



GENOMIC
SOLUTIONS

Lamb or wool,
we have you covered

SHEEP HANDBOOK

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The market leader in the provision of **premium genomic solutions** to the Australian and New Zealand livestock industry

Neogen Australasia, based in Queensland, Australia is a subsidiary of the Neogen Corporation, and is focussed on advancing human and animal wellbeing through science and technology to fuel a brighter future for global food security.

Neogen Australasia prides itself on being the market leader in the provision of premium genomic solutions for the Australian and New Zealand livestock industry.

Neogen is Australia and New Zealand's largest livestock genomics testing facility, with our modern, state-of-the-art laboratory in Bundamba specialising in the provision of DNA tests for a wide variety of livestock, including beef cattle, dairy cattle, sheep, goats, pigs, and alpacas, as well as other species such as dogs, cats, aquaculture, and plants, among others.

Neogen Australasia offers a premium portfolio of genomic solutions, providing a product range that not only offers value for money, but is tailored to the needs of the local livestock industry in Australia and New Zealand, while leveraging the power of the global Neogen Corporation.

Neogen Australasia's genomic solution portfolio is supported by our experienced sales, technical support and customer service teams who are on hand to offer guidance and support every step of the way.



So why should you test with Neogen? **Because ‘There is a Difference’**

1. Premium, Modern Product Offering

Neogen’s Smart Flock product range is the premium genomic solution available to Australian lamb and wool producers.

Rather than rely on generic genotyping platforms, Neogen’s Smart Flock Elite and Smart Flock Profile products include the genomic profiling of animals with Neogen’s premium, proprietary genotyping platform, the GGP Ovine 50K.

The GeneSeek Genomic Profiler (GGP) Ovine 50K genotyping platform was designed ‘by the Australian sheep industry, for the Australian sheep industry’, and contains markers that were specifically identified by researchers at the University of New England, Agriculture Victoria and the Animal Genetics and Breeding Unit as explaining the most genetic variation in the Australian sheep population.

The GGP Ovine 50K is ideal for the calculation of genomically enhanced breeding values, particularly for seedstock animals, along with use for parentage assignment, management of recessive genetic traits and conditions, genome wide selection, comparative genetic studies, and higher density imputation.



2. Fast Turnaround Time Backed by a Guarantee

Neogen understands that time is money and prides itself on offering the fastest testing turnaround times of any livestock genomics laboratory.

By leveraging the operational strength, size and efficiency of our new state-of-the-art, \$11 million genotyping laboratory in Bundamba, Queensland, coupled with utilisation of the latest high-end genomic analysis tools and robotic processing, the vast majority of genomic testing is completed within 2-3 weeks of when samples arrive at the lab.

Neogen stands behind its commitment to offering unrivalled turnaround time and offers a guaranteed 28 day turnaround time for Smart Flock Elite. In the event that Neogen Australasia does not return results in 28 days, a discount of 10% is applied as a credit to the customer’s Sheep DNA account.



3. Comprehensive Product Range

Neogen offers the most comprehensive range of genomic solutions of any of our competitors, ensuring customers can find a genomic testing option that suits their individual needs.

In addition to our Smart Flock premium product range, Neogen offers a range of tests to assist with the management of important qualitative traits and genetic conditions in sheep operations, such as the Sheep Poll test, hypotrichosis, spider lamb syndrome, booroola, GDF9, myostatin and scrapie resistance.

Neogen also retails sample collection equipment, such as Allflex TSUs and TSU applicators, offering customers a ‘one-stop-shop’ for all their genomic testing needs.



4. Complete Results

The excellence of the Neogen lab results in less failed samples and unrivalled parentage assignment, leading to a return of more complete results from your investment in genomic testing.

Our Smart Flock Elite and Smart Flock Parentage product range are fully integrated with Meat & Livestock Australia's central genomics database for the Australian sheep industry, delivering a blue-ribbon DNA parentage assignment service.

Coupled with outstanding customer service, utilisation of all available genomic profiles in the MLA genomics database, including those from the Cooperative Research Centre for Sheep Industry Innovation (i.e. Sheep CRC), maximises the probability of successfully assigning an animal's sire and dam, delivering additional value to your breeding program.



5. Outstanding Service Delivery Platform

Neogen's service delivery platform is without peer when it comes to offering a streamlined genomic testing experience.

Neogen exclusively utilises a service delivery platform that was purchased from the Sheep CRC to deliver its genomic products and services to the Australian sheep industry. Known as SheepDNA, the service delivery platform was developed specifically for the Australian sheep industry and is fully integrated with the MLA central genomics database, Sheep Genetics, and the RamSelect website, ensuring automated and efficient transfer of results between Neogen and key industry service providers.

The result is faster turnaround times, reduced risk of human or transcription errors, more successful parentage assignment, and a seamless, hassle free genomic testing experience.



6. Nationwide Network of Genomics Specialists

Neogen's genomic solution portfolio is supported by our experienced sales, technical support and customer service teams who are on hand to offer guidance and support every step of the way.

Our national team of genomics specialists are available to provide Neogen customers with day-to-day assistance, either on-farm or remotely, in the design and execution of their genomic testing program.



7. Long Term Industry Partner

Neogen is proud to be the largest and longest term provider of genotyping services to the Australian sheep industry.

