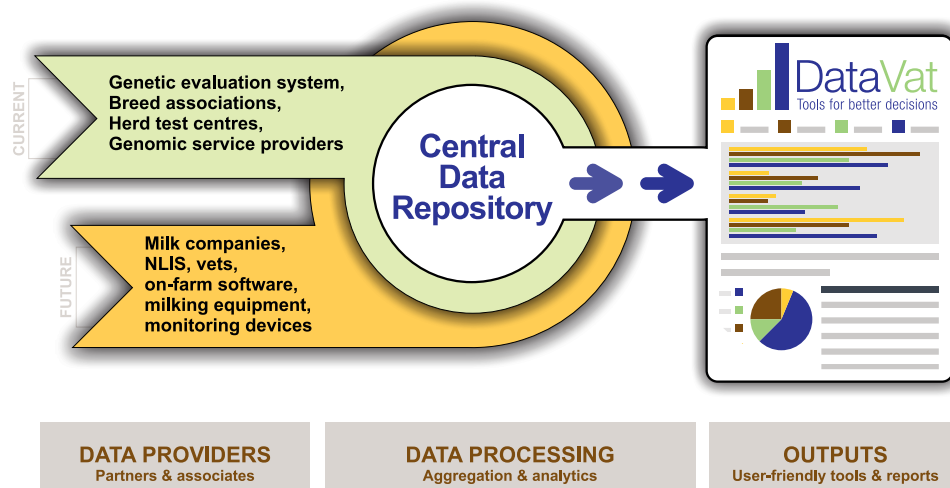DataVat is a web portal that allows customised, secure access to various reports, tools and resources that draw upon data in the Central Data Repository (CDR), including information in the genetic evaluation system. DataVat is home to a diverse range of tools and reports, some of which are publicly accessible, while others are available only to herd owners, or fee-paying customers of DataGene services (such as bull companies, and genomic service providers).

Central Data Repository (CDR)

The CDR is an IT platform to connect data from a variety of external sources, such as herd test centres, breed associations, on-farm equipment and software, vets, milk companies, monitoring systems such as NLIS and the genetic evaluation system. Information and data from the CDR feeds into tools and resources delivered via DataVat.

Key deliverables

- ✓ DataVat enhancements
- ✓ iDDEN
- ✓ HerdPlatform
- ✓ Selective Dry Cow Tool
- ✓ Review of DataGene Centre software

DATA PROVIDERS	DATA PROCESSING	OUTPUTS
Partners & associates	Aggregation & analytics	User-friendly tools & reports

Highlights 2021/22

DataVat enhancements

Enhancements implemented on DataVat this year included: more frequent data update cycles, HerdPlatform, Selective Dry Cow Tool, and MIR Conception - a tool to predict a cows likelihood of conceiving from a herd test sample, using MIR technology (see page 17). Farmers can now view their bull's genomic results on DataVat. Genomic service providers can link bulls to herds by entering the herd's National ID into the bull record.

iDDEN

DataGene is a member of the international dairy data exchange network (iDDEN), which is negotiating data exchange between on farm equipment and software systems and national databases, including Australia's CDR. This will provide the pipeline to dramatically expand the number of data suppliers connected to the CDR. It will also create access to new types of data, offering opportunities to develop new breeding values and decision support tools. iDDEN's hub exchange development was completed this year with Denmark becoming the first member to implement live data exchange, in June 2022. DataGene is currently implementing the Australian connection. This work is supported by Dairy Australia, the National Herd Improvement Association and Holstein Australia.

