

Merino Genetic Progress – impact of the MLP project and where to from here?

Bronwyn Clarke

WALRC & Murdoch University

- What is the MLP Project?
- Industry impact of the MLP Project
- Latest tools and technologies to increase rate of genetic gain

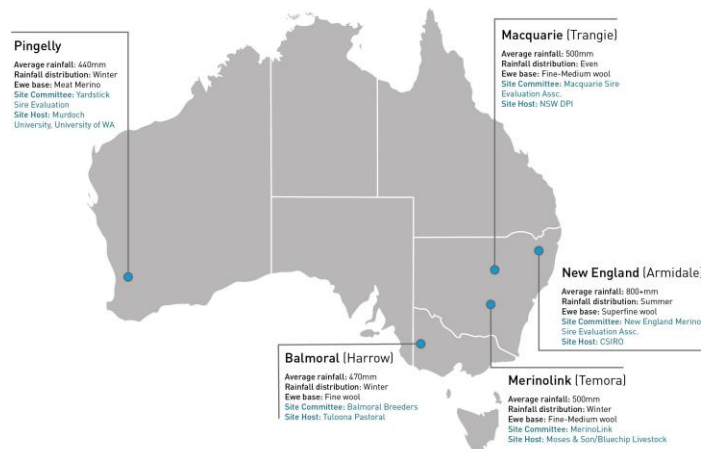
What is the MLP Project?



- Captured lifetime data
- Across diverse environments, genetics & Merino types

Deliver increased profit through:

- Better understanding of the drivers of lifetime productivity
- Refining & testing current genetic selection tools



A large flock of sheep is gathered in a metal pen under a bright, cloudy sky. A sign is attached to the fence, and a large orange rectangle is visible on the right side of the image.

COMPARISON OF UDDER AND TEAT TRAITS IN MERINO EWES RECORDED

DESIGN AND PURPOSE

Udder traits are heritable (0.23-0.36)

Lamb mortality was significantly higher for ewes with unsound versus sound udders.

Autopsy results showed that lambs from dams with unsound udders were significantly more likely to die from starvation than any other cause.

SUMMARY

In improved visual assessment of the udder across genetic improvement of Australian Merinos.

INTRODUCTION

Neonatal lamb mortality is the most significant health issue of Australian sheep with substantial

THE IMPORTANCE OF EARLY ENVIRONMENTAL EFFECTS ON MERINO FLEECE TRAITS ACROSS TWO SHEARINGS

“...yearling and adult fleece weight traits examined were influenced significantly by birth type”

evaluated. Significance and overall influence of the effects of birth type and rear type were consistent with previous reports. However, estimates of the size of effects were generally less than previously reported, with the specific context of LTEM and impacts of management environmental effect estimates requiring further investigation.

INTRODUCTION

In breeding programs, we seek to disentangle the effects of genes from environment accurate estimates of the genetic merit of individuals and maximise genetic progress. adjustment factors are applied in the MERINOSELECT genetic evaluation system (B 2007) to account for environmental influences such as age of dam, birth type, birth or age at trait assessment. For example, classer grades birth/rearing type (Clarke and Thompson 2021; Mortimer *et al.* 2009). From the earliest genetic studies (Clarke *et al.* 1969), it is established that most

SUMMARY

Selection of Merino sheep for use in breeding programs includes the assessment and measurement of production traits. Genetic evaluation takes into account non-genetic effects to improve the genetic hypothesis tested in this paper was that sire effects on carcass point and a novel five-point visual assessment of the udder. Genetic effects such as sire effects on carcass point and a novel five-point visual assessment of the udder. Genetic effects such as sire effects on carcass point and a novel five-point visual assessment of the udder. Genetic effects such as sire effects on carcass point and a novel five-point visual assessment of the udder.

RELATIONSHIPS OF TRAITS

S.I. Mortimer¹, B.W.B. Holman², D.L. Hopkins³, K.L. Egerton-Warburton⁴, S.J. Hine⁵ and A.A. Swan⁶

¹NSW Department of Primary Industries, Armidale, NSW, 2351 Australia

MERINO LIFETIME PRODUCTIVITY FROM WOOL

B.E. Clarke¹, J. Young², S. Hancock³ and A.N. Thompson⁴

¹Murdoch University, Murdoch, WA, 6150 Australia
²Farming Systems Analysis Service, 476 Tindale Rd, Denmark, WA, 6333 Australia

“...analyses are underway to estimate the accurate genetic parameters needed to include an EQ breeding value in MERINOSELECT indexes”

genetic relationships were likely to exist between these traits. The sire ASBVs were not associated with either overall flock scores of loin, knuckle and topside cuts, or intramuscular fat and shear force of the loin. This preliminary study has shown that it is likely that selection on sire ASBVs to improve Merino production traits would yield negligible responses in EQ traits.

INTRODUCTION

data to calculate flock profitability so comparisons can be drawn between sires

using DNA means that it is now feasible to obtain pedigrees from syndicate mating which may have some practical advantages over single-sire mating. Being able to syndicate mate sheep and determine parentage using DNA requires less paddocks than single sire joining and reduced labour in terms of feeding, labour for lambing rounds (preparation for lambing through identification of dams and mothering up) together with less disturbance during the lambing period as well less risk of failed matings with infertile single-sire mated rams.