Neogen's new state-of-the-art genomics laboratory in Bundamba, Queensland, opened in September 2022, is the largest livestock genomics laboratory in the southern hemisphere, and is part of Neogen's strong commitment to providing the Australian and New Zealand livestock industry with domestic genotyping capability, removing the need to send DNA samples offshore for genotyping.

Neogen continues to be the industry's genotyping laboratory of choice for research and commercial genotyping services, with many thousands of progeny in the Sheep CRC Information Nucleus and Sheep Resource Flock being genotyped through the Neogen laboratory.



SHEEP GENOMICS

Uncover your flock's potential

Genomics, or DNA testing, has revolutionised livestock breeding and is now routinely used by livestock breeders around the world.

Genomics has a wide and varied range of uses within modern sheep breeding programs, from confirming parentage information, to the benchmarking of a flock's genetics for economically important traits, to the management of recessive genetic traits and conditions, through to better and more accurate breeding decisions.

Genomic information can enhance animal selection and accelerate genetic improvement in your flock across traits from fertility to production and performance.

The advantage of genomic testing is that you can access vital measures of an animal's potential shortly after birth – from productive traits to potential genetic defects – allowing selection decisions and planning to occur well in advance.

Use genomics to:

- Assign parentage and/or reduce parentage errors
- Make faster rates of genetic gain in a breeding program
- Make more accurate selection decisions
- Make selection decisions earlier in an animal's life, and with more confidence
- Make selection decisions for traits that can't be routinely measured on-farm (e.g. lean meat yield)
- Fast track introgression of favourable qualitative traits into a flock. e.g. polledness
- Streamline the management of recessive genetic conditions
- Benchmark the genetics of a sheep breeding enterprise, and track genetic progress over time





Smart FlockTM

Premium genomic testing for the Australian sheep industry

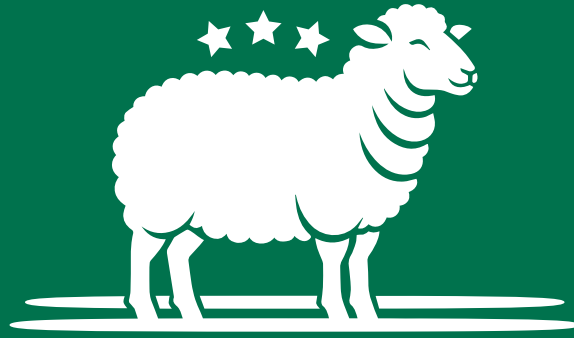
Neogen's Smart Flock product range is the premium genomic solution available to Australian lamb and wool producers.

Smart Flock enables sheep breeders to accelerate genetic gain, increasing the productivity and profitability of their sheep enterprise.

Using Smart Flock, sheep breeders can make better and more accurate breeding decisions, confirm parentage information, benchmark their flock's genetics for economically important traits, and manage important recessive genetic traits and conditions.

Smart Flock's different product options are tailored to the needs of the sheep industry in Australia, allowing sheep breeders to find a genomic testing option that best suits their individual needs.

 Smart  Flock ELITE	 Smart  Flock SELECT	 Smart  Flock PARENTAGE	 Smart  Flock PROFILE
All sheep breeds	Merino only	All sheep breeds	Merino only
Individual animal testing	Individual animal testing	Individual animal testing	Flock testing
Genomically Enhanced ASBVs Smart Flock Parentage Sheep Poll Test	Genomic only BV Smart Flock Profile Smart Flock Parentage Sheep Poll Test	Parentage assignment Sheep Poll Test	Flock average ASBVs



Smart FlockTM

ELITE

Neogen Australia's leading sheep genomic product.

Smart Flock Elite includes genomic profiling, parentage assignment, the sheep poll test (Merino only), and the incorporation of genomic profiles into the Sheep Genetics genetic evaluation for the calculation of genomically enhanced breeding values.

Smart Flock Elite is particularly suited for use by members of Sheep Genetics. Sheep Genetics membership requires animals to have pedigree, linkage and phenotypic measurements as minimum requirement.



Genomic Profiling

Animals tested with Smart Flock Elite are genomically profiled with Neogen's premium, proprietary genotyping platform, the GGP Ovine 50K



Genomically Enhanced ASBVs

The genomic profiles for animals tested with Smart Flock are automatically provided to Sheep Genetics for incorporation into the calculation of genomically enhanced Australian Sheep Breeding Values (ASBVs).



Sheep Poll Test

For Merino animals only, Smart Flock Elite includes the Sheep Poll test, increasing the speed of transition from a horned to polled Merino flock.



Parentage Assignment

Smart Flock Elite includes Smart Flock Parentage – that is, identifying the sire and/or dam of an animal – from a list of potential sires and dams that are provided as being possible parents.

A number of optional add-ons are available in association with Smart Flock Elite that screen for genetic conditions and traits of relevance in particular breeds. Add-on testing includes scrapie resistance and our comprehensive traits bundle (including Booroola, GDF9, Myostatin and Hypotrichosis).