HerdPlatform

This year, HerdPlatform, a module of DataVat that gives dairy farmers access to their herd test results in interactive format via a user-friendly dashboard, was delivered. Following field testing and product refinements, HerdPlatform was available to customers of Farmwest and NHD, with other herd test centres able to participate in the near future. Further reports can be added over time as requested by herd test centres.
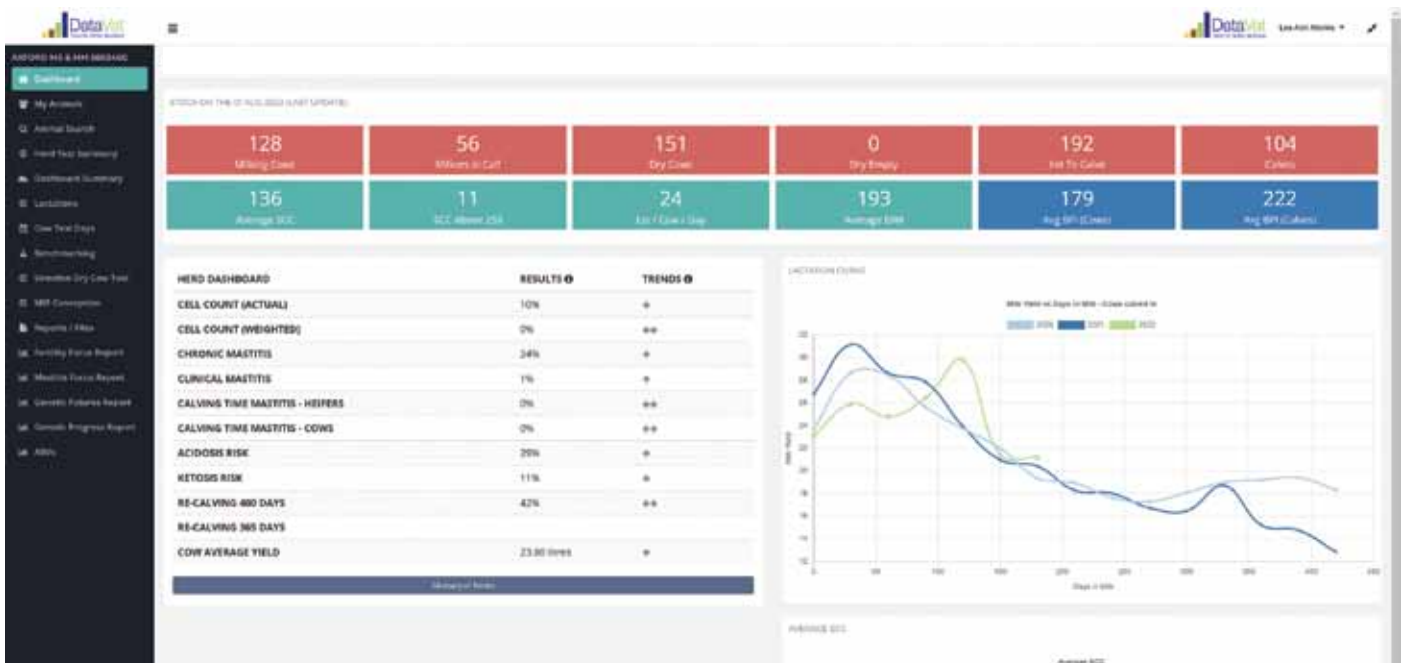
Highlights 2021/22

Selective Dry Cow Tool

This year saw the implementation of the Selective Dry Cow Tool which is delivered via HerdPlatform to customers of participating herd test centres. It offers an alternative to blanket dry cow therapy by identifying animals at risk of mastitis infection for antibiotic treatment at drying off. By treating only at-risk cows, farmers can reduce levels of antibiotic use, resulting in cost and time savings and reduced risk of antibiotic resistance. The tool was developed in collaboration with Dairy Australia and the Agricultural Business Research Institute (ABRI). NHD was the first herd test centre to provide the tool to its customers.

Review of DataGene Centre software

DataGene Centre is the software that supports over 90% of herd testing in Australia. Originally developed more than 20 years ago, DataGene has started the process of mapping out its redevelopment path working in conjunction with the herd test centres and other users to understand their needs.

The Selective Dry Cow Tool can help farmers reduce levels of antibiotic use.

Highlights 2021/22

Strategic Pillar 2: Animal performance through herd improvement

Genetics contribute about 30% of production gains on Australian dairy farms. DataGene's genetic evaluation system underpins these gains. A key goal is to increase the number of farmers breeding replacements from bulls carrying the Good Bulls icon and keeping the best genetic animals in their herds by using Australian Breeding Values and indices to make breeding decisions.

Priorities for 2019-2024 include:

- Increase reliabilities
- Improve service delivery
- Increase farmer and industry service uptake
- Increase the number of genomically tested females.

