FINAL REPORT

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Management, Administration and Reporting of Merino Sire Evaluation

Contents

Executive Summary

Executive Summary

Project ON 557 continued the work of the Australian Merino Sire Evaluation Association (AMSEA) which commenced operation in 1989 and has been the breeder managed, governing body for sire evaluation in Australia for more than 30 years.

Funding provided by Australian Wool Innovation ($285,300) during the past 3 years has leveraged breeder entry fees ($658,300) and a large amount of in-kind contributions made by the industry (estimated to be $630,000). With ON 617 AWI Link Sire funding for the same 3 year period of 211,330, the total cash and in kind contributions to Sire Evaluation is $1,784,930. ($594,976 pa)

- Sire Entry fees   37% $658,300   ($219,433pa)
- Industry in kind for Site activities   35% $630,000   ($210,000pa)
- ON 557 AWI AMSEA Management Admin &Reporting   16% $285,300   ($ 95,100pa)
- ON 617 AWI Link Sire Funding   12% $211,330   ($ 70,443pa)
- Total   100% $1,784930   ($594,976pa)

This ON 557 and ON 617 levy funded, public good investment has assisted AMSEA to:

- Be at the lead in Industry adoption of best practise stock management and data collection.
- Provide a vehicle for industry consultation that leads to improvements in Sheep Genetics services, such as the development of the Wool Production Plus (WP+) Index.
- Collect more older age data than what most ram breeders are collecting themselves, as well as expensive to measure traits such as WEC
- Add new traits such as a range of visual scores (in particular the 3 key breech traits).
- Record classer grade.
- Provide high level of genotyping on sires and progeny.
- Aid in the acceptance of commercial products such as TSUs.
- Continually upgrade the Site Reports and the range of options and reports for the annual publication of Merino Superior Sires.
- Provide an introduction and entry level for ram breeders to join MERINOSELECT.
- Host annual field days that provide ram buyers the opportunity to compare sires run in similar and different environments to their own and compare the visual assessment of the progeny, together with FBV's and ASBV's.
- Work with other industry researchers, such as Sydney University, in the delivery of important industry projects.
- Provide the opportunity for new sites to commence the process of sire evaluation.

Sire entry levels between 2019-2021 were below that of the previous 3-year period, which was expected as the previous period included the commencement of the Merino Lifetime Productivity (MLP) Project. When compared to the 3-year period prior to the MLP Project (2013-2015), entry levels were significantly increased thus demonstrating the ongoing demand for sire evaluation services.

Period	No of Sires Entered	No of New Entrants
2018-2021	275	62
2016-2018	339	71
2013-2015	215	50

During 2019-2021 a total of 62 new entrants were attracted to sire evaluation for the first time. This continued the long-term trend of new entrants starting in the sire evaluation program every year.

AMSEA continues to publish a vast amount of results which are widely distributed and freely available for download from the Merino Superior Sires website. During 2019-2021 over 18.2K reports were downloaded from the website, including over 4.5K downloads of the annual Merino Superiors Sires (MSS) publication.

By analysing the sires entered in sire evaluation over the past 15 years it is possible to gauge the level of genetic gain in the flocks that are using the services of AMSEA. This analysis shows that the key production traits of Body Weight and Fleece Weight have both seen increases during the period. Significant decreases in the key flystrike indicator traits of Breech Wrinkle and Dag were also observed.

Trait	ASBVs Sire entered between 2007-2009	ASBVs Sire entered between 2019-2021
AWT	1.3	6.0
ACFW	11.4	21.4
EBWR	0.1	-0.2
LDAG	0.04	-0.04

In relation to visually assessed traits, sire evaluation progeny have got plainer, with more open faces, whilst retaining or slightly improving wool quality. Body structure has remained relatively constant, however feet and leg structure appear to have regressed, which flags an area for improvement in future years.

Moving forward AMSEA will continue to work in areas that add value to the sheep industry. The core focus will remain on recording traits that are difficult and expensive to measure including adult traits, reproduction and meat-eating quality.

AMSEA's key role remains servicing sire evaluation sites in progressing adoption and genetic gain in the Merino industry. The decision-making process of AMSEA is dominated by ram breeders and it continues to be in a strong position, created through a history of sound governance, efficient management, with the ability to provide additional services to the industry in the area of the AMSEA database contributing to the Merino genomic reference population, adoption of R&D and the management of research projects that relate to genetic improvement.