GENOMIC PROFILING WITH A DIFFERENCE



GGP Ovine 50K

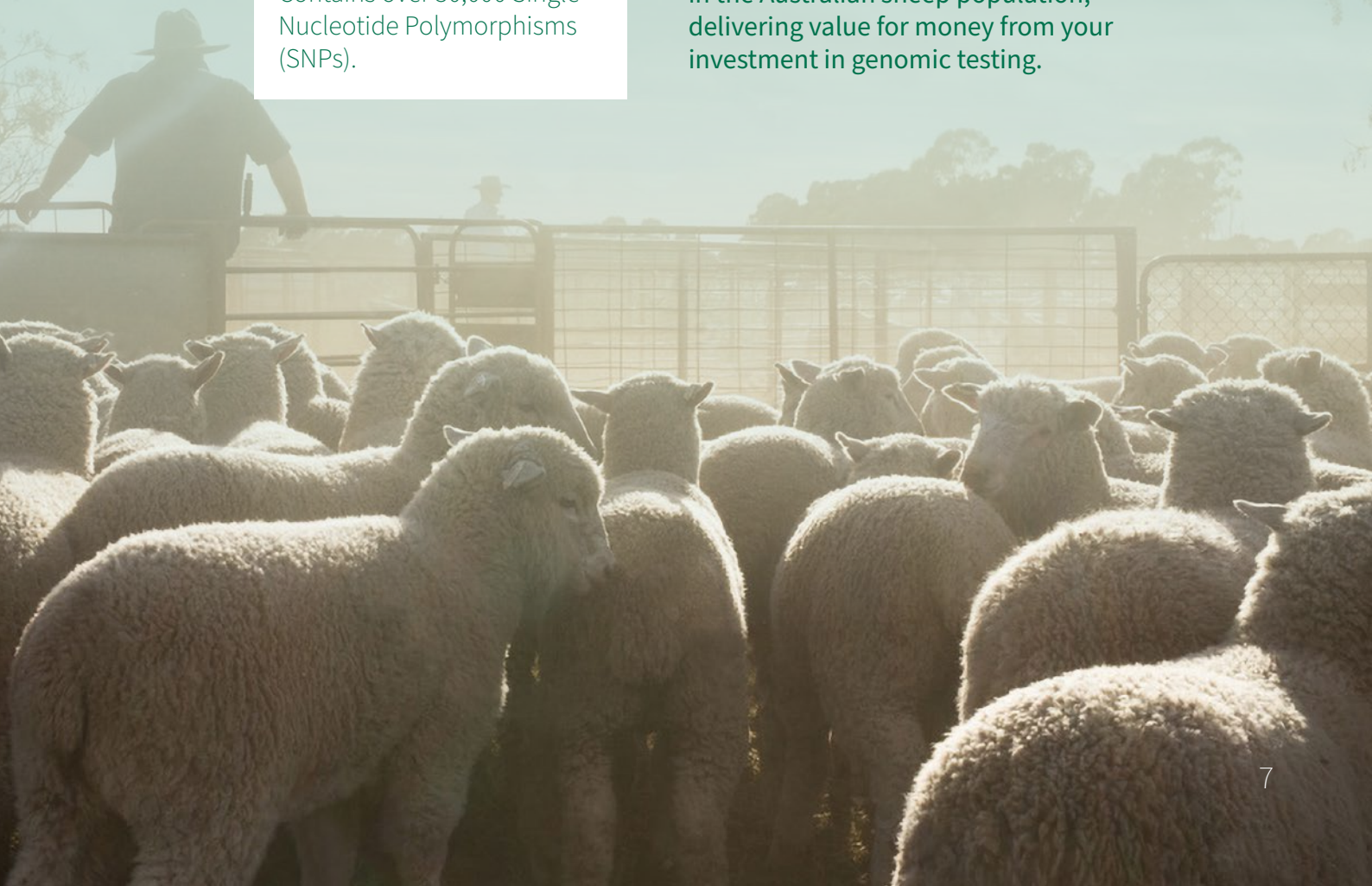
Designed specifically for the Australian sheep industry.

Contains over 50,000 Single Nucleotide Polymorphisms (SNPs).

Neogen Australasia's **Smart Flock Elite** product includes the genomic profiling of animals with Neogen's premium, proprietary genotyping platform, the GeneSeek Genomic Profiler (GGP) Ovine 50K.

The GGP Ovine 50K genotyping platform has over 50,000 markers, known as single nucleotide polymorphisms (or SNPs), and is designed specifically for the Australian sheep industry.

The GGP Ovine 50K was developed in collaboration with researchers at the University of New England, Agriculture Victoria and the Animal Genetics and Breeding Unit, and consists of markers that were specifically selected to explain maximum genetic variation in the Australian sheep population, delivering value for money from your investment in genomic testing.



GUARANTEED TURNAROUND TIME

Spend Less Time Waiting for Results



Smart Flock Elite comes with a guaranteed 28 day turnaround time, demonstrating Neogen Australasia's commitment to providing Australian sheep breeders with a premium genotyping service.

To qualify for this offer, samples must be submitted as tissue sampling units (TSUs), be accompanied by a correctly completed electronic submission form, and be correctly identified.

In the event that Neogen Australasia does not return Smart Flock Elite results in 28 days, a discount of 10% will be applied as a credit to the customer's Sheep DNA account.

Additional terms and conditions apply – visit neogenaustralasia.com.au

UNRIVALLED PARENTAGE ASSIGNMENT

Determine Sire and Dam Pedigree with Ease

Smart Flock Elite is fully integrated with Meat & Livestock Australia's central genomics database for the Australian sheep industry, delivering Smart Flock Elite customers with a blue-ribbon DNA parentage assignment service.

