Sheep GENETICS

mla
MEAT & LIVESTOCK AUSTRALIA

ANNUAL OUTCOMES REPORT 2022–23

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Sheep Genetics Manager's report

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Manager – Sheep Genetics, MLA

I am pleased to share the Sheep Genetics *2022–23 Annual Outcomes Report*. The team at Sheep Genetics continues to have a strong focus on delivering our service to clients and working with the range of service providers that are involved in the Sheep Genetics delivery pipeline. As the use of Australian Sheep Breeding Values (ASBVs) continues to grow within the commercial sector we've seen mimicked growth in the number of animals and clients involved in the evaluations. This has been achieved alongside genetic gain across all the standard indexes. Engaging with our stakeholders has been key to driving this. Our flagship Leading Breeder event held in March 2023 was once again a highlight of our calendar. The videos from this event are available on our YouTube channel (**youtube.com/@SheepGenetics/videos**).

To maintain our world-leading sheep evaluation, we implemented our annual enhancements to the evaluation in May 2023. Thank you to the Animal Genetics and Breeding Unit (AGBU) for their research and development which underpins these enhancements. Read more about these improvements in the Research and Development section of this report.

Thank you to everyone who contributed to the Sheep Genetics program over the past year. We look forward to working with you over the next 12 months.

2022–23 Sheep Genetics highlights

Number of animals included in Sheep Genetics evaluations:
- **MERINOSELECT – 3.8 million**
- **Terminal – 3.8 million**
- **Maternal – 2.7 million**

New MERINOSELECT research indexes released

Record number of genotypes included in Sheep Genetics evaluations – MERINOSELECT reached a milestone 347,000 genotypes included in the evaluation, LAMBPLAN Maternal 57,700 and Terminal 95,300

Single step genomic Lambing Ease evaluation for Terminals implemented

Over 60% of files included in Sheep Genetics evaluations were uploaded directly by breeders and service providers using the new submission portal

26 service providers interacting with 350 Sheep Genetics clients attended service provider training

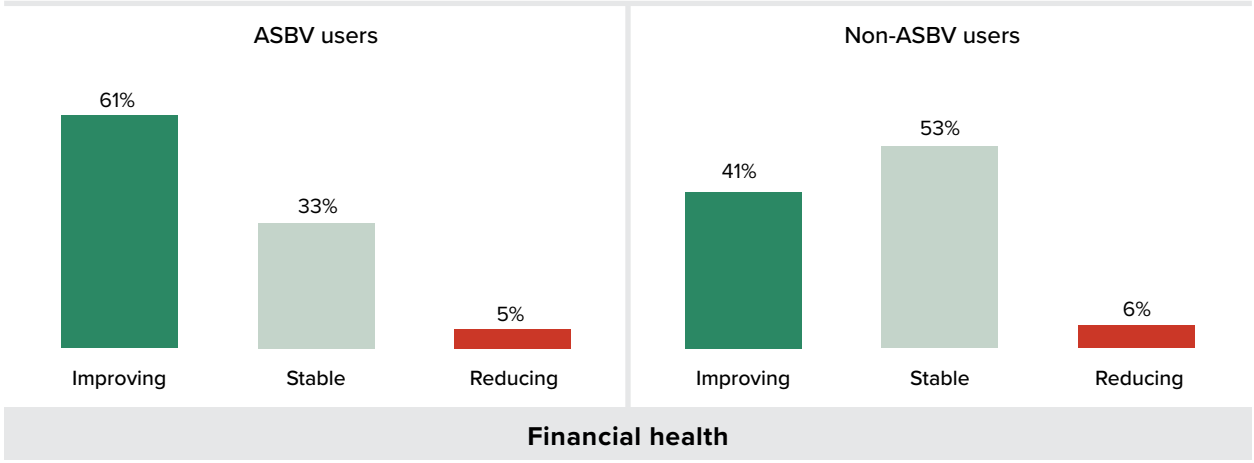
Genetic insights survey – increased use of genetic tools by industry

MLA's recent Genetics insights survey was conducted to provide up-to-date insights into the use of genetic tools and breeding practices in the Australian beef and sheep industry. A representative sample of the industry in terms of location, breed type and production systems were surveyed through telephone interviews and online surveys. There were 525 beef and 585 sheep commercial producers surveyed. Key survey outcomes included:

- The use of Sheep Genetics ASBVs by commercial sheep producers increased between 2016–2023 from 14% to 55%.
- Commercial producers who use ASBVs were significantly more likely to say they think their financial health is improving compared to commercial producers who do not use ASBVs (61% vs 41%) (Figure 1).