Genomics for red breeds

The August 2021 ABV release was the first to publish genomics for red breeds (Aussie Red, Ayrshire, Illawarra, Dairy Shorthorn and crosses sired by a red bull). Implementing genomics for red breeds was challenged by the smaller Australian population and limited amount of data. At this stage genomic breeding values are published for Milk, Fat, Protein and Cell Count in red breeds. The genomics in these traits also contribute to the indices: Balanced Performance Index (BPI), Health Weighted Index (HWI), Sustainability Index and Australian Selection Index (ASI). The calculation of red breed genomics was also the first time that a new methodology called Single Step was used in the Australian dairy industry. The development of Single Step analysis for Red Breed genomics will provide a foundation for moving other breeds to Single Step in the coming years.

Accelerating female genomic testing

DataGene and Dairy Australia are collaborating on a multi-year project to dramatically increase the rate of genomic testing of heifers. With a much faster turnaround time for providing genomic results, the focus this year was on awareness campaigns and extension activities to support farmers considering adopting heifer genomics. Awareness campaigns are delivered in May and September, when many farmers have batches of calves in the shed for easy sampling. Three extension activities were developed and delivered, each pitched at farmers at different stages of the genomics journey (see graphic on page 16): Genomics at a Glance, Genomics in Practice, Genomics in Action. Delivery of these activities is led by Dairy Australia in collaboration with

Key deliverables

✓ Red Breed genomics

✓ Accelerated female genomic testing

✓ Genomic markers (interim deployment)

Red Breed genomic ABVs were first published in the August 2021 edition of the Good Bulls Guide.

Highlights 2021/22

its Regional Development Programs and herd improvement organisations including genomic service providers. DataGene provides technical expertise for development of program content and delivery of activities.

Genomic testing rates have continued to grow, with a record number of both males and females evaluated by DataGene in 2021/22.
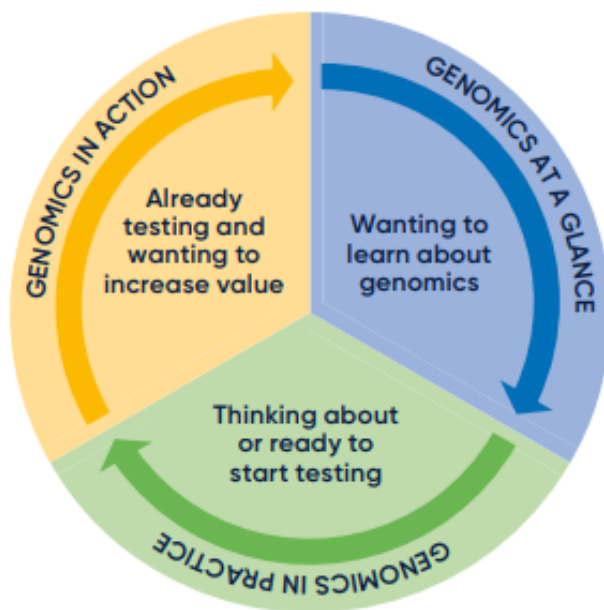

Genomic markers

Since 2010 DataGene's genomic analysis has used a set of 50,000 markers (Illumina 50k chip) that was state-of-the-art at the time. Many more markers have since been discovered, including many with better links to traits of importance. DairyBio has created an upgraded chip (XT50) that includes many of these markers as well as mutations for haplotypes and genetics codes. It is a result of many years of research by the DairyBio team including international collaborations such as the 1000 Bulls Genome project. The location of markers on the chromosomes is reviewed at times by international peers and updates made to the bovine reference genome. The latest 'build' has been released and is being used by international evaluation centres.

Work is underway to incorporate the update in DataGene's genetic evaluation system to utilise the expanded set of markers (73k), the latest reference genome (ARS1.2) and other technical updates.