Coupled with outstanding customer service, utilisation of all available genomic profiles in the MLA genomics database, including those from the Cooperative Research Centre for Sheep Industry Innovation (I.e. Sheep CRC), maximises the probability of successfully assigning an animal's sire and dam, delivering additional value to your breeding program.



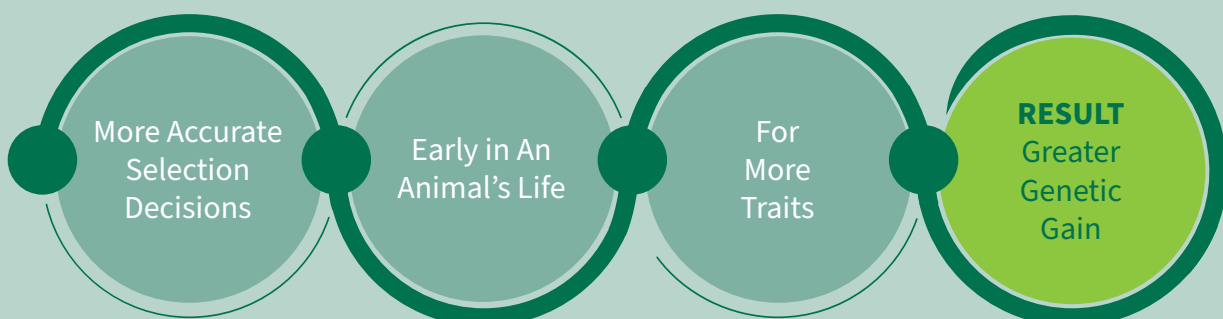
MAKE SELECTION DECISIONS EARLIER AND WITH MORE CONFIDENCE

Smart Flock Elite is ideal for incorporation into the Sheep Genetics genetic evaluation for the calculation of genomically enhanced Australian Sheep Breeding Values (ASBVs).

Genomically enhanced ASBVs facilitate:

- More accurate selection decisions – Obtain higher accuracy breeding values through the incorporation of genomic information.
- Selection decisions early in an animal's life – Make accurate selection decisions on young animals with more confidence.
- Selection for more traits – Incorporate hard-to-measure traits that can't be routinely measured on-farm, or measured prior to an animal entering the breeding herd, into selection decisions.

Making more accurate selection decisions, at an earlier age, and for a greater range of traits, results in faster genetic improvement, and ultimately improved productivity and profitability within a sheep enterprise.



BREEDS WITH GENOMICALLY ENHANCED BREEDING VALUES

Smart Flock Elite is incorporated into the calculation of ASBVs for all breeds, with the exception of Dohnes and extremely rare breeds who are not adequately represented in the Sheep Genetics genomic reference population.

Contact staff at Sheep Genetics if you are unsure if Smart Flock Elite will be incorporated into the calculation of ASBVs in your breed.

Breeds for which Smart Flock Elite is currently incorporated into the calculation of ASBVs include, but are not limited to:

Australian White
Border Leicester
Composite Maternal
Composite Shedder
Composite Terminal
Coopworth

Corriedale
Dorper
Hampshire Down
Merino
Perendale
Poll Dorset

Southdown
Suffolk
Texel
Ultra White
White Dorper
White Suffolk

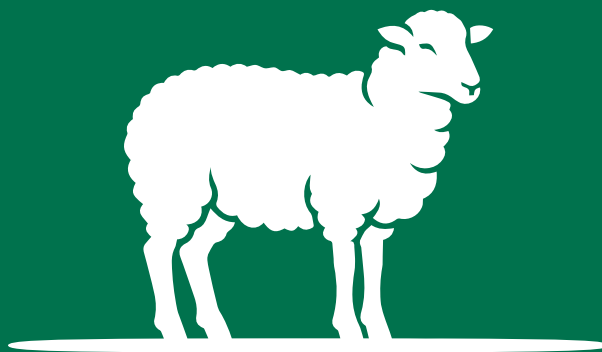


TRAITS EVALUATED

Smart Flock Elite is incorporated into the calculation of ASBVs for a range of economically important traits.

	Merino	Maternal	Terminal	Dohne
Growth				
Birth Weight	•	•	•	•
Weaning Weight	•	•	•	•
Post Weaning Weight	•	•	•	•
Yearling Weight	•	•	•	•
Hogget Weight	•	•	•	•
Adult Weight	•	•	•	•
Carcase				
Carcase Weight	•	•	•	n/a
Fat Depth	•	•	•	•
Eye Muscle Depth	•	•	•	•
Lean Meat Yield	•	•	•	n/a
Dressing Percentage	•	•	•	n/a
Intramuscular Fat	•	•	•	n/a
Shear Force	•	•	•	n/a
Health& welfare				
Worm Egg Count	•	•	•	•
Reproduction				
Scrotal Circumference	•	•	•	•
Gestation Length	•	•	•	•
Lambing Ease	•	•	•	•
Number of Lambs Weaned	n/a	n/a	•	•
Number of Lambs Born	n/a	n/a	•	•
Weaning Rate	•	•	n/a	n/a
Ewe Rearing Ability	•	•	n/a	n/a
Litter Size	•	•	n/a	n/a
Conception	•	•	n/a	n/a
Condition Score	•	•	n/a	n/a
Maternal Behaviour Score	•	•	n/a	n/a
Wool qualityand quantity				
Staple Strength	•	•	n/a	•
Staple Length	•	•	n/a	•
Fibre Curvature	•	•	n/a	•
Fibre Diameter Coefficient of Variation	•	•	n/a	•
Fibre Diameter	•	•	n/a	•
Clean Fleece Weight	•	•	n/a	•
Greasy Fleece Weight	•	•	n/a	•
Visual traits				
Early Breech Wrinkle	•	n/a	n/a	•
Early Breech Cover	•	n/a	n/a	•
Late Dag	•	•	n/a	•
Late Wool Character	•	n/a	n/a	n/a
Late Fleece Rot	•	n/a	n/a	n/a
Late Wool Colour	•	n/a	n/a	n/a
Foot Rot	•	n/a	n/a	n/a

