Sheep GENETICS

MEAT & LIVESTOCK AUSTRALIA

# Sheep Genetics Business Plan

2021-2025

# Summary

This plan highlights the expected outcomes from the Sheep Genetics program between 2021 and 2025. It aligns strongly with the MLA Strategic plan and Red Meat 2030 with a strong focus on Customer Centricity.

We worked with key stakeholders to ensure that the outcomes are feasible and align with the expectations along the supply chain, including:

i. Sheep Genetics Advisory Committee
ii. Animal Genetics and Breeding Unit (manage the technical part of the Genetic Evaluation)
iii. MLA Business Units including Market Insights and Meat Standards Australia

During this process, we identified 5 key areas or Drivers that Sheep Genetics can have the biggest impact:

| Sheep Genetics Driver | Alignment to MLA plans | Impact |
|---|---|---|
| Productive and profitable | Double red meat value | ↑ production traits |
| Healthy? No worries | Increase health and welfare | ↑ lamb survival ↓ mulesing |
| I care about my farm | CN30 | ↑ efficiency and ↓ methane |
| Eat me, I'm tasty | Improve lamb eating quality | ↑ MSA sheep model outputs |
| I am Aussie farm ready | Resilience to climate change | ↑ condition score/resilience |

These drivers will help us maximise industry genetic gain through a transparent strategy about how we can collaborate with the industry to maximise our contribution. This strategy sets clear research development targets that maintain focus on the 5 Sheep Genetics drivers.

Furthermore, we also identified the priorities to improve Customer Centricity based on feedback from our Client base. With the aim of getting more customers with higher satisfaction**,** we identified the needs of our diverse and growing stakeholders. This plan includes how we deal with the challenges of more clients and data, more services including Genomics and transitioning to a new Database and IT system.

# Contents

# 1 Outcomes that make a difference

How Sheep Genetics will contribute to an aligned strategy across Australia's Sheep industries

The Red Meat 2030, MLA strategic plan and Wool 2030 strategies are complementary strategies. The main aims related to are to sheep;

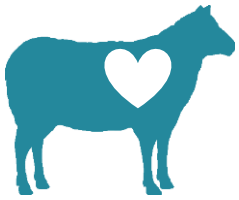
1. Double the value of the red meat industry (MLA strategy only)
2. Increase welfare and health of animals (flystrike and lamb weaning rates in Wool 2030).
3. Reduce net carbon emissions and move towards carbon neutrality by 2030.
4. Improve eating quality (MLA strategies only)
5. Make wool growing systems resilient to climate change (Wool 2030 only)

More information about these objectives are in (Appendix A).

From these aims, we created 5 Sheep Genetics Industry drivers to work towards in this business plan:

## Productive and profitable

Double the value of the red meat industry



## Healthy? No worries

Increase welfare and health of animals

## I care about my farm

Moving towards carbon neutrality by 2030

## Eat me, I am tasty

Improve meat eating quality in lamb

## I am Aussie farm ready

Making farm systems resilient to climate change

# Productive & profitable

we produce animals that will be productive and profitable in the future

## Objective

Increase production and value of Wool and Meat

## Behaviour change

**Stud:** We trust breeding values and should be members of Sheep Genetics

**Commercial:** We need rams bred using ASBVs for traits that make money on farm

## Who do we target?

Existing and non existing Sheep Breeders in Australia.

Commercial producers/farmers buying rams plus other industry stakeholders such as classers or stock agents

## Products and solutions

1. Continue producing ASBVs and indexes including key production traits
2. Promotion of ASBVs and indexes to commercial producers/farmers through MLA adoption networks
3. Keep indexes updated

## What does success look like?

1. 2% annual improvement in main industry indexes
2. 4% annual increase in flock subscriptions to Sheep Genetics
3. 5% annual increase in data submitted to Sheep Genetics
4. 2% annual increase in data quality scores across analyses

## Who is involved?

MLA: Sheep Genetics, Adoption and Market Insights
AGBU

# Eat me, I am tasty

my sheep are certified tasty, consumers want to eat them

## Objective

Increase value of red meat by improving eating quality.