The process of incorporating these into DataGene's genetic evaluation system is complex, however the benefits are expected to include:

- Improved reliability of Australian Breeding Values and Indices.
- More accurate determination of breed percentage and genomic inbreeding.
- Improved identification of haplotypes and genetic codes.
- Better reporting of haplotypes and genetic tests on DataVat.
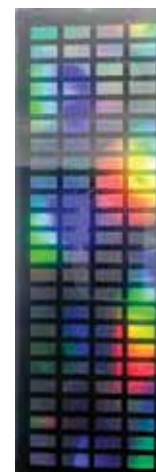
Highlights 2021/22

Strategic Pillar 3: Herd Improvement R&D and collaboration

Genomics and other technological advances present opportunities to improve animal performance through herd improvement R&D. One of DataGene's main strategic priorities is to increase the rate of genomic testing of females in the Australian dairy population. The data collected by the Central Data Repository (CDR) and Ginfo enable the development of breeding values for traits that are difficult to measure, such as health traits, and enable the industry to use new technologies such as MIR (mid infrared).

This strategic pillar also includes Ginfo, the industry's national reference data set of genetic information. Ginfo includes genotypes (genetic information) and phenotypes (performance information) which underpin the reliability of Australian Breeding Values (ABVs) and indices.

Priorities for 2019-2024 include:

- Deliver new health breeding values
- Use genomics and other technology (MIR) to predict future performance

Sustainability Index

A priority for the year was the development work to underpin the release of the Sustainability Index. First published in August 2022, the Sustainability Index is a breeding tool to fast-track genetic gain for reduced greenhouse gas emissions intensity.

There are two major steps in delivering a new index or breeding value: the scientific research done by DairyBio and the integration of these findings into the genetic evaluation system, which is carried out by DataGene. The focus this year was on the latter. In parallel with the technical genetic evaluation work, DataGene undertook extensive industry consultation and developed a set of extension resources to support early users. A key message is that the Sustainability Index adds breeding to the variety of tools dairy farmers use to improve the sustainability of their systems. The Sustainability Index includes the same traits as the Balanced Performance Index. The difference is the weighting: the Sustainability Index has triple the weighting on feed saved and survival compared to the BPI in Holsteins.

MIR Conception tool

DataGene has been working with DairyBio researchers to develop a tool to predict a cow's likelihood of conceiving, based on herd records and MIR results from a herd test sample. This multi-year project is complete and ready to roll out. Herd test centres will begin using the MIR Conception tool with their clients in the coming year.

Key deliverables

- ✓ Sustainability Index
- ✓ MIR Conception tool
- ✓ Ginfo sample collection blitz

DairyBio provided the research pipeline for the development of genomic breeding values for red breeds and the Sustainability Index.

Highlights 2021/22

Ginfo

Ginfo is Australia's national reference herd for genetic information. Managed by DataGene and funded by Dairy Australia, Ginfo's genetic and performance information is used by DairyBio researchers to develop breeding values for traits that are difficult to measure and to increase the reliability of Australian Breeding Values (ABVs) and indices.

The reference population includes commercial dairy herds with excellent records located across Australia's eight dairying regions. Additional herds have been recruited to maintain a representative cross section of the Australian dairy population, for example some of the breeds with small numbers in Australia.

Ginfo data underpinned the development of genomics for red breeds which were published for the first time in August 2021. Ginfo data is also being used in a wide range of DairyBio research projects which are developing breeding values and herd improvement tools that will be delivered in the future.

Ginfo is a collaboration of DairyBio, DataGene, Dairy Australia, Holstein Australia, Jersey Australia and the Victorian Government.

2022 progress: Ginfo had a record year, processing 20,745 genotypes, collecting 13,212 hair samples with another 11,222 collected directly by farmers. The year also saw a record 11,258 linear type evaluations (LTEs) from Ginfo farms. This translated to a 17% increase in the Holstein and Jersey reference population (to 73,114). A further 8,395 animals contributed to Red Breed genomic analysis.

Jason Webb collecting tail hairs from a Ginfo herd.

| Number of animals in the genomic reference population |
| --- |
| **Holstein:** 48,661 females; 9,475 males |
| **Jersey:** 12,566 females; 2,412 males |
| **Reds and red crossbreeds:** 9,280 females; 1,035 males |

Collaboration

DataGene plays a role in the pathway between research outcomes and on-farm application. With many others also having a role in this process, collaboration is vital.

DataGene has a long standing collaborative relationship with DairyBio which provides the research pipeline for genetic evaluation, new traits, improved reliability and novel applications (see page 22).