Scan the QR code to access the Genetics insights survey

Figure 1: Reported financial health effects from users of ASBVs compared to non-users



Membership

Twice a month, Sheep Genetics runs large scale genetic evaluations, which involve the inclusion of pedigree, on-farm measurements, genotypes and research information to generate ASBVs across a suite of trait groups.

In July 2023, MERINOSELECT and the LAMBPLAN Terminal evaluation both included a total of 3.8 million animals, with the LAMBPLAN Maternal evaluation including 2.7 million animals.

Throughout 2022–23, Sheep Genetics continued to see increased growth in both the number of animals in the evaluations, and the number of members contributing to a total of 1,305 flocks. This year, the team welcomed 85 new LAMBPLAN flocks, and 39 new MERINOSELECT flocks to the evaluation.

The LAMBPLAN membership included both maternal and terminal analyses. The MERINOSELECT membership include both Merino and Dohne analyses.

Figure 2: LAMBPLAN and MERINOSELECT total number of flocks over time

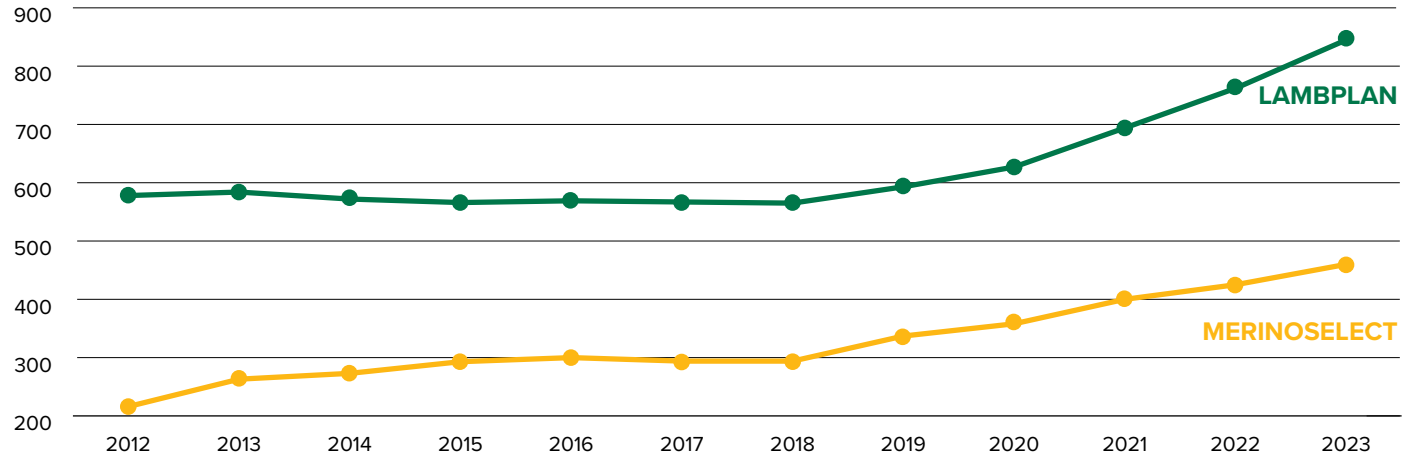
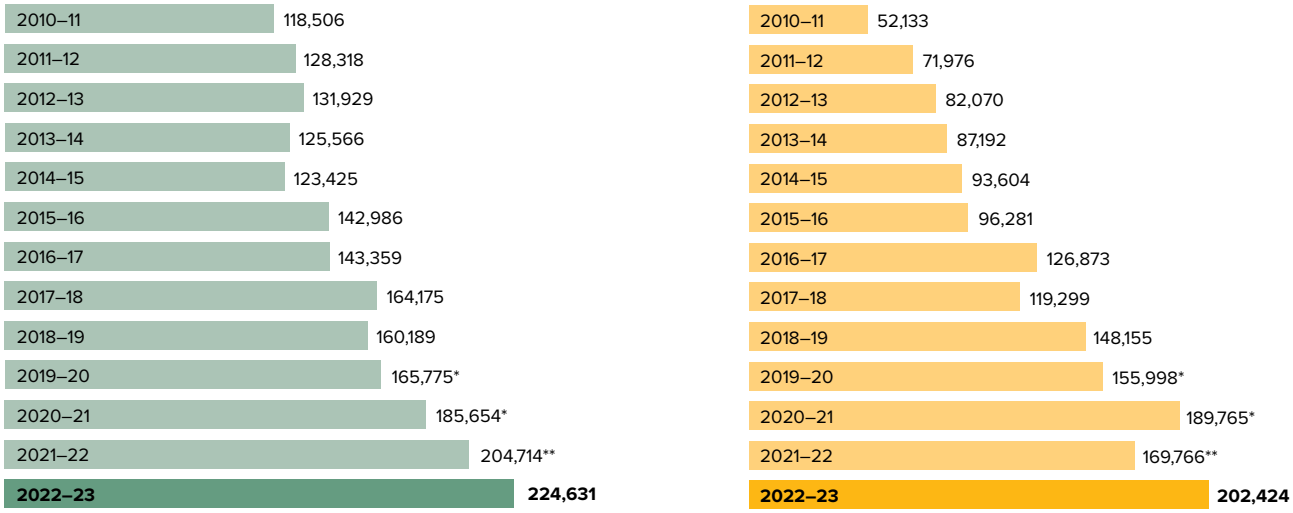