• Incorporated • Not Incorporated



Smart  **Flock**™

SELECT

Smart Flock Select is a Merino genomic selection tool used to describe the genetic merit of animals for economically relevant traits, assisting producers to select animals for use in their breeding program with genetics that are most aligned with their breeding objective, while eliminating low genetic merit animals from production systems.

The tool allows for within flock ranking of sheep based on traits that impact productivity, helping producers select animals more accurately based on their genetic merit. This improves the overall profitability, production and sustainability of their sheep operation.

Additionally, the genomic selection tool provides Merino producers with an efficient solution for managing and marketing their sheep with more confidence. Producers can evaluate wool quality and quantity, health and welfare, growth and carcase traits in one step, and focus resources on young stock of verified merit. This allows you to breed sheep tailored to your specific production and business goals, leading to a stronger flock overall.

A minimum number of 20 animals must be tested to provide results.

Smart Flock Select provides:

- Genetic merit for 13 traits associated with wool quality and quantity, health and welfare, growth and carcase, along with 4 selection indexes.
- Smart Flock Profile to benchmark the genetics of their flock against the MERINOSELECT population.
- Smart Flock Parentage – parentage assignment provided for progeny that have a sire and/or dam profile tested and listed as being possible parents.
- Sheep Poll Test

TRAITS EVALUATED

Results are provided for 13 important traits associated with wool quantity and quality, health and welfare, growth, carcase and reproduction, along with 4 selection indexes.



Wool Quality and Quantity

- Yearling Fibre Diameter
- Yearling Fibre Diameter Coefficient of Variation
- Yearling Staple Length
- Yearling Clean Fleece Weight
- Yearling Fibre Curvature



Health & Welfare

- Worm Egg Count
- Early Breech Wrinkle
- Condition Score



Growth

- Post Weaning Weight
- Yearling Weight



Reproduction

- Weaning Rate



Carcase

- Yearling Eye Muscle Depth
- Yearling Fat Depth



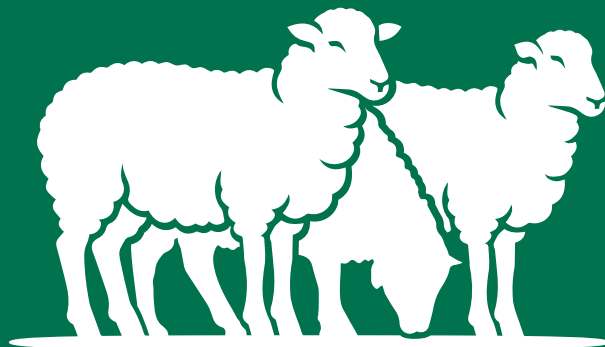
Selection Indexes

- Fine Wool Index
- Wool Production Index
- Sustainable Merino Index
- Merino Lamb Index

Reporting of Smart Flock Select results

Smart Flock Select results are reported as a genomic breeding value (GBV) using an intuitive 1-10 scoring system, with a score of 1 representing an animal in the top 10%, and a score of 10 representing an animal in the bottom 90% of the flock.

Results are provided for each individual animal, along with an overall Smart Flock Profile that can be used to benchmark the genetic level of the flock against the Sheep Genetics MERINOSELECT population.



SmartFlock™

PROFILE

Smart Flock Profile provides the average genetic merit of a flock or mob based on the collection of DNA samples for a random sample of 20 animals.

Results are published as the average genomic predicted breeding values for the flock, scaled to Australian Sheep Breeding Values (ASBVs), and enable sheep breeders to:

- Benchmark the genetics of their flock with the industry average.
- Track genetic progress over time.
- Make better ram buying and selection decisions.

Smart Flock Profile is only available for Merinos at this stage.

Smart Flock Profile Traits & Indexes

Results are provided for 13 important traits associated with wool quantity and quality, health and welfare, growth, carcase and reproduction, along with 4 selection indexes.