DataGene is also working with Dairy UP, a NSW-driven collaborative project that is working to unlock the potential of milk, cows and water to increase dairy industry profitability. Dairy UP has a network of both pasture-based and intensive commercial farms that are being intensively monitored (pasture, animal and weather data). DataGene and Dairy UP are working together to integrate the data collected from diverse sources and software systems to create opportunities for novel approaches to data storage, interrogation and analysis.
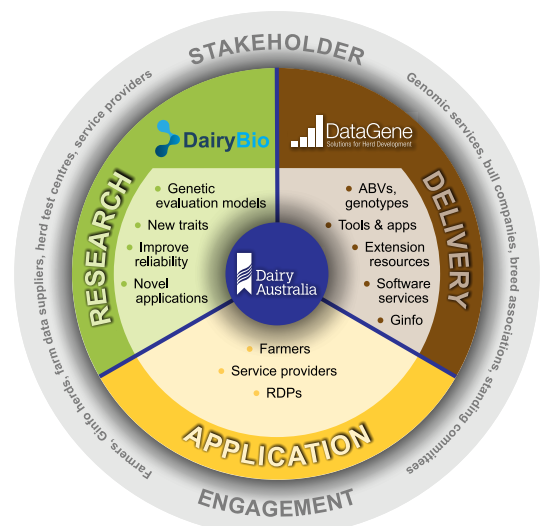
Highlights 2021/22

Strategic Pillar 4: Service provision

Strategic Pillar 4: Service provision

DataGene needs to be continually improving and diversifying its services to fulfil its vision of enabling farmers and their industry to maximise profit through data-driven decisions.

Priorities for 2019-2024 include:

- Build and maintain DataGene and industry infrastructure
- Develop and maintain industry solutions
- Establish new revenue streams.

Data update cycles

A variety of enhancements have been made to DataGene's IT systems to enable more frequent data transfers. Here is a summary of routine data updates.

DataVat

- Female ABVs: updated weekly (Tuesdays) based on latest genomic and herd test results.
- Genetic Progress Reports & Genetic Futures Reports: updated with the current data from DPC Centre databases each time when the report is run.
- Bull ABVs: updated weekly (for private users) and with public ABV releases in April, August and December.

Herd Test Centres

- Herd Test results: updated as soon as herd test centre supplies.
- Parent average ABVs: updated with each herd test.
- Female ABVs: updated to the Herd Test Centre software in April, August and December with each public ABV release

Discovery Day

DataGene's Discovery Day is typically held in the year between Herd conferences. Designed for people working in dairy herd improvement, the day is an opportunity to provide updates on new developments and share experiences. Genomics was the theme for the February 2022 Discovery Day, with about 70 people attending either in person or online.

Key deliverables

- ✓ Faster data updates
- ✓ Discovery Day
- ✓ International Insights
- ✓ Contracted projects

Highlights 2021/22

DataGene's Discovery Day is an opportunity for updates and exchange of ideas between members of the herd improvement industry. Pictured at the 2022 Discovery Day: Kristen Davis (GippsDairy), Chris Hoffmann (Neogen), Thuy Nguyen (DataGene) and Jade Taylor (Neogen).

Consultation

A variety of formal and informal mechanisms provide stakeholder input to DataGene's priorities. Formal governance structures include the Board, Standing Committees and Consultative Committees (see pages 23-27).

The Genetic Evaluation Standing Committee and Herd Test Centre Committee meet regularly and make a valued contribution to DataGene policies and activities. However, some other committees have not met regularly. An external review made recommendations to improve consultation and these recommendations are being progressively rolled out, including changes to committee membership and structures (see page 26).

Forage Value Index

DataGene evaluates Dairy Australia's Forage Value Index each year. Developed by Dairy Feedbase, the Forage Value Index (FVI) is a tool that helps Australian dairy farmers and their advisers to make more informed decisions when selecting ryegrass cultivars. It provides an accurate, reliable and independent assessment of the potential economic value of ryegrass cultivars in different dairy regions of south-east Australia and Western Australia.

Contracted projects

When DataGene was formed in 2016, it received most of its funding from Dairy Australia, with some income from fees-for-services through genomic testing, export heifer certification and NASIS bull registration. In recent years, DataGene has diversified its income through new services both within the Australian dairy industry and further afield where its expertise can add value, particularly in IT. For more information refer to page 21.