Figure 3: LAMBPLAN and MERINOSELECT animals each financial year



*Growth in billable numbers under MLA's Accelerate Adoption Initiative (AAI) which involved there being no cost to submit data to Sheep Genetics for Australian red meat levy payers.

**Billable animals to May 2022 included in this total, as the new database was deployed in June 2022. The 2022–2023 includes June 2022–July 2023.

Genetic trends

Selection indexes combine several important production traits into a single number and are an important tool to drive genetic improvement where there are a range of traits of economic or functional importance. Index trend is used as a gauge of the genetic gain industry is making.

In 2022–23, all reported indexes increased across all major analyses. There was also notable, continued improvement in:

- reproduction for both Merinos and Maternal breeds, assisted by the introduction of the component reproduction traits and Weaning Rate (WR) in recent years
- yearling reproduction traits in Maternal breeds, as breeders select for improved reproduction in ewe lambs
- breech wrinkle (EBWR) for Merinos, which has additionally been included in all of the new MERINOSELECT research indexes
- lambing ease (LE_DIR) for Terminal breeds, which was added to all Terminal indexes in 2022.

For more information on Sheep Genetics selection indexes go to **sheepgenetics.org.au/getting-started/asbvs-and-indexes**

Figure 4: Merino indexes

↑ 3.2% to 157

Dual Purpose Plus (DP+) index

Based on 07/07/2023 MERINOSELECT run

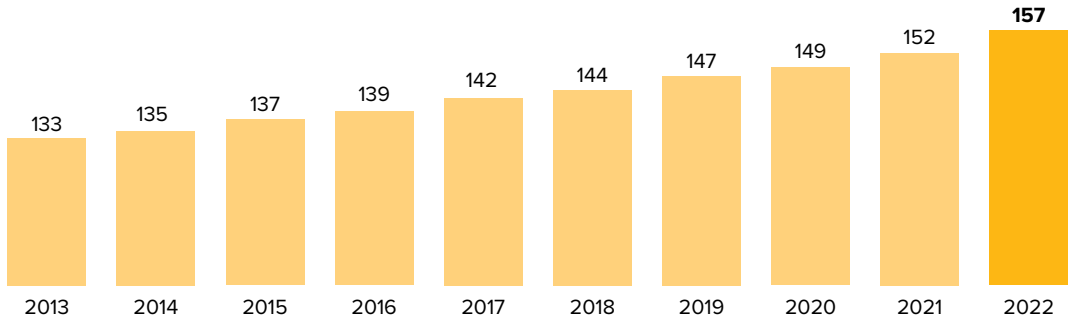


Figure 5: Terminal indexes

↑ 2.2% to 140

Terminal Carcase Production (TCP) index

Based on 01/07/2023

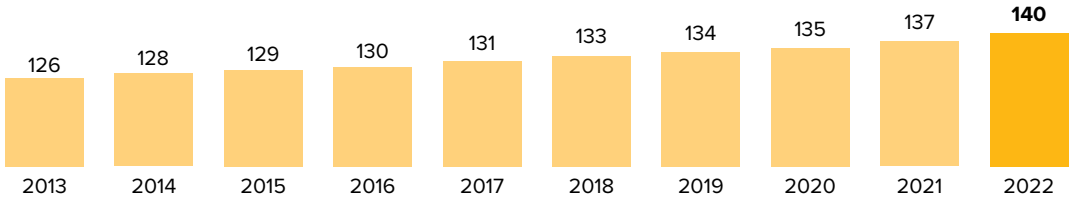


Figure 6: Maternal indexes

↑ 5.0% to 148

Maternal Carcase Production Plus (MCP+) index

Based on 15/07/2023 LAMBPLAN run

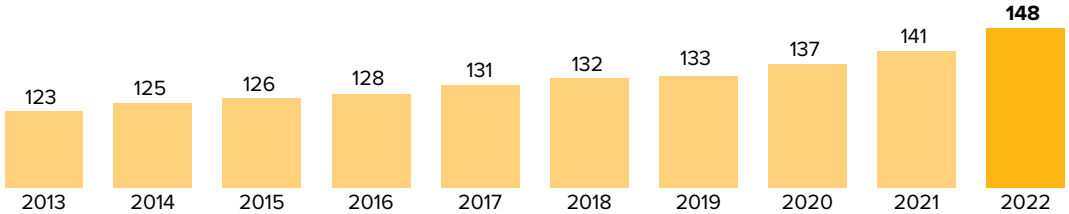
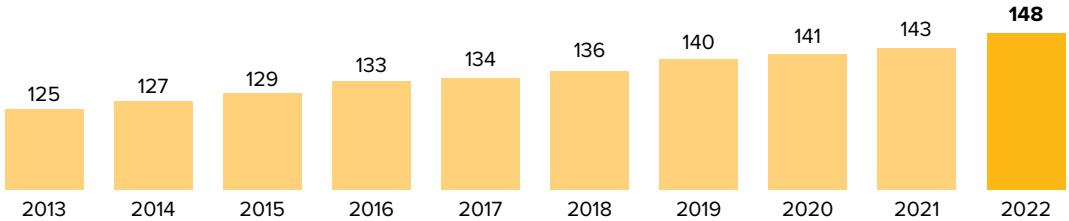