Contribute to a better Meat Standards Australia Sheep Meat Model score

## Behaviour change

**Stud:** Breeding for taste, juiciness and tenderness improves the value of my rams

**Commercial:** We need rams with high Eating Quality indexes to get a price premium

## Who do we target?

Terminal ram breeders that currently select for growth without considering the impact on eating quality.

## Products and solutions

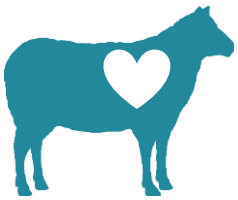
1. Continue to produce ASBVs for Intra-muscular fat, yield and Shear force
2. Create Research Breeding Values (RBVs) for MSA eating quality (2023)
3. Update genetic evaluation with improved parameters for eating quality and carcase traits in Merino and Terminal analyses (2022)
4. Update indexes to represent new MSA Sheep Meat model (2024)

## What does success look like?

1. 3% annual improvement in IMF and Shear Force

## Who is involved?

MLA: Sheep Genetics, Meat Standards Australia and Adoption
AGBU



# Healthy? No worries

I want my animals to be healthy, fit and easy to look after

## Objective

Improve welfare status of Australian sheep

Create a positive social perception about Sheep produced in Australia

## Behaviour change

Breeding and selecting healthy animals increases production, makes my life easier and consumers love it

Breeding can help me become a Mules free flock (Merino)

## Who do we target?

Mostly Merino breeders in high rainfall areas and other environments susceptible to worms and fly strike.

Maternal and Merino breeders and commercial producers for lamb survival.

## Products and solutions

1. Include wrinkle in all Merino indexes and dag in relevant indexes (2023)
2. New reproduction traits including Ewe Rearing Ability incorporated into Merino (2023) and Maternal (2024) indexes
3. Start to explore lamb survival as a direct trait

## What does success look like?

1. Annual 5% improvement in Wrinkle ASBV and 5% increase in wrinkle recording in MERINOSELECT analysis
2. Annual 2% improvement in Ewe Rearing Ability ASBV in MERINOSELECT and Maternal analyses
3. Transition another 5% of Merino flocks onto the new component reproduction analysis

## Who is involved?

MLA: Sheep Genetics, AGBU

# I care about my farm

I want animals that produce less Carbon and produce more value

## Objective

Improve the sustainability Australian Sheep farms

Improve the efficiency of Australian Sheep to produce more with less waste

## Behaviour change

**Stud:** Breeding for efficiency and methane increases the value of my rams

**Commercial:** More efficient animals increase farm profit and consumers love it

## Who do we target?

Merino and Maternal self-replacing breeders/producers who have bred for production over many years

## Products and solutions

1. Research breeding values for methane production (2025)
2. Research selection indexes that balance efficiency, production and methane (2025)

## What does success look like?

1. Research breeding values available for breeders

## Who is involved?

MLA: Sheep Genetics, CN30 team
AGBU + other research institutions

# I am Aussie farm ready

my sheep can handle anything the future throws at me

## Objective

Improve the resilience of Sheep managed in environments with uncertain feed availability

## Behaviour change

Breed and manage sheep that suit the farm they are managed on

## Who do we target?

Merino and Maternal self-replacing breeders/producers pushing production (high stocking rates) or have mixed enterprises

## Products and solutions

1. Include condition score in Merino indexes as a resilience trait (2023)
2. Explore alternative traits that represent resilience in Sheep
3. Investigate how climate change might change the type of sheep required in different regions of Australia (changes to parasites/diseases)
4. Explore economic resilience of sheep and the production system they are managed in.