Software development and IT strategic consulting

DataGene provides software and strategy services and has a portfolio of services to deliver solutions for Australian and international customers across dairy and agriculture. This suite of services has enabled DataGene to diversify its income stream and to create opportunities for collaboration and learnings that benefit our stakeholders.

DataGene has a specialist team of IT and change management professionals that has built up a skillset around IT project management, working with large complex data sets, managing large-scale global projects, the ability to scale on demand and assessing change readiness. Further development of these skillsets helps to maintain DataGene's genetic evaluation and milk recording software and provide improved services to customers.

Current projects include: strategic analysis of data and technology requirements; assessment of change readiness and people capability; project scoping, design and management; data collaboration solutions; and implementation of new tools and systems. Working with our offshore development partner, DataGene uses established, proven and repeatable methods and processes to deliver projects from concept through to implementation.

Examples of recent projects across several agricultural and food industries include:

- Agricultural Business Research Institute (ABRI): collaboration to develop HerdPlatform (see page 13).

- Animal Genetics and Breeding Unit (AGBU): digital strategy, organisation structure and design, role clarity, people capability, project management design and delivery capability, and a collaborative project with Australian Pork Limited.

- Cotton Research and Development Corporation (CRDC): analysing the digital supply chain, digital strategy, proof of concept for a nitrogen management tool, and a data and governance framework.

- Council on Dairy Cattle Breeding (CDCB): completion and delivery of interactive web portal, WebConnect, for delivering genetic evaluation and other reports to the US dairy industry and the people strategies to support organisational success.

- Food Agility: collaborative project led by Dairy Australia to develop a cow-side app, underpinned by artificial intelligence, to support farmers to make better clinical mastitis treatment decisions and reduce antibiotic use.

- Dairy UP: connecting data collected from DairyUP monitor farms with data from diverse sources and software systems to create opportunities for novel approaches to research, data interrogation, and analysis.

- DairyBio: delivery of the MIR Conception tool delivered via HerdPlatform (see page 17).

- Dairy Australia: delivery of updated Mastitis Focus Report to DataVat, and the development of the Select Dry Cow Tool via HerdPlatform (see page 14).

- Holstein Australia: development of digital strategy and capability review.

DairyBio: Developments in the pipeline

DairyBio's Animal Program provides a research pipeline for Australia's genetic evaluation system, including breeding values for new traits, improved reliability of existing ABVs and other innovations.

DataGene works closely with stakeholders and industry to understand farmer priorities which can be translated to research opportunities for innovative solutions. DairyBio's lead animal scientist, Professor Jennie Pryce sits on DataGene's leadership team, enabling clear alignment between farmer priorities, research opportunities and application of outcomes.

Highlights from recent DairyBio research which will be implemented by DataGene in the near future include:

- Updated Semen Fertility
- Updated Daughter Fertility ABV
- Better prediction of survival using type
- More accurate identification of recessive lethals and haplotypes
- Genomic inbreeding trends

DairyBio's research program for 2021-26 includes:

- Advanced Heat Tolerance ABV
- Updated survival ABVs
- Collaboration with Lactanet (Canada) on predicting cow performance
- Transition cow ABVs
- Using sensor data in ABVs
- Methods to control inbreeding and accurately identifying haplotypes and other lethals
- Genetic prediction of calf vitality.

PhD student Michelle Axford is working with the DairyBio team to develop a breeding value for calf vitality.

DairyBio is a bioscience research program, focused on delivering outcomes of direct value to Australian dairy farmers. Conducting both animal and plant improvement research, DairyBio is joint initiative between Agriculture Victoria, Dairy Australia and the Gardiner Dairy Foundation.

The DairyBio team works in purpose-built facilities at the AgriBio Centre for AgriBioscience near Melbourne, as well as at Agriculture Victoria's research facilities in regional Victoria. The AgriBio research facility is home to Agriculture Victoria's molecular scientists and quantitative geneticists, as well as industry organisations such as DataGene, Holstein Australia, Jersey Australia and NHIA. Being co-located creates a unique mix of great scientific minds, cutting edge technology and real-world perspective.