RELATIONSHIP BETWEEN MERINO SHEEP LAMB CARCASS VALUE

J. L. Smith¹, B.W.B. Holman², D.L. Hopkins³, A.A. Swan⁴

NSW, 2351 Australia
Armidale, NSW, Australia
NSW, 2800 Australia
NSW, 2351 Australia

INTRODUCTION

Merino sheep are often visually assessed for a range of traits that are not easily evaluated by quantitative measurements (Mortimer *et al.* 2009). These traits contribute to the cost of production, the value of wool and meat and the welfare of the sheep; hence, they are considered valuable components within the breeding objective of Australian Merino sheep. Professional sheep classers

Age of eruption of the first permanent incisors varies between Merino genotypes and is related to liveweight

Serina N. Hancock^{1,2}, Bronwyn E. Clarke³, Jen L. Smith⁴, Gavin A. Kearney⁵, Andrew N. Thompson⁶

¹College of Science, Health, Engineering and Education, Discipline of Agricultural Science, 90 South Street, Murdoch University, Murdoch, Western Australia, 6150, Australia
²CSIRO Agriculture & Food, P.O. Mailbox Laboratory, Chisholm, New England Highway, Armidale, New South Wales, 2350, Australia
³3rd Floor Road, Stirling, 2000, Australia

ARTICLE INFO

Keywords:
Sheep
Development
Maturity
Growth
Genetic differences

ABSTRACT

The eruption of the first permanent incisors in sheep determines the classification of lambs and reports the age of lambs in Australia. This study tested the hypothesis that the age of eruption would differ between genotypes from different Merino sires and would occur earlier for progeny of sires with a higher genetic merit for liveweight. The study utilised ewes from a sire in Western Australia from 29 sires (1967) and 10 sires from the UK and Ireland (1968) mated to progeny of a sire in the UK from 29 sires in 2017 ($n = 713$ ewes and 343 lambs) in 2018 ($n = 828$ ewes and 457 lambs). The average age of incisor eruption varied by up to 2.5 months between sire groups. Incisor eruption was completed for all progeny within a six month period for most sires. For some sires, incisor eruption occurred earlier for animals that were heavier at 12 months.

on average 53.3% of twins and triplets come from more than one sire

K.L. Egerton-Warburton¹, S.I. Mortimer² and A.A. Swan³

¹NSW Department of Primary Industries, Orange, NSW, 2800 Australia
²Department of Primary Industries, Armidale, NSW, 2351 Australia
³Faculty of Agriculture, University of New England, Armidale, NSW, 2351 Australia

Classers successfully combine structural traits with assessments of liveweight and wool quality when visually classing sheep at PINGLY MLP site but should account for birth and rear type

B. E. Clarke^{1,2} and A. N. Thompson³

¹College of Science, Health Engineering and Education, Murdoch University, WA 6150, Australia.
²Email: bronwyn.clarke@murdoch.edu.au

Professional sheep classing based on visually assessed traits relevant to wool quality and conformation is included in selection decisions for most Merino ram breeding and commercial flocks. The Merino Lifetime Productivity (MLP) Project involves professional classing of approximately 5500 ewes from 134 sires for five years as well as the collection of wool, carcass and growth traits (Ramsey *et al.* 2019). Research has shown classers have a heritability between 0.12 and 0.2 and have favourable genetic and phenotypic correlations with

feedlot sources and their interactions with sire effects were examined on progeny of Macquarie Merino Sire Evaluation and Merino Life effects significantly influenced fleece traits expressed at post weaning. These results support the methods to account for these effects in MERINOSELECT genetic evaluations.

Reproduction & Genotyping

- Reproduction
 - low heritability
 - Hard to measure
- MLP data & genotypes in MERINOSELECT since 2020
- Key role in development of new reproduction analysis
- Improved the accuracy of reproduction breeding values for important industry sires

Reproduction Reference Population

Source	Merino Ewe Genotypes
INF	4,353
Breeder & Resource Flock	13,335
MLP	5,250
Total	22,938

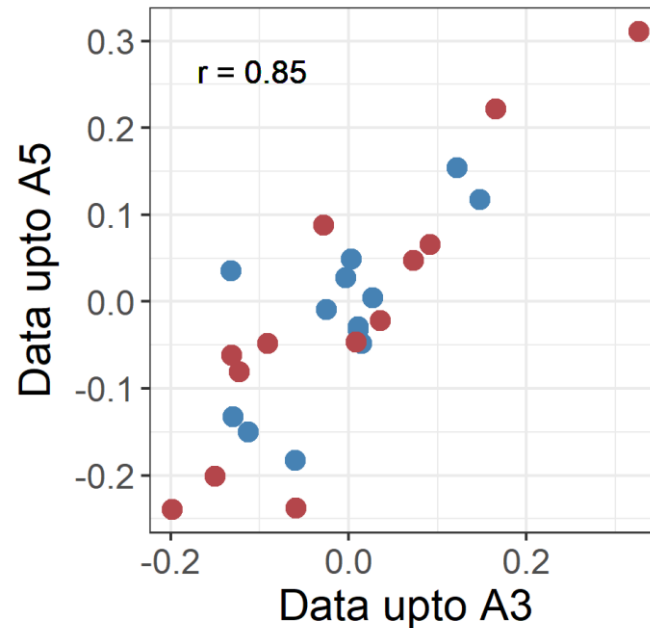
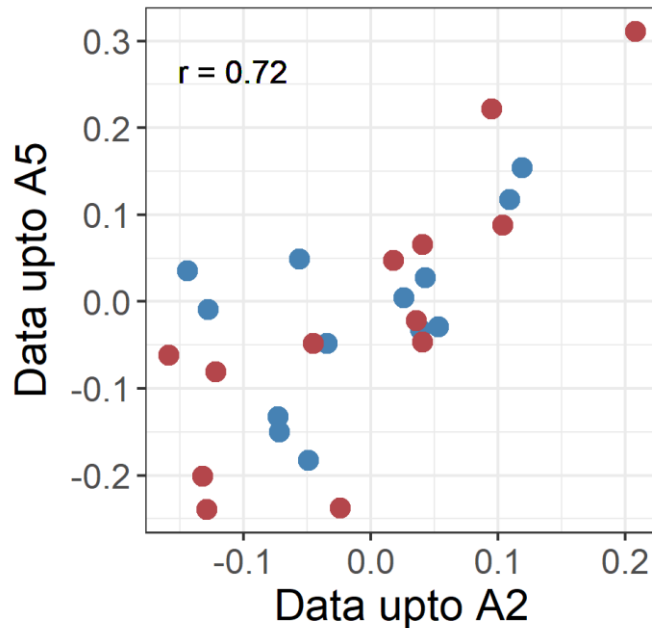
	Progeny in MERINOSELECT	
	Pre-MLP	Post MLP
MLP Sires	9,000	70,000