The 10 Site Committees across Australia have 176 members made up of ram breeders and buyers, service providers, breeding consultants and Site Managers. They hold 3 or so site meetings a year and an annual field day and are an important extension network for the AWI Genetic Program and AWI outcomes in general, as is the AMSEA Executive Committee that meets twice per year.

AMSEA general distribution list includes 723 subscribers and includes most ram breeders, their consultants and classers. 73 emails were sent regarding site reports, Merino Superior Sires publications and Site Filed days over the 3 years.

Introduction

This project continued the work of ON-00340 to provide support for the management, administration and reporting of sire evaluation in Australia. Sire evaluation operates at sites around Australia with sites across 2019-2021 located at Armidale (NSW), Boorowa (NSW), Bathurst (NSW), Coleraine (VIC), Dookie (VIC), Balmoral (VIC), Harrow (VIC), Hensley Park (VIC), Katanning (WA), Lameroo (SA), Malinong (SA), Muresk (WA), Pingelly (WA), Temora (NSW), Trangie (NSW), Urana (NSW), and Yass (NSW).

The project also enabled AMSEA to act as a key proponent of genetic improvement in the sheep industry, by providing an organisational platform to originate new traits and collect data on adult traits. Both of which are difficult in ram breeding flocks that are focused on the commercial business of selling rams. In addition, the project was also aimed at allowing AMSEA to continue to act as a co-partner with AWI for the contracted management of the MLP project.

AMSEA Admin & Reporting Project ON557 Final Report

Project Objectives

1. Provide governance and coordination of the collection of a wide range of data at sire evaluation sites across Australia.

2. Publish results of sire evaluation sites in a publicly and freely available manner in a range of formats for all breeders with differing interests.

3. Administer and manage the Australian Merino Sire Evaluation Association (AMSEA) so it is a properly functioning, relevant and leading organisation in the Merino industry, that is properly equipped to service the needs of sheep breeders and AWI.

4. Maintain the AMSEA database and ensure that the data collected at sire evaluation sites around Australia is available for R&D purposes by other organisations. This includes hard or expensive traits to measure, as well as adult traits.

5. Ensure sheep breeders are provided with practical experience in sire evaluation and can engage with the outcomes and results of it.

6. Provide a practical and affordable pathway to MERINOSELECT for those breeders wishing to utilise the service.

7. Work closely with other organisations to ensure benefit from sire evaluation is gained across the entire industry.

Success in Achieving Objectives

Objective	Complete	Measure
1. Provide governance and coordination of the collection of a wide range of data at sire evaluation sites across Australia.	✓	Application of the sire evaluation Site Requirements across current and new sites, including regular review of the Requirements document, with regular communications with sites (both informal and formal) to ensure that mandatory requirements are met through the course of each trial. The most recent formal full update of the Sire Evaluation Requirements took place in August 2018.
2. Publish results of sire evaluation sites in a publicly and freely available manner in a range of formats for all breeders with differing interests.	✓	Site reports generated after the completion of each sire evaluation trial, field day materials produced, plus the annual MSS publication and various media articles. Reporting includes results in a variety of types (eg sire means, ASBVs). Results are also routinely and timely submitted to Sheep Genetics for inclusion in the MERINOSELECT database.
3. Administer and manage the Australian Merino Sire Evaluation Association (AMSEA) so it is a properly functioning, relevant and leading organisation in the Merino industry, that is properly equipped to service the needs of sheep breeders and AWI.	✓	General organisational operations completed in a professional and transparent manner, under the governance of an Executive Committee who meet regularly, with annual independent financial audits, with input from and to other significant organisations.
4. Maintain the AMSEA database and ensure that the data collected at sire evaluation sites around Australia is available for R&D purposes by other organisations. This includes hard or expensive traits to measure, as well as adult traits.	✓	Ongoing coordination of data submission from each sire evaluation site into a central database which is then analysed by AGBU and submitted to the SG MERINOSELECT database. The sire evaluation Requirements direct collection of more expensive traits including carcase scanning and WEC, the said also encourages collection of later stage data wherever possible.
5. Ensure sheep breeders are provided with practical experience in sire evaluation and can engage with the outcomes and results of it.	✓	AMSEA provides the following to sheep breeders: - Field days for each trial / drop of progeny - Presentations, media articles etc. outlining sire evaluation and its results, eg., SheepConnectNSW Webinar, May 2021. - Opportunity for involvement at a Site Committee level giving firsthand