## What does success look like?

2. Annual 2% increase in CS ASBV and 2% increase in CS recording

## Who is involved?

MLA: Sheep Genetics
AGBU + other research institutions

# 2 Decisions informed through data and insights

## Objective

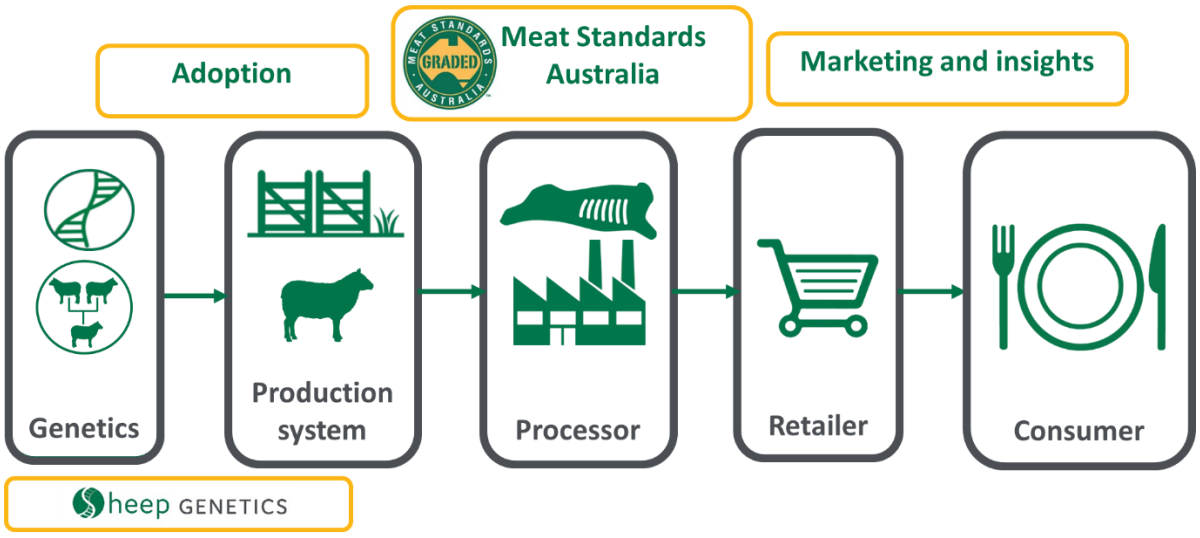
Maximising impact by connecting programs to customer, consumer and community insights

## What does success look like?

Regular collaboration between MLA business units

This business plan was written with consultation with the MLA Market Insights team. The decisions in this plan were aligned to ensure that industry targets for genetic progress meet consumer expectations domestically and abroad. These targets are underpinned by data and insight, keeping the consumer front of mind. This collaboration is important because Sheep Genetics and the Market insights teams work at opposite ends of the supply chain.

This collaboration will also improve breeder understanding of markets and expectations. Through awareness and education, we can help improve the value of red meat across the industry.




Additionally, the Sheep Genetics team collaborates with Meat Standards Australia. This collaboration means that improvements to the MSA sheep meat model can be incorporated into the breeding programs of Australian breeders. Another important collaboration is with the MLA adoption team, which includes a dedicated Genetics National Adoption Manager. By working with the adoption we can improve awareness and understanding of the tools and services we have available and demonstrate the value of genetics on farm.

# 3 Customer centricity and accountability through transparency

## Objective

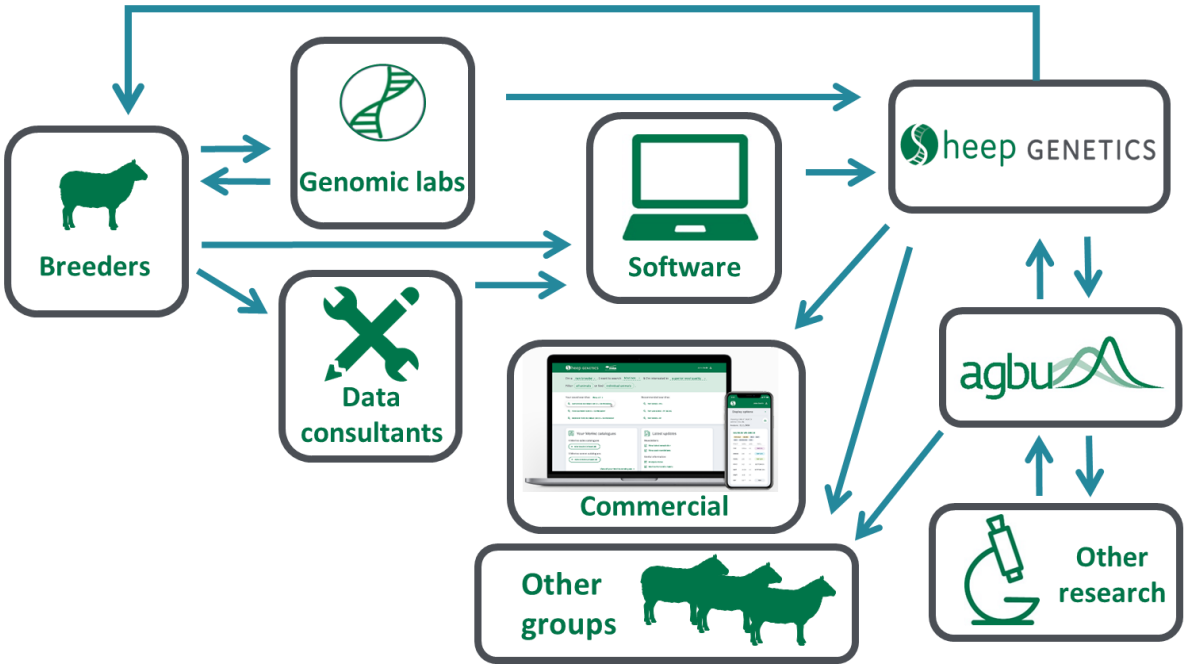
Make Sheep Genetics a premium product with high customer satisfaction and understanding of our product