Weaning Rate FBV Over Time

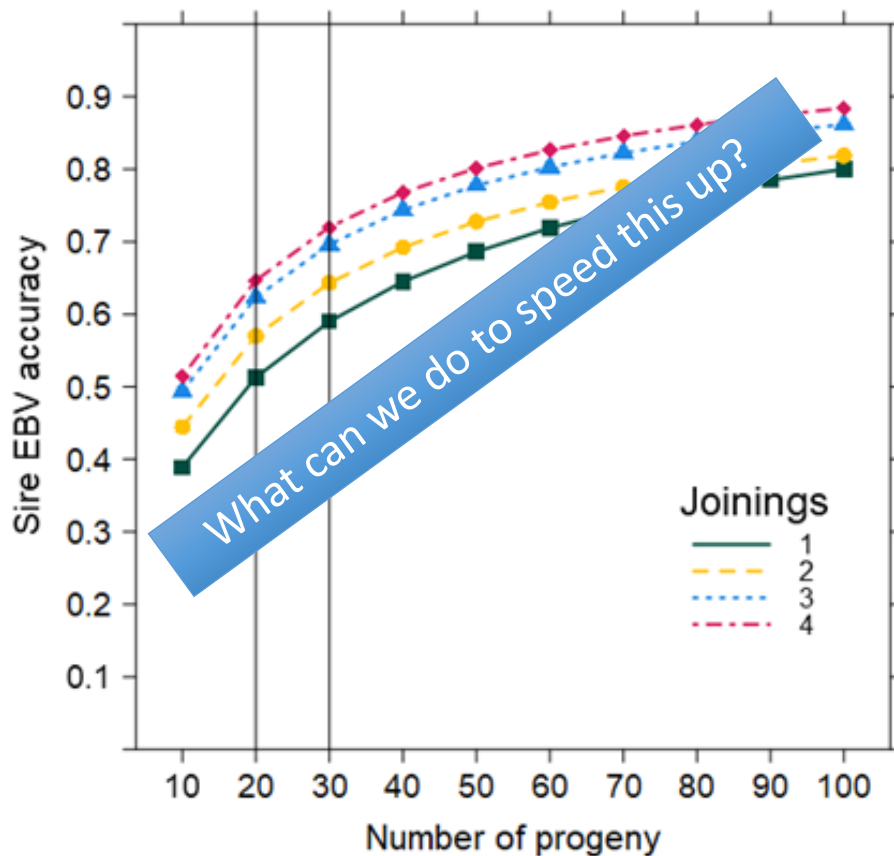
Drop

● 2016

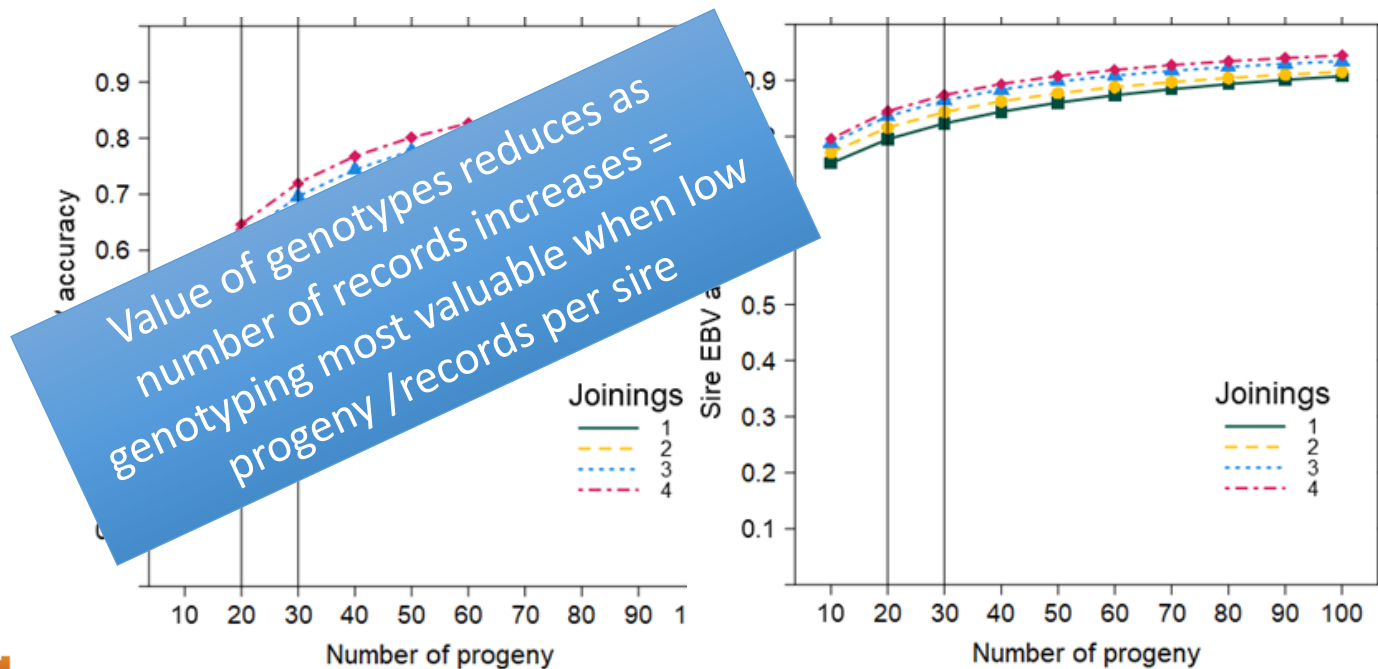
● 2017



Impact of Progeny Number?