More information: www.dairybio.com.au

DataGene Board

DataGene is governed by a skills-based board. Members are elected on their knowledge and experience in dairy, herd improvement, finance, R&D and governance. The board must include three directors with direct expertise in dairy farm management. Directors are entitled to serve a three-year term and up to three consecutive terms (i.e. nine years). The ongoing rotation of Directors ensures the ongoing refreshment of skills and experience on the board.

Ross Joblin

LLB (Hons), Dip Corporate Management, FAICD, FCIS, FGIA

Chair and Dairy Australia-nominated Director

Ross was previously part of Dairy Australia's senior management team, leading its business operations group. Responsibilities included finance, strategic planning, human resources, issues management, corporate communications, human resources, IT and legal. His prior experience includes a range of roles as a corporate lawyer and in senior management in listed public companies. This has provided him with a broad range of commercial experience in areas including operations management, corporate strategy, mergers, acquisitions and start-ups and human resources. Ross has also worked with a number of industry boards in the area of board governance and effectiveness.

Lucinda Corrigan

BScAg (Hons), FAICD
Director

Lucinda and her husband run 4,000 performance recorded cattle on seven properties in the NSW Murray Valley, near Albury. Over the past 30 years they have developed a leading Angus genetics business, 'Rennylea', from a small base, with dedicated use of Breedplan for genetic improvement and a highly accurate database of phenotypes and genotypes. Having graduated with an Agricultural Science degree, Lucinda also has significant off farm experience, including nine years as a Non Executive Director of Meat and Livestock Australia and Chair of the Animal Genetics and Breeding Unit at the University of New England (current). In 2007 Lucinda received the Helen Newton Turner Medal from AAABG in recognition for her contribution to animal breeding and genetics.

DataGene Board

Graeme Gillan

Director

Graeme is chair of the National Herd Improvement Association of Australia (NHIA) and former CEO of Holstein Australia. His involvement with dairy herd improvement spans more than 45 years working with several leading Australian genetics companies. Over this time Graeme has been involved at the coal face of herd improvement innovations including expanding the sources of genetics, the introduction of computerised mating programs and increasing the gene pool of the Jersey breed in the 1990s, overseas investment in Australian genetics in the 2000s and the promotion of genomics since 2010. He is passionate about the industry's role in influencing priorities for research, development and extension programs, to ensure herd improvement continues to deliver value to Australian dairy farm businesses.

Tim Jelbart

B. App. Sci (Hons) AAPI
Director

Tim is a dairy farmer and Holstein breeder from Inverloch, West Gippsland, Victoria. He is the general manager of the 1,000-cow dryland grazing operation, Jelbart Dairy, which is owned by Tim and his brother. The business relies on genomic testing for accurate genetic information, which has resulted in significant genetic gains across the herd in recent years. Before returning to the family farm Tim completed a degree in applied science, specialising in property valuation. He remains a part-time rural and agribusiness property valuer with Colliers and has valued some of the largest agribusiness assets across Australia.

Daniel Meade

Dip Agriculture, Dip Agronomy, GAICD
Director

Daniel and his wife Michaela are co-owner operators of Boonderoo Pastoral Company, milking 400 cows at Kolora, south-west Victoria. Their focus is on maximising pasture production and home grown feed efficiency whilst breeding an efficient cow that suits this system. In 2017, Daniel received a Nuffield scholarship to investigate how agricultural organisations engage with farmers. Before starting dairy farming in their own right in 2018, Daniel spent 10 years as a Dairy Agronomist, and studied at Glenormiston Agricultural College. Daniel was first elected to Moyne Shire Council in 2016 and is currently the Deputy Mayor, having served as Mayor from 2019-2021. He has also held positions on numerous community organisations including WestVic Dairy, VFF, CFA and on local sporting clubs.

DataGene Board

Anthony Shelly

Anthony has spent most of his career in dairy herd improvement, creating the opportunity for him to fulfill a wide range of roles across the livestock industry. Anthony has an exceptional understanding of the application of herd improvement at all levels of business. He is also a non-executive director of the National Herd Improvement Association of Australia (NHIA), the current CEO of Genetics Australia. Anthony remains passionate about the role of genetics and data in helping farmers optimise their businesses.