## What does success look like?

Maintain client satisfaction levels
More commercial products for breeders and commercial producers
Improved Sheep Genetics IT system
Targeted interaction with key Sheep Genetics stakeholders

## Our Stakeholders

Sheep Genetics interacts with diverse stakeholders. These stakeholders interact from the moment data is collected by the breeder until breeding values are released to the industry:



# 3.1 Working with our stakeholders

## What do we want to improve in our direct stakeholders

Our main Stakeholders are breeders, breeder groups and the service providers that work with Breeders. These are our day to day customers. We have slightly different goals for what we want to achieve with each of these segments of customers

| | Breeders | Breed groups | Service providers |
|---|---|---|---|
| Who are they? | Breeders that submit data into Sheep Genetics | Groups of breeders that work together to get faster genetic progress. Includes SuperBorders, Meat Elite and Superwhites | Consultants and data managers that advice on how to breed and help submit data to Sheep Genetics |
| What they should be doing | i. Submitting good data using optimal breeding design and gain<br>ii. Trusting and using industry indexes<br>iii. Educating clients about benefits of balanced breeding | i. Leading industry for genetic progress that benefits the industry<br>ii. Working as a team to reach a common objective<br>iii. Look to SG/AGBU for guidance | i. Working independently to improve data quality and breeding program design<br>ii. Promoting SG and trust us |
| What they need to know | i. The potential and limitations of genetic evaluations<br>ii. How to use genomics effectively<br>iii. How to use a software and SG import system | i. How to get a group of breeders with diverse views to agree on the best direction for the group<br>ii. How to optimise gains and maintain diversity within the group | i. Basic and intermediate breeding and genetics knowledge<br>ii. How SG systems work including MateSel and other tools |
| What we do to help each segment | i. Written material<br>ii. Regional forums<br>iii. MateSel training<br>iv. Online training (seminars and tools) | i. Facilitation during 1 workshop a year (AGBU+SG)<br>ii. Support for combined MateSel (teaching not doing) | i. A service provider network exchanging information, tips and case studies<br>ii. Once a year workshop (AGBU/SG/other) |

## What do we want to improve in other Stakeholders

We have additional stakeholders that are critical for Sheep Genetics to operate. We have separate goals for these stakeholders

| | Genomics labs | Software companies |
|---|---|---|
| Who are they? | Labs that have a contract with MLA to submit Genotypes into the MLA genomics pipeline | Companies that have software that our clients can use to submit data into Sheep Genetics |
| What they should be doing | i. Ethical promotion of genomic products<br>ii. Promote SG tools and systems | i. Updating software to ensure correct data entering Sheep Genetics<br>ii. Promoting SG |
| What they need to know | i. How genomics incorporated in to breeding values/products<br>ii. How clients should submit data and parentage results to get breeding values | i. Changes to the genetic evaluation<br>ii. Updates to XSD<br>iii. General understanding about SG |
| What can we do to get each segment | i. SG and AGBU workshops once every 2 months<br>ii. Join service provider training | i. One on one virtual meetings every 3 months<br>ii. Biannual meeting face to face with all companies |

# 3.2 Priorities to improve Customer Centricity

We also identified the priorities to improve Customer Centricity based on feedback from our Client base. We highlighted the key areas that need improving and our plan to improve the customer experience.