Impact of Progeny Number + Genomics?



Take home



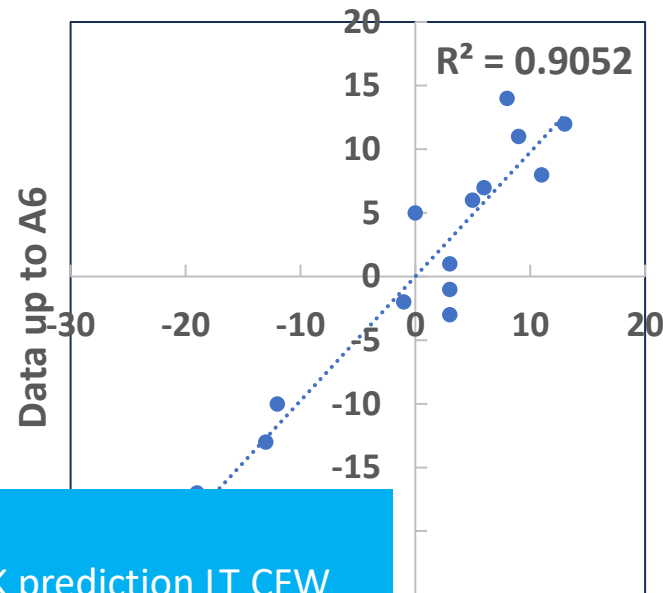
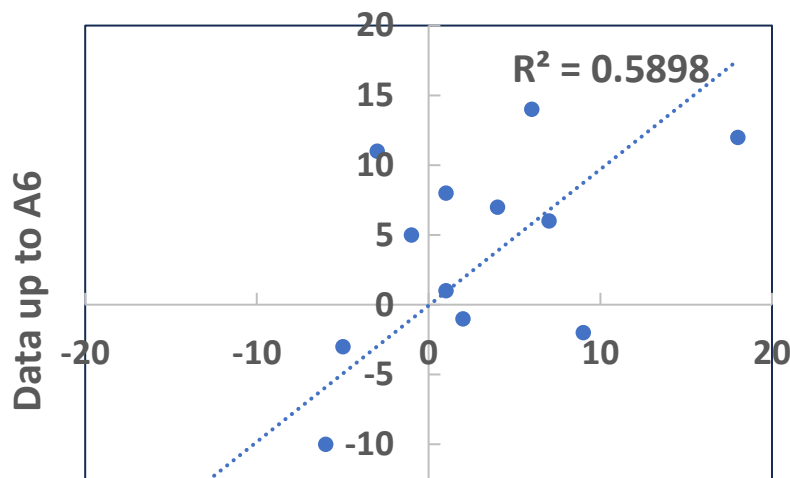
Weaning Rate accuracy improves with the number of progeny evaluated & repeat joinings



Genotyping increases the accuracy & reduces volatility of early Weaning Rate BVs

CFW FBV Over Time

Pingelly 2016 Drop



Take Home

- Evaluating ewes + rams at an early age = OK prediction LT CFW
- One extra H or A measurement greatly improves prediction

Classing Insights

- Project classing results show classing aligns well with indexes prioritising fleece and growth

Pingelly 2016 Drop Hogget Classing Results and Lifetime Performance

HGRADE	Ave CFM	Ave L	Ave WT%	Ave EMDmm	Ave WR	Final MP+
Top	18.8	0.5	102	-0.5	100	6.4
Flock	0.1	-0.2	100	0.1	100	0.1
Cull	2.0	0.3	97	-0.4	102	-5.7
Total	18.8	99	34	65	25	6.1
Difference	-18	-0.7	-5.0	0.1	5	-0.2
					-2	12

Take Home

- Classers play a valuable role in selecting for productivity

MLP Analysis in Progress

Phenotypic & genetic relationships between:

- Lifetime wool production & quality
- Body composition
- Reproduction
- Visual traits + Classing
- Welfare & disease traits



Output will help us to:

Refine current genetic selection tools to breed Merino sheep that are more productive through life

What does it mean for you?

- You can have confidence in the accuracy of ASBVs
- Early measurements are good, an extra is better
- Classers provides a valuable role in selecting for productivity

So, what's on the horizon ...