Wool Quality and Quantity

- Yearling Fibre Diameter
- Yearling Fibre Diameter Coefficient of Variation
- Yearling Staple Length
- Yearling Clean Fleece Weight
- Yearling Fibre Curvature



Health & Welfare

- Worm Egg Count
- Early Breech Wrinkle
- Condition Score



Growth

- Post Weaning Weight
- Yearling Weight



Carcase

- Yearling Eye Muscle Depth
- Yearling Fat Depth



Selection Indexes

- Fine Wool Index
- Wool Production Index
- Sustainable Merino Index
- Merino Lamb Index

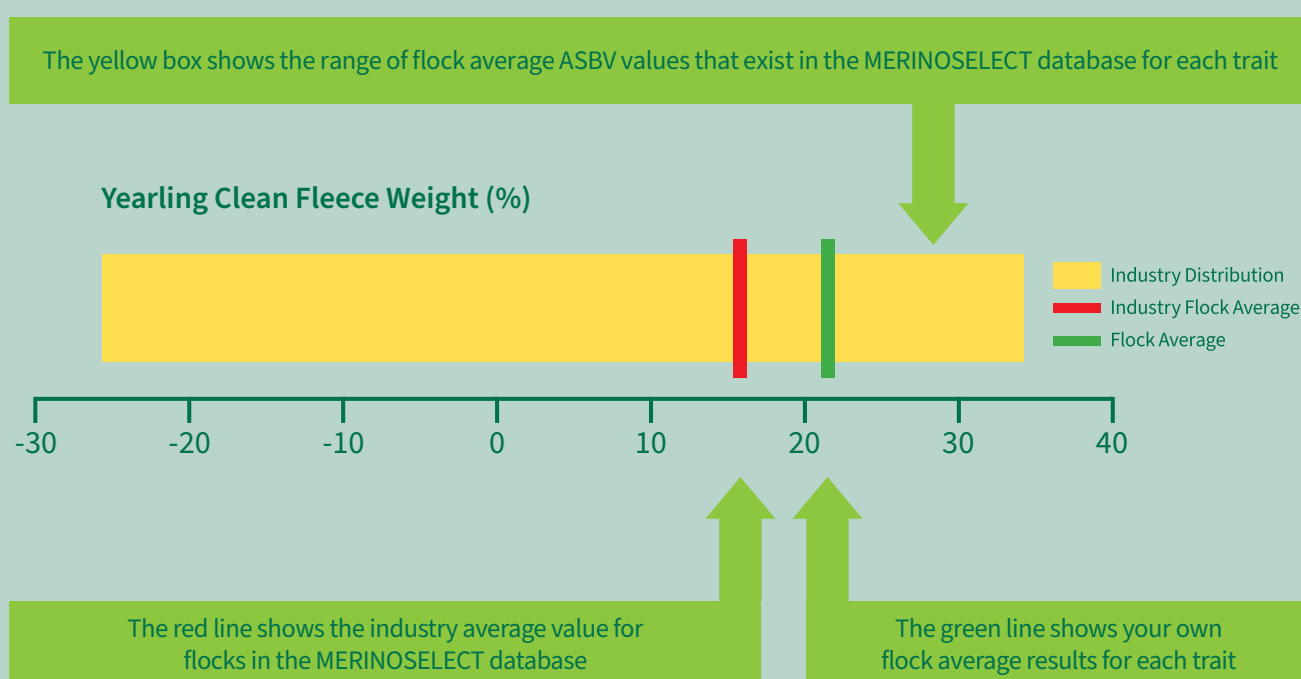


Reproduction

- Weaning Rate

SMART FLOCK PROFILE RESULTS

Smart Flock Profile results are provided via email, with results also uploaded onto the RamSelect website (ramselect.com.au) to allow results to be accessed at any time. A complimentary 12-month subscription to RamSelect is provided when undertaking Flock Profile testing. Smart Flock Profile results are updated on the RamSelect website after each fortnightly MERINOSELECT analysis.



Sampling Animals for Smart Flock Profile

Correctly selecting the animals from which DNA samples will be collected is important in obtaining reliable Smart Flock Profile results.

When selecting your animals to sample, there must not be any bias of individual animals for testing.

An easy selection method is to count your entire mob and divide by 20 and select every animal that presents at (mob number/20). For example, if you have 1000 sheep in your drop you would select an animal every 50 sheep (using $1000/20 = 50$) and then collect samples from those 20 animals.

Selecting samples from the youngest drop of ewes is often recommended to give an indication of the genetics entering the flock. Alternatively, stud breeders not utilising ASBVs may elect to collect samples from the ewes in their nucleus flock, or the rams in their sire team.



Smart  **Flock**™

PARENTAGE

Smart Flock Parentage determines the parentage of lambs – that is linking a lamb to its dam and/or sire – from a list of potential sires and dams that are provided as being possible parents. Testing is available for all sheep breeds and can be ordered as either a standalone product, or in association with Smart Flock Elite.

Smart Flock Parentage takes the guesswork out of assigning parentage, increases the accuracy of pedigree information, and saves valuable time traditionally spent mothering up lambs.

Smart Flock Parentage is particularly useful for:

- Assigning pedigree when parentage can not be determined via other methods;
- Reducing the pedigree errors associated with traditional parentage assignment practices;
- Identifying which lambs from multiple sire groups belong to specific rams;
- Confirming the parentage of accelerated reproductive programs (i.e. embryo transfer and AI lambs);
- Removing any parentage errors associated with mismothering;
- Increasing the accuracy of sire information when lambs from multiple births (i.e. twins, triplets) have been sired by different rams;
- Increasing the accuracy of ASBV estimates.

Parentage assignment requires a genomic profile for both the animal and its parents, so a parentage result can only be provided for animals if their parents have also been tested with Smart Flock Parentage, or have another suitable genomic profile available.

In Merino animals only, the Sheep Poll test is provided in association with Smart Flock Parentage.

GENETIC TRAITS AND CONDITIONS

Neogen Australasia offers a range of tests to assist with the management of important qualitative traits and genetic conditions in sheep operations.