## More clients and records in the analysis

**The key issues:** 6% increase in 2019-2020 and 8% increase in 2018-2019. These new clients require a lot of attention to support and keep within Sheep Genetics.

More animals are being submitted into Sheep Genetics (9% increase each year) – more animals means more diagnostics and support is needed for breeders.

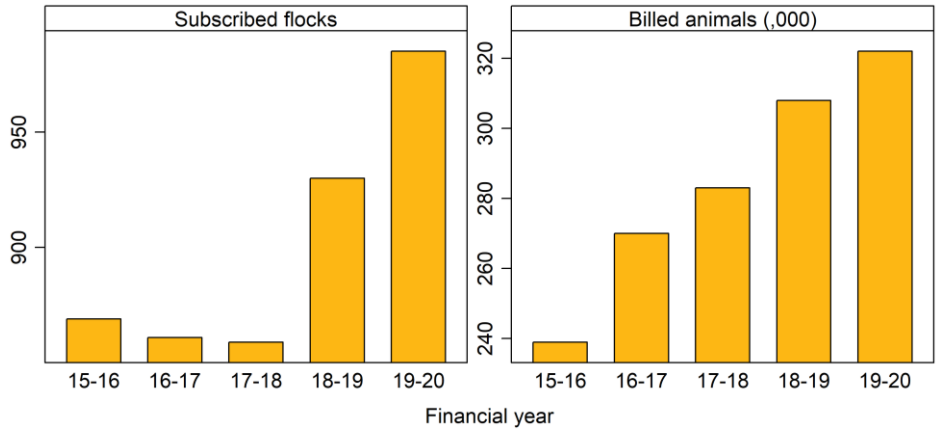



**Figure 2**
Number of flocks and animals submitted each financial year to Sheep Genetics.

Our plan for success

1. Improved data import system – includes more ability for breeders to diagnose data issues (2022)
2. Improved Ramping Up Genetic Gain reports and Data Quality scores (2021). Breeders can access own reports.
3. One database means there is more flexibility to specialise roles now that there is a new ½FTE for project management and a dedicated Senior Development Officer

## Infrastructure and the Sheep Genetics IT architecture

During this business plan we will transfer our working databases to a new Database Warehouse. This is the back end of the Sheep Genetics system that includes data and prepares data for analysis. Around this back end we will also transition to a new front including improved data import and reporting system.

This system requires constant improvements over time so that it can evolve to satisfy the requirements of different Sheep Genetics clients and commercial producers/farmers. These continuous improvements and upgrades are also required to ensure that the site evolves to match the increase in data flowing through Sheep Genetics. This increase in data requires updates to the APIs used to move data between Stakeholders.

1. Phase 3 and of the Sheep Genetics database redevelopment –
    a. Updated import system,
    b. update the reporting system and
    c. include the MLA Sheep Genomics database into the Sheep genetics data warhouse.
2. Continuous update of Sheep Genetics search site.
3. Incorporate tools into Sheep Genetics infrastructure including
    a. Improved diagnostic tools
    b. Genomics pipeline
    c. Incorporate pedigree master into current system
4. Data quality metric incorporated into genetic evaluation

This new system requires new skills within the Sheep Genetics team and an update support model.

### Our plan

1. Improved infrastructure support model working with MLA IT and ISC. This includes a combined support contract with Third Parties to ensure the Sheep Genetics system is always running.
2. Transition of roles from current database managers to cover understanding of system architecture.

## Genomics

We have 5 new labs that need to be supported to ensure their clients understand how to submit data and genotypes through Sheep Genetics. Additionally Since the beginning of the last business plan, the total number of genotypes going through the MLA genomics pipeline has almost.

Additionally, we currently use Genotypes within the genomic analysis to estimate relationships. These relationships are used with pedigree relationships to estimate Genomically enhanced breeding values. There is opportunity to produce breeding values and products that use genotypes only.