Figure 7: Dohne indexes

↑ 3.5% to 148

Dohne Plus (DOHNE+) index

Based on 07/07/2023 DOHNE run



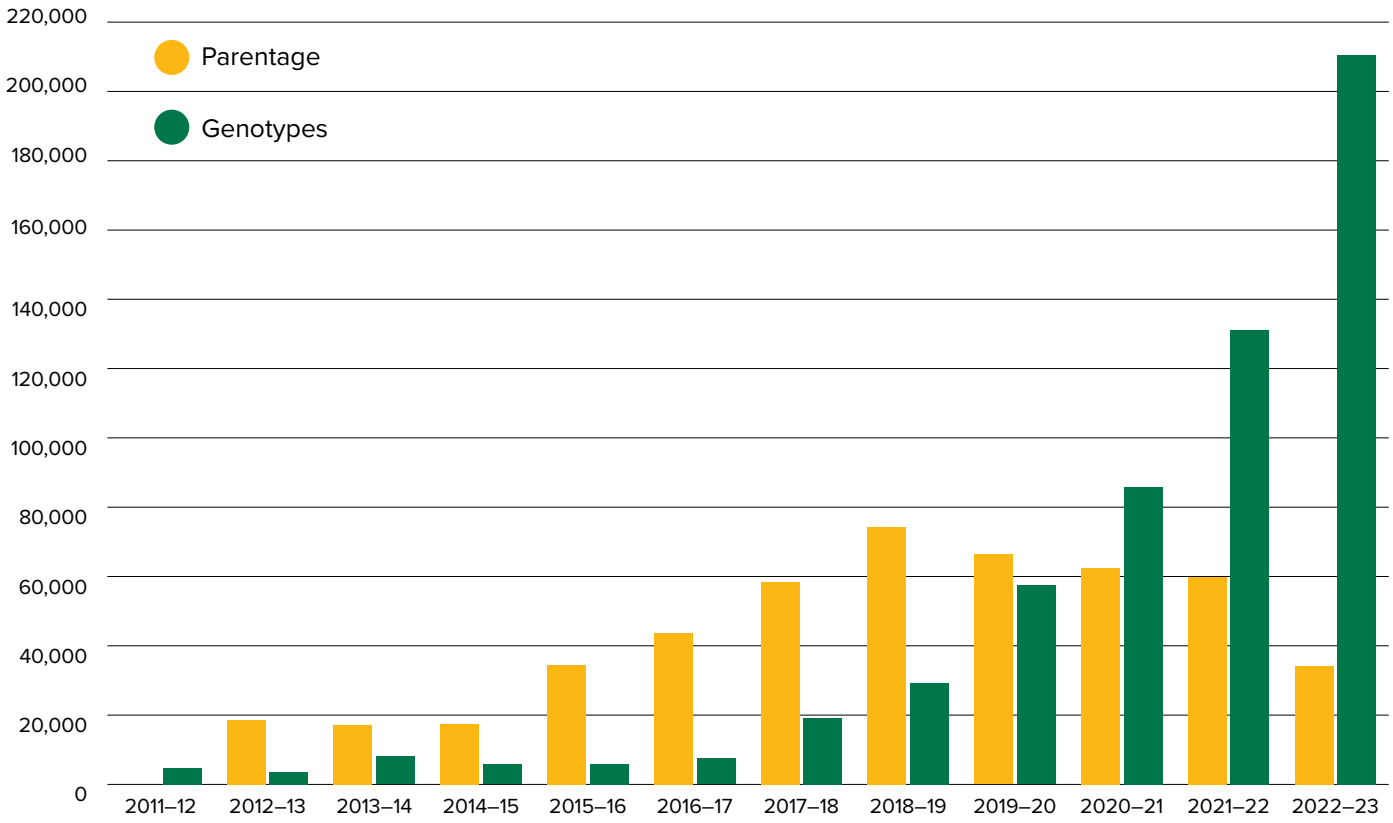
Genotyping

Sheep Genetics, through our service provider, AGBU, maintains and delivers the Sheep Genomics database. This database is responsible for the storage and processing of three genomic services used by sheep producers:

- DNA parentage
- genotyping for evaluation
- Flock Profile.

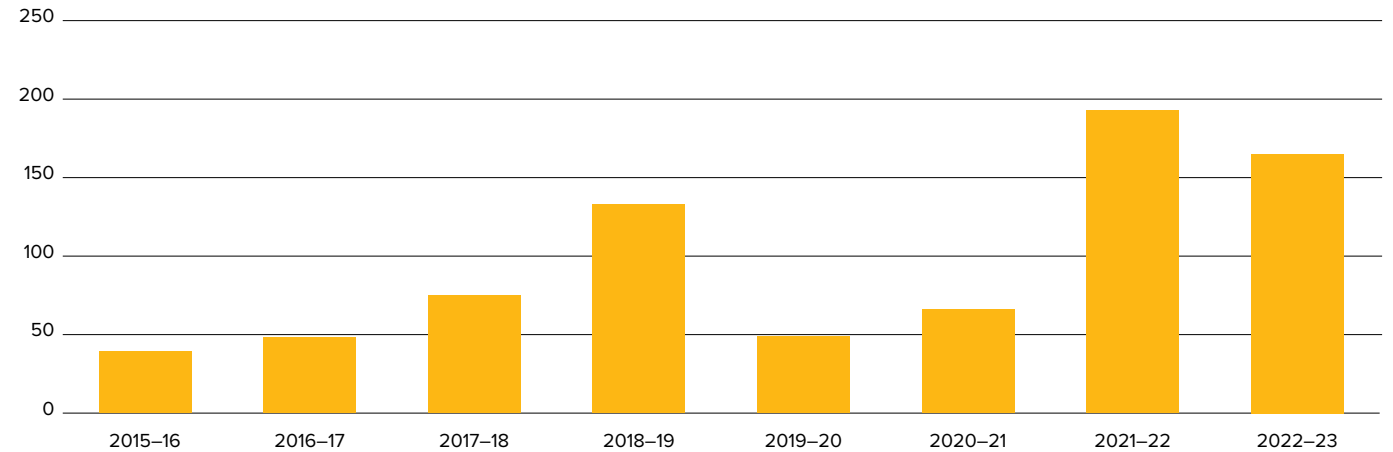
The uptake of genotyping by Sheep Genetics breeders continues to grow, with over 347,000 genotypes contributing to MERINOSELECT, 95,300 contributing to the Terminal evaluation and 57,700 in the Maternal evaluation.