Depending on the trait or condition of interest, testing can be ordered as either a standalone test, or in association with Neogen's Smart Flock Elite or Smart Flock Parentage products.

Sheep Poll Test

The Sheep Poll Test is designed for Merino breeders who are looking to transition from a horned to a polled flock.

The Sheep Poll Test involves testing animals that are phenotypically polled, and identifying those that are predicted to be homozygous polled animals (i.e. will only pass polled genes onto their progeny), versus those that are carriers for the horned gene (i.e. will pass horned genes to 50% of their progeny).

Selection of homozygous polled animals, versus simply selecting phenotypically polled animals, increases the proportion of polled progeny from a particular mating, which in turn increases the speed of transition from a horned to polled flock.

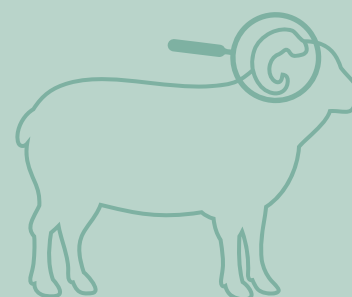


Table 1: Expected Proportion of Polled Progeny When Mating Parents of Differing Horn Status

Mating Combination		Proportion of Polled Progeny	
Sire	Dam	Males	Females
PP Sire	PP 'polled' dams	82%	92%
PH Sire		65%	87%
HH Sire		49%	82%
PP Sire	HH 'horned' dams	49%	82%
PH Sire		27%	50%
HH Sire		6%	18%

** Estimates based on 2300 Merino progeny in the CRC information nucleus*

The Sheep Poll Test can be ordered as either a standalone test, or in association with Neogen's Smart Flock Elite or Smart Flock Parentage products.

The Sheep Poll test is available for Merino animals only.

Spider Lamb Syndrome

Spider Lamb Syndrome is a recessive inherited disorder associated with severe skeletal deformities caused by abnormal bone and cartilage growth in young sheep.

Spider Lamb Syndrome testing is available as a standalone test for Suffolk animals.

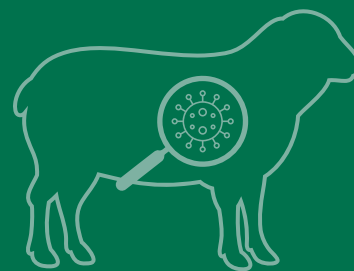


Scrapie Resistance

Export certification reports can be provided for Scrapie Resistance from animals that have been tested with Smart Flock Elite.

Scrapie is a progressive degenerative disease of the central nervous system that is fatal to sheep and goats. While Australia is free of scrapie, it is present in several European Union member states, including the United Kingdom, as well as Canada, the United States, Iceland, India, Japan and Brazil.

Testing for scrapie is not a priority for most Australian sheep breeders, however, it is of vital importance to breeders using imported genetics or breeders seeking to gain access to international markets for export.



Comprehensive Traits Bundle

A comprehensive bundle of fertility, meat and health traits available for order with Smart Flock Elite.



Fertility Traits

Trait	Validated breeds	Description
Booroola	Merino and Composite Maternal.	The Booroola gene (FecB) is a major prolificacy gene associated with increased ovulation rate and litter size in sheep.
GDF9	Composite Maternal & Terminal, Ultrawhite, Border Leicester, Coopworth, Corriedale.	The Growth Differentiation Factor 9 gene (GDF9 FecG(F)), was originally identified in the Finn breed, and has been introgressed into various Australian sheep breeds including shedding and woolled terminals and maternal composites. Ewes carrying one copy of the gene typically exhibit a 30% increase in ovulation rate, while those with two copies can show up to a 60% increase, with no adverse effects on fertility.



Meat Traits

Trait	Validated breeds	Description
Myostatin	Texel	A mutation in the myostatin (MSTN/GDF8) gene is associated with an abnormal increase in muscular tissue caused entirely by enlargement of existing cells leading to the double muscling (DM) phenotype. The effects of the GDF8 mutation are generally more pronounced in homozygous animals and may lead to slightly reduced eating quality. Texel sheep are known for their pronounced muscle development, particularly in the hindquarters, and the mutation is near fixation in this breed. Myostatin has also been reported in other breeds including White Suffolk, Poll Dorset, Lincoln and Charollais.
Callipyge	Rambouillet, American Dorset, Southdown	The Callipyge trait (DLK1 gene) is an autosomal condition characterized by muscle hypertrophy—an abnormal increase in muscle mass due to enlargement of existing muscle fibers. Lambs expressing this trait show improved feed efficiency, higher retail yield, reduced fat thickness, and lower marbling, with no effect on carcass weight; however, meat tenderness is consistently reduced.