## Our plan

## Our plan

1. Updated Genomics contracts with clearer guidelines around MLA's service to labs
2. Targeted communication and extension with Genomic labs to improve their understanding of Sheep Genetics

**Fewer bigger bolder 1 – Genomic only products**

**Aim**

- Create new genomic only products that improve genetic gain in the Australian Sheep industry
- Price products appropriately to optimise the use of Sheep Genetics and the submission of quality data for reference populations

**Who is involved**

Sheep Genetics, AGBU, UNE, Sheep Genetics advisory committee, Sheep Genetics technical committee

**Key tasks**

1. **Improve genomic pipeline:** Developing new pipeline for creating genomic breeding values for the evaluation. This includes accounting for genetic group differences when only genomic information is available.
2. **Creating new products:** Using existing techniques from flock profiles and in the other animal industries investigate new potential genomic breeding value products that complement ASBVs. Explore accuracy and linkage estimates from genomic only estimates of breeding values. Including estimating SNP effects or including genomic only in the single step analysis.
3. **Fee schedule and communication:** The cost of creating and maintaining reference populations has been simulated in several studies. The cost of using this reference population needs to be optimised to ensure that it balances collection of quality data for the reference with genomic only breeding values.

## More traits and technical requirements

More traits means more data problems to diagnose and help breeders with. Genomics has ~150 CRM entries per year (third most important). New traits including eating quality and reproduction traits are harder to measure and require more diagnostics (data entry has ~180 CRM entries per year, the most important issue)

Our plan

1. Updated Breeders Guide/Quality Assurance manual
2. Better prioritisation of new traits and technical work

**Fewer bigger bolder 2 – Targeting our technical work**

**Aim**

Maintain focus on the Sheep Genetics 5 drivers.

**The issue**

Sheep Genetics get requests to create breeding values for new traits. Breeders are encouraged to submit measurements for traits following guidelines such as the Visual Score Guide. Additionally, other research institutions often research new traits but there is no formal pathway to get that data into the Sheep Genetics evaluation. The updated database system will make it easier for researchers to upload data in the Sheep Genetics database, offering more potential to use this data.

**How to include new traits**

If new traits are not already included in the business plan as a priority, the investment in these traits will be prioritised. Therefore, each year there will be a cycle) that prioritises work on new traits based on;

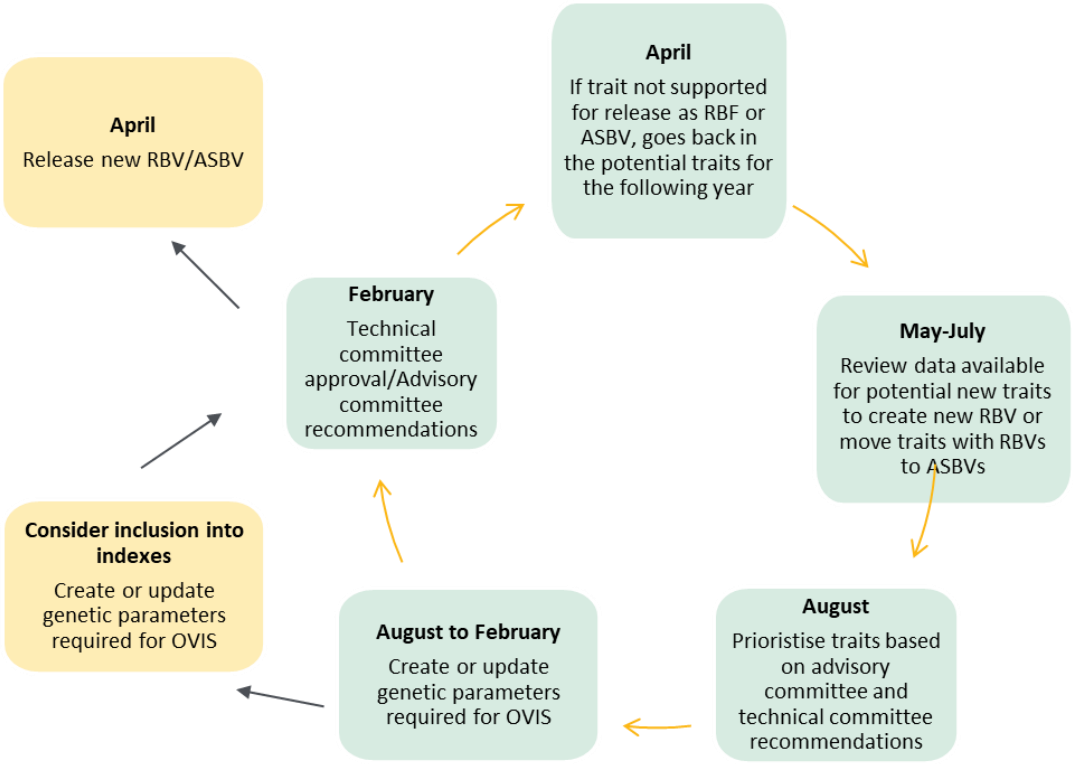
i. How much data is available for each trait
ii. The impact these traits will have on the sheep industry

The process will make investment into new traits transparent and inclusive of all client needs.