The latest tools and technologies to maximise gain

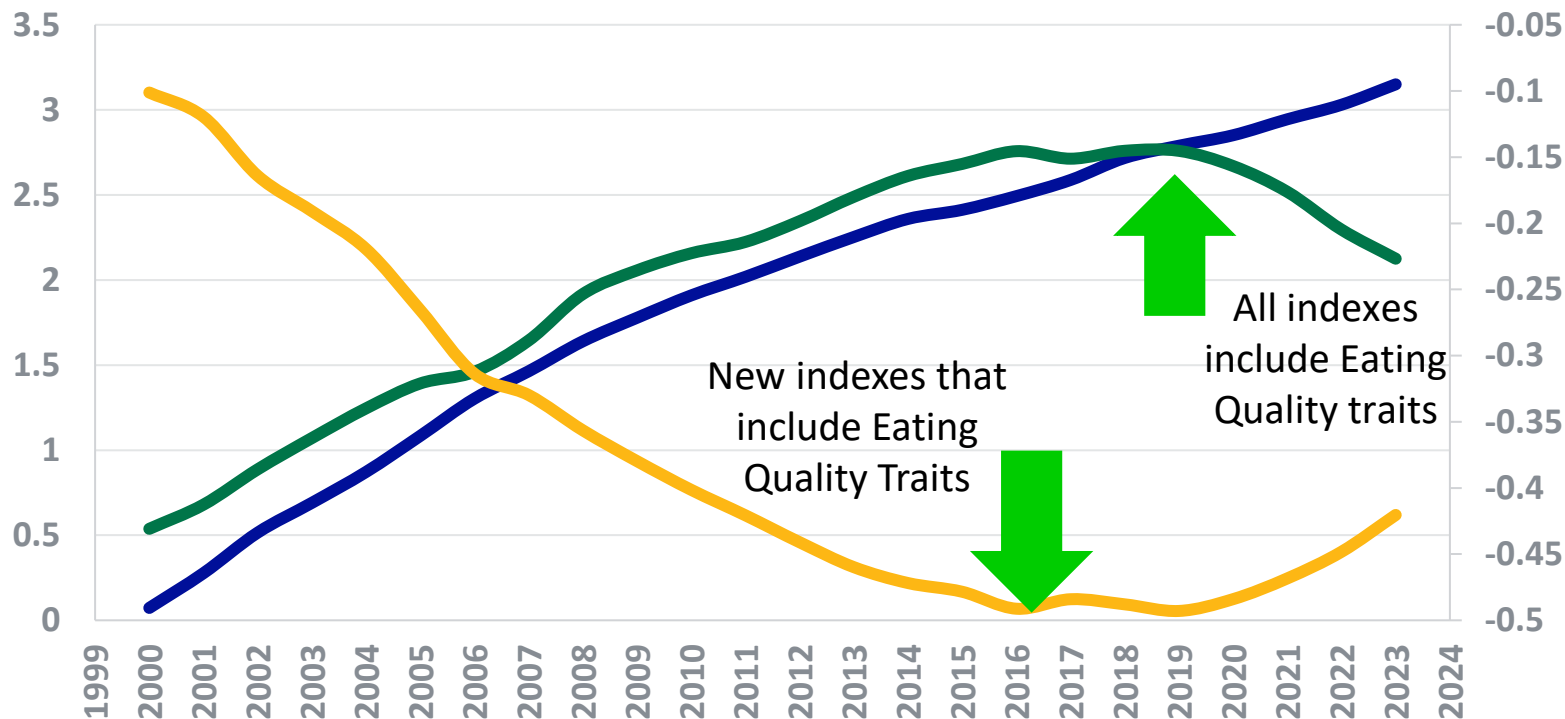
New traits

- Methane
- Eating quality

New Tools

- Combined LAMBPLAN analysis
- New genomic tools

What have we been able to do with ASBV's for Eating Quality (EQ) Indicator Traits?