Sam Simpson

MMarketing (Agribusiness), BAppSci(Agric), GradDipAgribusiness, DipFrontlineManagement

Sam and her husband operate at 450-cow dairy farm, Craiglands Holsteins, at Larpent in South Western Victoria. They have been members of Holstein Australia for 17 years and genotyping their animals since 2015. Sam runs the herd's breeding program as well as the business finances, HR and information systems. She is actively involved a number of industry groups including promoting dairy to the local community and school groups. Craiglands Holsteins was a focus farm for the ImProving Herds project and Sam was a member of the MIR for Profit project steering committee. Before taking on a full-time role with the farm, Sam spent 10 years as a sheepofficer and Farm$mart Project Manager with the Victorian Department of Primary Industries.

DataGene consultative committees

DataGene has a variety of formal and informal mechanisms that provide stakeholders with input to DataGene's priorities. Formal governance structures include the Board and Standing Committees.

The Genetic Evaluation Standing Committee and Herd Test Centre Committee meet regularly and make a valued contribution to DataGene policies and activities.

A formal standing committee gives members direct influence over DataGene's priorities and program activities. This is not simply an advisory body, but exercises authority as delegated by the Board in areas of industry policy and guidelines. It comprises individuals from within the dairy industry and herd improvement sector who possess relevant skills and experiences. Standing Committee members are nominated by stakeholders and appointed by the Board. It is chaired by a member of the DataGene Board and includes at least one member of the DataGene management team.

Review of consultative committees

A review of DataGene's consultative committees was undertaken during the year. A key recommendation was to create a Data Access and Standards Committee to incorporate the functions previously performed by the following groups which would be discontinued: Data Governance Group, and the Data and Services Standing Committee. This recommendation has been implemented.

The review also recommended that the Genetic Evaluation Standing Committee include an additional member as a representative of genomic services providers. This will be implemented in 2022-23.

The review recommended some refinements to the terms of reference of the Genetic Evaluation Standing Committee and the Herd Test Centre Committee. Most of these have already been implemented.

Genetic Evaluation Standing Committee

The Genetic Evaluation Standing Committee provides advice and recommendations to the DataGene Board on specialist matters in relation to genetic evaluation and related technologies.

Members of the Genetic Evaluation Standing Committee in 2022 included:
- Graeme Gillan (DataGene Board and Committee Chair)
- Rohan Butler (Holstein Australia)
- Janet Auchterlonie (Farmer representative)
- Trevor Parrish (Farmer representative)
- To be appointed (Australian Dairy Farmers representative)
- Christian Hickey (National Herd Development – NHD)
- Tim Humphris (Farmer representative)
- Vaughn Johnston (Semex)
- Bruce Ronalds (ABS Australia)

DataGene consultative committees

- Glen Barrett (Jersey Australia)
- Trevor Saunders (Farmer representative)
- Tim Weller (World Wide Sires)
- Steph Bullen (Dairy Australia representative)
- DataGene staff
- Agriculture Victoria staff.

The Genetic Evaluation Standing Committee met three times during 2021/22. The committee received regular progress updates and provided feedback on the updating genomic analysis, genetic evaluation system (GES), the central data repository (CDR), DataVat and scientific issues, such as genetic trends, breeding values under development and industry projects.

The committee advises DataGene on delivery priorities; which this year included the Sustainability Index (August 2022), and ongoing discussions about the new genomic pipeline, within-herd ranking tool, intermediate type trait expression and separate bases for red breeds.

Reports from each meeting are distributed to stakeholders and are available on request.

Herd Test Centre Committee

Formed early in 2019, the Herd Test Centre Committee provides advice and recommendations to DataGene on specialist matters regarding herd testing and related software and technologies. It focuses on pre-competitive discussions, including software and service development.

The committee is made up of management representatives from National Herd Development (NHD), Hico, Yarram Herd Services, Dairy Express, TasHerd and FarmWest, with support from DataGene and secretariat support from Chris Murphy.

It met as a committee six times during 2021/22. A sub-group of members met nine times during the year regarding release planning, training, and communication for HerdPlatform, a tool on DataVat that gives farmers interactive access to their herd test results and new herd recording and herd improvement tools, reports, and services.

The Committee is also working with DataGene on the redevelopment of Centre Software and the effective use of inline sensor data.

DataGene
Solutions for Herd Development

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