If traits are not included in visual guides or collected routinely, breeders should first discuss the new traits with Sheep Genetics. New nomination swill be considered at advisory and technical committees to understand;

i. If they are worth investment from the industry
ii. Create a standard protocol for collecting the trait

Nominations can be made at any time during the year and considered at the next available technical and advisory committees.




**Annual cycle of new trait creation**

# Sheep Genetics Indexes

Indexes are a tool that combines ASBVs for traits with how important each traits it to a production system into one number. This one number can be used by breeders and commercial producers to select the best sheep to breed with.

Sheep Genetics indexes are currently updated sporadically when new traits or changes in the industry. The adoption of indexes within the industry could be improved by ensuring they are relevant to the aims of our key businesses, whilst directing the industry towards industry targets for 2030.

## Our plan

**1. Improved industry involvement in making indexes**

Include breeders and commercial producers in the development of indexes to make them relevant to industry. We also aim to include MLA business units Market Insights and Meat Standards Australia to strengthen the relevance of our indexes across the supply chain.

**2. Review the role of custom indexes**

Understand how custom indexes could be used within the Sheep Genetics system by reviewing:

i. Do custom indexes improve genetic improvement?
ii. Are there alternative methods to custom indexes?
iii. Is there enough demand for custom indexes?
iv. What tools do we need for industry to responsibly develop custom indexes

**3. More prioritisation of index work on the annual work plan.**

We created a schedule for when indexes should be updated:

| Year | Main priorities |
|---|---|
| **2021/22** | Merino indexes<br>Add new traits to indexes for:<br>i. Conception, litter size and ewe rearing ability<br>ii. Wrinkle/dag<br>iii. Resilience (CS) |
| **2022/23** | Maternal indexes<br>Review maternal indexes, updating current maternal production systems. Potentially include meat eating quality |
| **2023/24** | Terminal indexes<br>New terminal indexes based on updates of MSA sheep model and markets |

# Appendix A

## Summary of goals of sheep industry strategic plans related to genetics and breeding

| Theme | Red Meat 2030 & MLA 2025 Strategic plan | Wool 2030 |
|---|---|---|
| livestock | We set the standard for world class animal health, welfare, biosecurity and production practices.<br><br>1. We are recognised as the world-leaders in animal health, welfare and production practices<br><br>2. Understanding and use of Estimated Breeding Values (EBVs) have increased, enhancing our productivity<br><br>3. Improve eating quality. | Meet the 'Caring for our sheep' priorities identified in the Australian Sheep Sustainability Framework, and the requirements of the Australian Animal Welfare Standards and Guidelines<br><br>Develop tools and systems so that growers have the confidence and the capacity to manage flystrike without mulesing<br><br>Lamb weaning rates increase by 5 percentage points – Genetic gain is 2% per annum<br><br>Develop or adapt new technologies to increase sustainability and efficiency Continue to build the capability and uptake of genetic and genomic technologies<br><br>Continue to drive genetic improvement to deliver higher sheep performance in all production zones with a focus on the yield and quality of both wool and meat, reproductive rate and easy-care attributes |
| environment | Our industry's net carbon emissions have been reduced resulting in carbon neutrality by 2030<br><br>1 Customers, consumers and community approval and trust in our environmental management and stewardship has increased<br>2 Australian sheep sustainability Framework | Strive for carbon neutrality of wool production<br><br>Undertake collaborative RD&A on emissions reduction<br><br>Support the red meat industry's CN30 goal<br><br>Develop and demonstrate adaptive, resilient wool growing systems that allow woolgrowers to manage a changing climate. |
| Our systems | Participation in coordinated industry integrity systems is 100% by 2030 | |