Future Eating Quality Traits

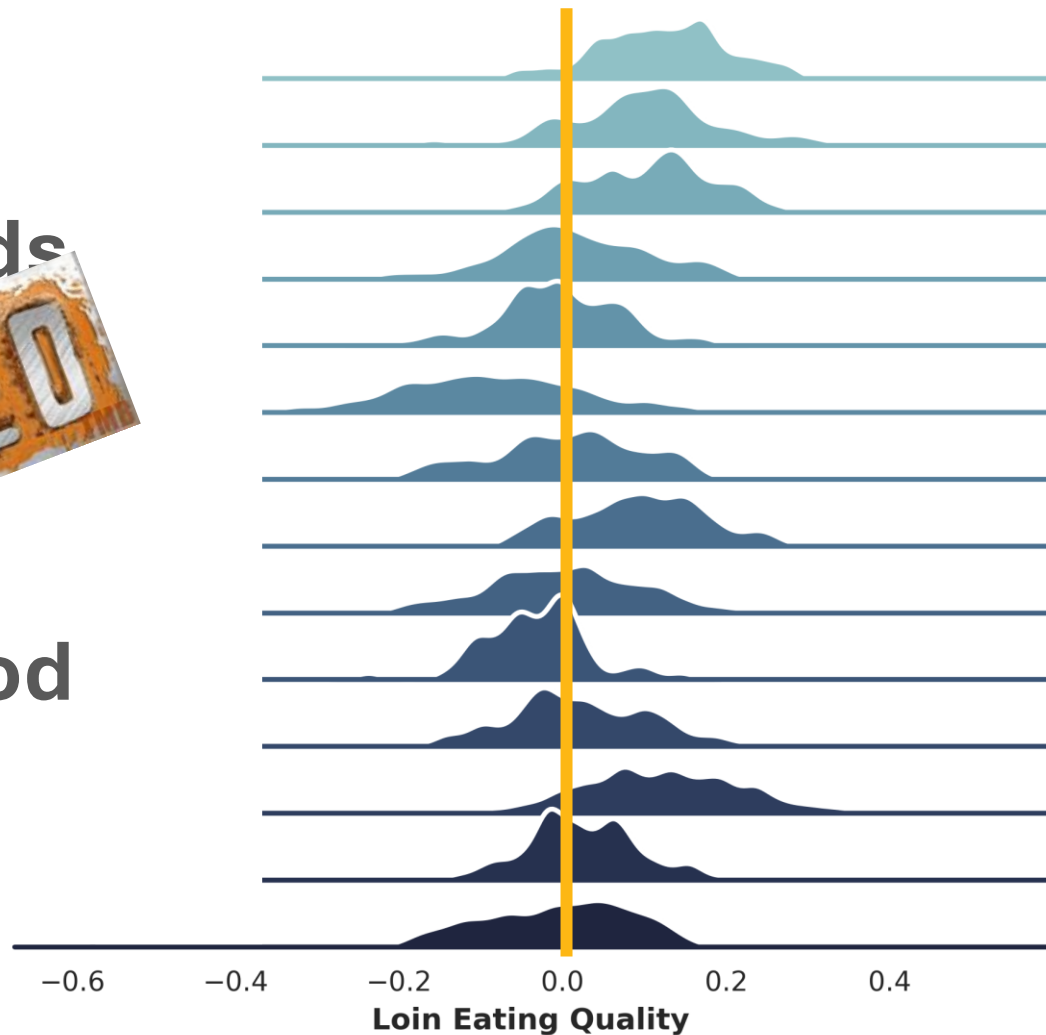
**Intramuscular
Fat (IMF)**

**Shear Force
(SF5)**

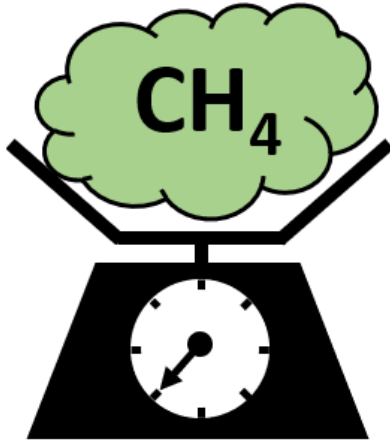
**Consumer
Satisfaction
Australian Sheep
Breeding Value
(ASBV)**

Myth: Some breeds
are much better
eating
from
breed X I have good
eating quality.

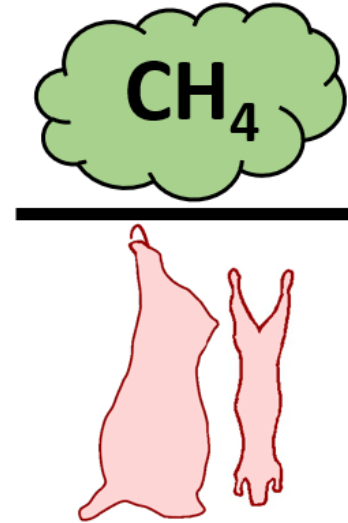
MYTH BUSTED



Breeding efficient animals



Methane
Production

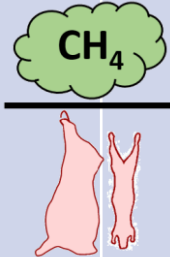
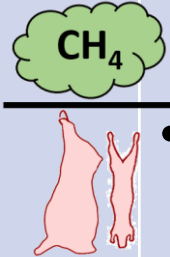


Methane
Intensity

New Traits - Methane

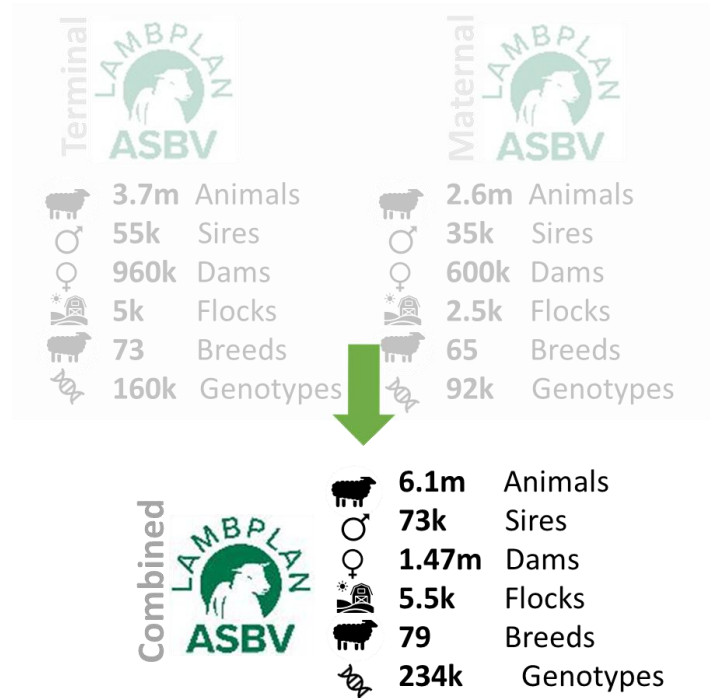


What about our current indexes?