Health Traits

Trait	Validated breeds	Description
Hypotrichosis	White Suffolk	Animals affected with hypotrichosis are generally born with little or no hair on the head, ears and legs and develop a thick leathery skin. Wool on the body is lower density than average sheep, and shedding of this remaining wool occurs as the animal ages.
Achondroplasia	Cheviot	This bone growth disorder, primarily observed in the Cheviot breed, results from impaired cartilage development. Newborn lambs exhibit a “squashed” facial appearance due to underdeveloped cartilage in the nasal cavity, and may also have absent feet, as well as shortened tails and ears. The condition is commonly known as “stumpy lamb.”
Microphthalmia	Texel	This autosomal recessive congenital anomaly is characterized by abnormal smallness or complete absence of one or both eyes, leading to blindness in affected lambs. It results in severely underdeveloped ocular structures.
Ovine Progressive Pneumonia (Maedi Visna); OPP TMEM Susceptibility	Dorper, White Dorper, Dorset, Finn sheep, Katahdin, Navajo Churo, Rambouillet, Romanov, Suffolk, Texel and Polypay	Ovine Progressive Pneumonia (OPP), also known as Maedi Visna outside the US, is a slow-progressing infectious disease caused by the OPP virus, a Small Ruminant Lentivirus. It is fatal over time, with common symptoms including wasting (often referred to as “thin ewe syndrome”), reduced milk production (“hard bag syndrome”), and pneumonia unresponsive to treatment, accompanied by labored breathing, exercise intolerance, and coughing. Symptoms typically appear later in life, and infection status can only be confirmed through testing. The highly-susceptible TMEM154 alleles are present in most breeds around the world. There are 4 haplotypes for OPP resistance/susceptibility. Haplotypes 1 and 4 infer less susceptibility to OPP.

DNA SAMPLING

Genomic testing of sheep is most commonly conducted using Allflex Tissue Sampling Units, or TSUs.

Tissue Sample Unit (TSU)

TSUs are a fast, simple method of collecting DNA.

These units use an ear punch to take a small tissue sample, placing it directly into a sealed vial for processing. This replaces the more complex tasks of collecting hair, blood, semen or other sample types used for DNA testing.

A single-squeeze motion collects a sample in seconds with minimum need for restraint or distress to the animal.

The genetic material is sealed in a specially designed vial to prevent contamination. Tissue samples contain a large quantity of high-quality DNA for genetic analysis, yielding excellent lab results, maximising sample integrity, and ensuring you have confidence in the results you receive for each animal.

The TSU is fully sealed and positively identified with both a 2D barcode and ID panel.

TSUs can be purchased from Neogen Australasia.

Other sample types

Semen straws, pellets or blood cards can also be submitted for genotyping, however these sample types attract a surcharge due to the additional steps required to process them within the DNA laboratory, and are not preferred.



CUSTOM GENOMIC SOLUTIONS

Every sheep enterprise and every breeder is unique, which is why Neogen Australasia provides a range of customised genomic solutions to help breeders achieve their breeding goals.

Neogen Australasia's customised genomic solutions cater for everyone from individual sheep breeders to large-scale pastoral companies, breed associations and research organisations.

Custom genomic test packages

Neogen Australasia is committed to delivering cutting edge and personalised genomic solutions. When existing genomic test offerings do not meet an organisation's needs, our team of experts can work closely to understand the unique genetic testing requirements of the organisation, and develop a custom genomic test package that aligns precisely with their objectives.

Custom genetic evaluation

Neogen's team of experienced and industry-leading Ph.D geneticists provide a range of customised genetic evaluation services, from the development of genomics-only selection tools, to the establishment of a single-step genetic evaluation where genomically-enhanced breeding values are calculated on a routine basis.

Custom genetic evaluation is suited to situations when existing genetic evaluation services (e.g. Sheep Genetics) do not adequately cater for the needs of an individual sheep breeding program, such as large-scale pastoral companies and vertically integrated businesses.

NextGen Sequencing

NextGen Sequencing is a rapidly expanding portfolio of innovative, next generation short and long read sequencing technologies that offer fast, high throughput, flexible and cost-effective genotyping solutions.

Neogen Australasia's NextGen Sequencing portfolio ranges from SkimSEEK to Whole Genome Sequence (WGS) and is ideally suited to use by research organisations who are looking for an additional depth of genomic information.

- SkimSEEK: WGS 4x coverage and below. Also called low pass sequencing.
- InfiniSEEK: SkimSEEK plus hybrid capture of selected targets, where both components are sequenced in a single sequencing run.
- Mid Coverage: WGS >4x to <30x coverage
- High Coverage: WGS >30x coverage

THE GENOMIC TESTING PROCESS

Get Organised

- Create your account on the SheepDNA website (sheepdna.com.au).
- Purchase your TSU applicator and TSUs from Neogen Australasia.

Collect DNA Samples

- Collect DNA samples from your animals.

Submit Samples

- Place your order by emailing a completed submission form to naa-sheep@neogen.com, or by entering your order on the SheepDNA website.
- Mail your samples, along with a Sample ID form, to Neogen Australasia, 14 Hume St, Bundamba, QLD 4304.

Confirmation & Payment

- Upon receipt of your samples, your order will be checked by Neogen staff and a confirmation email will be sent to you finalising your order, and prompting payment.
- Pay for your order.

Genotyping & Analysis

- Upon receipt of payment, genotyping of your samples will be undertaken, and any subsequent analysis of the genomic profiles conducted (e.g parentage assignment, calculation of ASBVs).

Access results

- Access your results.
- Parentage assignment and genetic condition testing results will be provided via email and are usually available within 3-4 weeks.
- Genomically enhanced ASBVs will be provided by Sheep Genetics. Subject to Sheep Genetics analysis schedules, ASBVs are usually available within 6-8 weeks.
- Smart Flock Profile results will be provided via email and the RamSelect website. Subject to Sheep Genetics analysis schedules, results are usually available within 6-8 weeks.





Questions?

To find out how we can help your business grow,
contact your local Neogen territory manager today



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