Figure 8: Number of genomic samples processed each year (parentage and genotypes)



Flock Profile is a genomic tool available for commercial Merino producers that provides a set of ASBVs which reflect the average genetic merit of their flock, in ASBV terms. This can then be used to inform ram selection, ensuring producers are purchasing rams that will meet their breeding objective.

Figure 9: Number of Flock Profile tests



Sheep Genetics took on the delivery of Flock Profile following the completion of the SheepCRC in 2019.

Education and events

Throughout 2022–23 the Sheep Genetics team engaged with over 900 seedstock and commercial producers at events supported or hosted by Sheep Genetics. This engagement included online new member workshops, MateSel training and MateSel refresher courses, presentations for breeder group meetings and conferences, as well as attending Sheepvention and the Bendigo Sheep and Wool Show. A few highlights from the last 12 months are included below.

Leading Breeder conference

The biannual Leading Breeder conference was held in March 2023 in Bendigo, Victoria. The conference showcased speakers from across Australia and the globe to an audience of 100 producers, service providers and researchers. The overall theme for the 2023 Leading Breeder conference was 'the role of genetics in sustainability and productivity'.

The sessions included contributions from experts throughout the supply chain and covered a wide range of species. Speakers included leading research scientists and innovative producers with a highlight being a demonstration by the 2022 World Butcher Challenge champion. The event had an overall satisfaction rating of 8.3/10.

Demonstrations and presentations at the Leading Breeder conference in Bendigo.

Achievements in data quality

As part of the evening activities at the Leading Breeder conference, Sheep Genetics hosted its first award ceremony acknowledging achievements in data quality. This presentation recognised those flocks with 5-star data quality in the 21 February MERINOSELECT and DOHNE runs, and 1 March LAMBPLAN runs. Over 80 flocks were recognised in this session for the efforts and investment undertaken by breeders in the data underpinning their ASBVs, and therefore selection decisions.

Regional forums

Sheep Genetics runs regionally-based workshops across Australia to keep breeders informed of enhancements to genetic evaluations and covers the principles of data recording and capture. In 2023, Regional forums were held in Ballarat, Cowra, Adelaide and Launceston, engaging with over 60 breeders throughout these workshops. Participants rated the overall value of the regional forums as 8.7/10.

Service provider workshop

Sheep Genetics also hosted the annual Service provider workshop in Melbourne, Victoria, bringing together service providers from across Australia to discuss upcoming enhancements to genetic evaluations, as well as breeding program advice. The workshop was attended by 26 providers, who collectively work with over 350 Sheep Genetics flocks and offer services such as data management and genetic advice.

The next generation

Sheep Genetics is also involved in several programs fostering an interest in genetic technology in the next generation. This year, Sheep Genetics has engaged with students ranging from primary to tertiary levels, through involvement in events such as the Walcha branch Rotary Youth Agriculture (RYAG) program, South Australian Sheep Expo and annual lectures on Sheep Genetics to University of New England students studying sheep production. Sheep Genetics value the development of the next generation and their understanding of genetics as they enter the workforce.

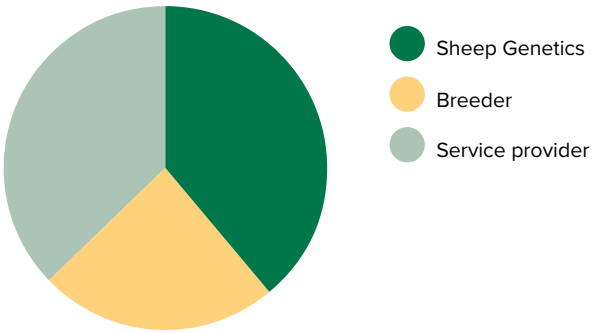
New data submission portal

In 2022 Sheep Genetics implemented a new database system which allowed for the development of a file upload portal on the Sheep Genetics search site. This allows breeders and service providers to upload data directly, rather than via the existing email pathway. This portal was made available in February 2023. A focus of the extension activities has been to upskill breeders and service providers so they have the confidence to use the online portal and access videos, webinars and other services.

While files can still be sent to the Sheep Genetics team for upload, many users have taken the opportunity to utilise the new system with the added benefit of receiving more timely feedback. Over 1,000 files were uploaded by breeders and service providers since its release in February 2023 until the end of June 2023. In the last quarter (April–June 2023), breeder and service provider submissions made up 61% of the files that were uploaded for Sheep Genetics evaluation.

The benefits of the portal that users are enjoying include real-time feedback, comprehensive data and exclusion summaries. Along with the database and web interface, this system will continue to be developed over the next year.