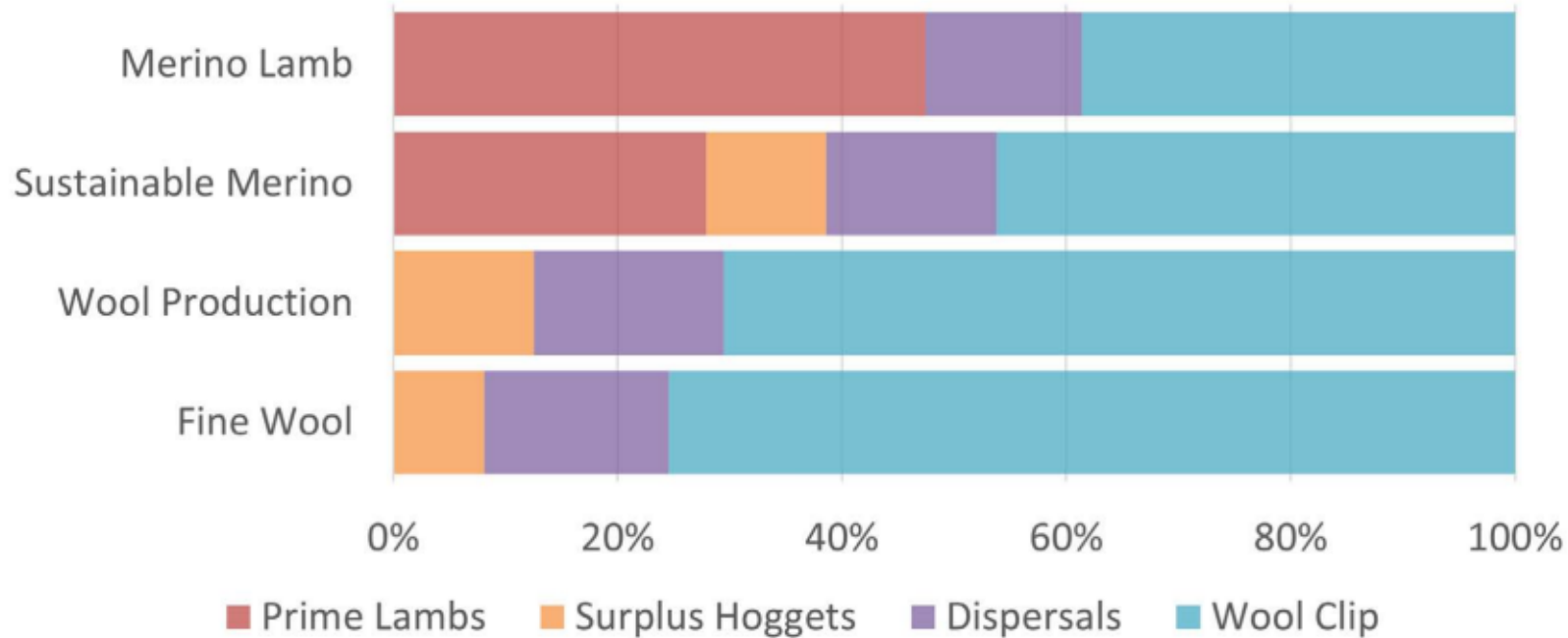
Terminal Sire Breeds	Maternal Sire Breeds	Merinos
• Faster growth • Improved Lean Meat Yield • Better Quality Meat  	• Faster growth • Lower mature size • Improved reproduction  	• Faster growth • Improved reproduction • Improved wool quality and quantity • Mature size? 

A Combined LAMBPLAN Analysis

- Completely comparable ASBVs for Terminals and Maternals
 - Simplify for commercial ram buyers
- Research results available in 2025
- 2026 rams sales will be using the new analysis



Merino Indexes



. Distribution of the production system income spread across sheepmeat sales from prime lambs, surplus hoggets and adult sheep dispersals, and from the total wool clip of the production system

The Sheep Genetics Offering is expanding

ASBVs and Indexes

- Across Flock Comparison
- Use to purchase rams/semen

Genomic Only Commercial Products (Merino)

- Within Flock Ranking Only
- Less information contributing
- Use to select rams (and potentially ewes)

Flock Profile (Merino)

- Flock level snapshot
- Not individual animal
- Use to help select rams to bring in

Genomic Only Commercial Animal Products

C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
VID	ycfw	ycuv	ysl	pwt	ywt	yfat	yemd	DP	MP	FP	yfd	ydcv	ebwr	pfec
220143	1	8	9	8	8	8	9	8	4	6	6	10	10	1
220178	10	8	7	10	10	1	2	10	10	10	10	8	4	7
220076	6	5	4	10	10	2	4	10	9	8	7	1	9	3
220224	10	1	9	4	5	3	3	4	7	7	3	8	7	3
220043	8	2	8	10	10	3	4	10	10	10	5	10	10	3
220054	4	9	1	7	7	1	1	8	7	8	9	6	1	6
220187	7	4	7	2	2	1	3	4	8	9	10	8	3	8
220217	5	7	10	6	8	7	3	6	5	4	6	7	6	10
220124	7	1	8	2	2	3	2	2	3	4	2	3	5	5
220077	5	2	8	10	9	5	2	10	8	8	3	9	10	4
220139	9	2	3	9	8	1	3	10	9	8	3	4	1	2
220211	4	4	1	4	4	4	3	7	9	10	10	4	3	10
220182	10	2	2	8	7	6	4	7	9	9	6	6	6	7
220221	8	4	6	7	8	1	2	9	9	9	7	7	7	6
220045	6	8	10	5	4	2	5	4	5	7	5	10		
220069	8	5	4	9	8	3	4	9	9	8	3	9	4	3
220205	10	2	7	7	7	8	1	9	10	8	2	4	10	4
220006	7	5	9	10	9	1	1	9	9	10	8	10	7	7
220193	5	6	7	9	8	2	3	8	6	6	7	2	4	8
220006	7	5	9	10	9	1	1	9	9	10	8	10	7	7
220002	7	3	5	4	5	5	5	7	8	9	7	9	5	10
220149	3	10	1	2	4	6	7	5	6	8	10	2	2	9
220133	5	7	2	3	5	4	3	5	6	8	8	8	4	6
220164	10	2	8	7	7	1	2	7	6	3	1	1	7	3
220056	5	8	2	7	7	1	3	8	9	10	8	10	1	8
220078	10	3	3	2	2	3	4	4	10	10	9	1	1	8
220158	7	9	2	10	10	5	3	10	10	9	5	4	3	2
220023	3	7	7	10	10	4	7	10	7	7	8	4	5	4

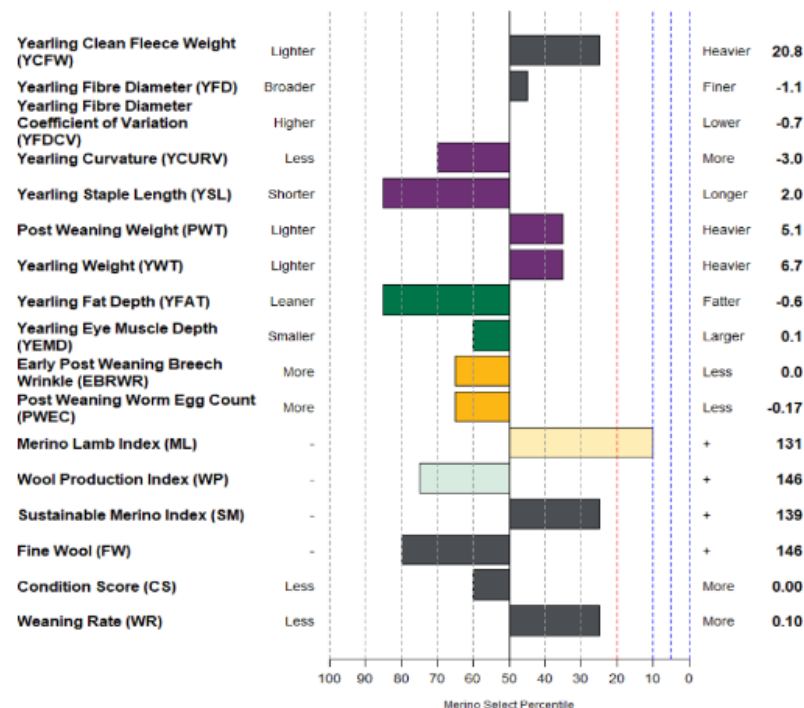
ID	Fleece Weight	Index
220143	1	8
220178	10	8
220076	6	5
220224	10	1
220043	8	2
220054	4	9
220187	7	3

Merino Flock Profile

Client:
Date: 06/03/2022
Flock Drop: 5 2022



Flock Profile



Your Flock Profile values are displayed in the far right hand column. The diagram shows how your flock compares to flock averages in the MERINOSELECT database. Note that the 100th percentile is the bottom value, 50th percentile is the average and zero percentile is top value of flocks in MERINOSELECT. If you do not see a bar for a trait or index, your Flock Profile sits in the 50% percentile. To achieve gain in desired traits or indexes, select rams with ASBVs higher than your Flock Profile value. Results are subject to change slightly as predictions update over time.

3.4 What about the future of these products

ASBVs and Indexes

- 2027 there will be just 2 evaluations
- Latest and new BVs

Genomic Only Products

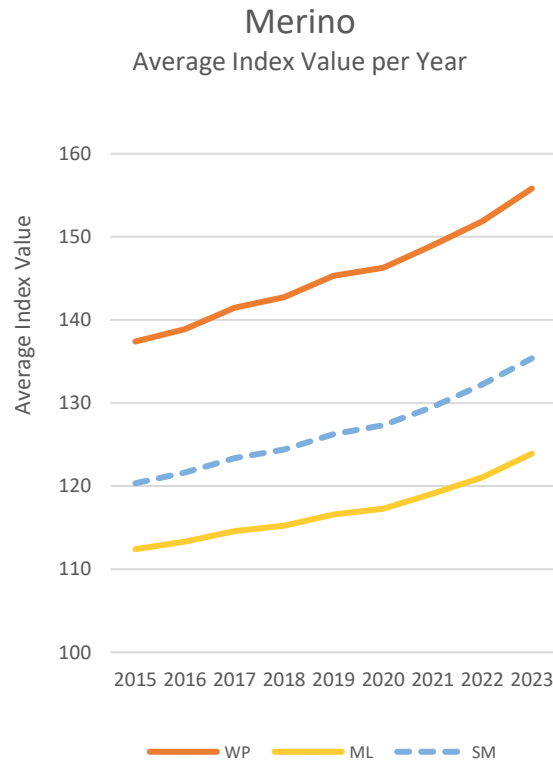
- Will be expanded to new breeds

Fock Profile

- Will be expanded to new breeds

What can you do now!

1. Have a breeding objective
2. Purchase rams with a ASBVs and Indexes
3. Use available tools
4. TRACK YOUR RAM TEAM!



Key Take Homes

1. Consider the future state and make selection decisions now that set your business up for success
2. A combined LAMBPLAN evaluation is part of the journey to enable genetic products for all breeds for a range of traits
3. There are a suite of genetic products available for all businesses – ASBVs, Genomic Only Breeding Values, Flock Profile and ram team tracking

Tools and resources

Coming in 2026 - MLP Project Site Workshops



Subscribe to the MLP newsletter@
wool.com/mlp-subscription

Subscribe to all AMSEA and MLP updates@
merinosuperiorsires.com.au/contact-us/



Sheep Genetics

info@sheepgenetics.org.au

02 8055 1818

Peta Bradley

pbradley@mla.com.au

0419 158 449

Stay up to date: Sheep
Genetics Monthly Update
Email



MLP Acknowledgements

MLP is a partnership between AWI, AMSEA and five sire evaluation sites and their hosts.

Support is provided by Woolgrowers through sire evaluation entry fees, site committee in-kind contributions and sponsors of AMSEA.

We acknowledge the Australian Government who supports R&D, plus marketing of Australian wool.

Thanks especially to the site partners and hosts.