Figure 10: Submissions uploaded by user type



Submissions uploaded by user type in last three months/FY22–23 Q4 (April to June 2023).

Livestock genetics research and development

The National Livestock Genetics Consortium (NLGC) acts in an advisory capacity and provides a formal industry consultation platform for investment in livestock genetics. The NLGC is governed by a skills-based taskforce established and funded by Meat & Livestock Australia (MLA). The primary aim of this initiative is to significantly increase the rate of genetic progress achieved in the sheep and beef industries.

Continual improvement in our genetic evaluations and collection of data to underpin these, is imperative to maintaining our world-leading evaluation.

The MLA Resource Flock

This project ensures the development and relevance of the reference population needed for genomic predictions in the Australian sheep industry.

In the 2023 joining, 150 sires were represented across three sites – Katanning WA, Kirby NSW and Temora NSW. The Katanning and Temora flock sites were joined in early February, and Kirby joined in May 2023.

2021 cohort – Carcase and meat science phenotypes

Carcase phenotypes and meat science data were recorded on 2,119 lambs in the 2021 cohort. These lambs were slaughtered between 18 December 2021 (Temora) and 24 October 2022 (Kirby 4th kill).

This year, the data has been consolidated and was added to the Sheep Genetics database to underpin genomic prediction.

2022 cohort – Lambing records and genotypes, and another cohort of Eating Quality satellite flock lambs

In the 2022 lambing round, a total of 2,395 lambs were born across the Resource Flock sites. The conception rates to artificial insemination (AI) were 67% at Kirby, 78% at Katanning, and 78% at Temora.

An additional 1,200 lambs were also born as part of the 2022 Eating Quality satellite flocks. This is in addition to another 1,750 lambs involved in the satellite flocks for Eating Quality in 2023.

Understanding the genetic variation in shedding characteristics of sheep to develop a shedding breeding value

Self-shedding breeds are becoming an appealing choice for commercial prime lamb production systems due to their ability to reduce and/or remove the need for shearing and wool management practices. The project, in conjunction with seed stock maternal shedding sheep breeders, will improve understanding of the genetic architecture behind the trait with the aim to develop breeding tools to aid the selection for, and infusion of, shedding characteristics into commercial flocks.

Increasing the number of animals with recorded phenotypes and genotypes will enable the discovery of key genes and the development of breeding values for industry. This three-year project was put forward to and approved by the NLGC taskforce through the 2021/2022 project call.

Adding sustainability traits to the MLA Resource Flock

This joint project between MLA and the Department of Primary Industries and Regional Development (DPIRD) aims to collect phenotypic data on sustainability traits that will inform the inclusion of these traits in genetic evaluations. Measurement is underway, with feed intake, growth, gas production (including CO_2 and methane) and body composition phenotypes being collected on the 2022-born MLA Resource Flock lambs at Katanning, WA. These records will be submitted to Sheep Genetics for routine evaluation and to contribute to the larger dataset required to develop ASBVs.

Development of the analytical software behind the Sheep Genetics evaluations

One of the major projects in the Livestock Genetics' portfolio is with the Animal Genetics and Breeding Unit (AGBU), to continually develop the analytical software and capabilities of the beef and sheep genetic evaluations. It is under this project that our annual analysis enhancements were developed. These enhancements were released in May 2023 and are summarised below.

Figure 11: 2023 Analysis enhancements

Enhancement	Merino	Terminal	Maternal	Dohne/ SAMM
Updated genetic parameters	✓			✓
Updated partitioning of genomic and pedigree information	✓			
Updated Single Nucleotide Polymorphism (SNPS) used in the genomic evaluation	✓	✓	✓	
Lambing Ease model updated to single step		✓		
Updated ASBV accuracy values		✓	✓	
New research indexes	✓			

Resources

Indexes explained

The review and redevelopment cycle of Sheep Genetics indexes continues with the delivery of new research indexes for MERINOSELECT in 2023 and the initiation of a review into Maternal indexes in 2023–24. The Animal Genetics and Breeding Unit (AGBU), who are responsible for the research and development that underpins these indexes, has been working closely with the Sheep Genetics team and industry in the delivery of these indexes.

With this ongoing interest in selection indexes, AGBU has developed a series of short videos to explain how to use these indexes and how they are developed.

Scan the QR code to watch the videos and learn more about indexes

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