		experience of the data collection process and understanding of the results.
6. Provide a practical and affordable pathway to MERINOSELECT for those breeders wishing to utilise the service.	✓	Sire entry into a Sire Evaluation trial provides an introduction and pathway into MERINOSELECT with data submitted into MERINOSELECT without the breeder having to undertake data collection independently on farm. Additional entries and breeder's own data collection will further improve the sire and bloodlines accuracies within the MERINOSELECT database. Link sires used across AMSEA trials /sites further improves linkage and accuracies. Cost of entry to a sire evaluation trial is set by each Site Committee (approximately $3500) which is significantly lower than the breeder undertaking the equivalent accuracies and linkages via independent data collection.
7. Work closely with other organisations to ensure benefit from sire evaluation is gained across the entire industry.	✓	AMSEA regularly collaborates with: - Australian Stud Merino Breeders Association (AASMB) and the majority of its state branches - Independent Merino Sire Evaluation Site Associations - AGBU - SG - MLA - SheepConnectNSW - Genotyping laboratories, service providers and genetic consultants - Various research and educational facilities including CSIRO, NSW DPI, Murdoch University, DPIRD WA University of New England and the Muresk Institute, Sydney University - Various industry bodies incl MerinoLink Ltd and Dohne Australia - The majority of Australia's Sheep Artificial Insemination service providers and laboratories

Methodology

AMSEA Management Methodology

AMSEA operates as a not-for-profit incorporated organisation with an Executive Committee governing both the business operations and Sire Evaluation program. An independent, external annual financial audit is completed to ensure due diligence.

The Executive Committee includes a member from each of the operating Sire Evaluation sites, representatives from AWI, AASMB and MLA, as well as expert advisors from SG, AGBU and NSW DPI. The chair and deputy chair are nominated and elected annually by the Committee at its AGM. The current AMSEA Executive Committee is:

Jock McLaren	Chairman / New England
Rich Keniry	Deputy Chairman / MerinoLink
Stephen Lee	South Australia
Matthew Coddington	Macquarie
Bill Sandilands	Yardstick
Anna Toland	North East Victoria
Brett Jones	Muresk / Pingelly
Mark Bunge	Balmoral
Don Mills	Dohne
Georgina Wallace	AASMB
Geoff Lindon	AWI
Gus Rose	MLA
Ben Swain	AMSEA Executive Officer
Andrew Swan	AGBU
Luke Stephen	NSW DPI
Emma McCrabb	SG

This national framework is underpinned by management of each trial by the independent and incorporated site committees that manage their own finances (entry fees and site costs). The current sites, key site personnel and site committees are listed below. These site committees are made up of a range of ram breeders, commercial breeders and service providers and consist of a range of ages and backgrounds. Site committees are an important extension vehicle for sire evaluation and genetic benchmarking.

Balmoral, VIC

Balmoral Breeders

Chair/AMSEA Representative: Mark Bunge   Secretary: Emma O'Bryan

MSE - Anthony Close   Site Manager(s): MLP - Tom Silcock

Mark Bunge	Tony Kealy	Ashley Read	Colin Frawley
Anthony Close	Emma O'Bryan	Mark Williams	Rick Luhrs
Michael Craig	Marina VanAken	Rich Currie	Amy Carpenter
Tom Silcock	Ian Murray	Simon Close	Tom Roughead
Nick Falkenberg	Sean Harvey	Michael Close	Elise Kealy
Hugh Jarvis	Rosey Leeming	Mark Wootton	Jonno Hicks
Andrew Howells	Russell Macgugan	Lachie McRae	Tom Sweeny
David Whyte	Scott Davis	Wayne Whale	Hamish Robertson
Jim Farran			

Dohne Site

Sire Evaluation Subcommittee - Dohne Association of Australia

Chair/AMSEA Representative: Donald Mills

Site Manager: Jim Meckiff

Don Mills
John Nadin
Greg McCann
Allan Casey
Jim Meckiff
Tom & Sophie Holt
Miguel Muniz
Maria Nikolaric

Macquarie, NSW

Macquarie Sire Evaluation Association

Chair / AMSEA Representative: Matthew Coddington   Secretary: Sally Packham

Site Manager: MLP - Tracie Bird-Gardiner

Matthew Coddington	Mark Mortimer	Tim Gole	Allan Casey
Sally Packham	Chad Taylor	Mark Kerin	Jane Rindfleish
Tracie Bird-Gardiner	John Nadin	Nigel Kerin	Sue Mortimer
Kathryn Egerton-Warburton	David Greig	Don Hamblin	David Mula
Glen Ormand	Boyd Aveyard	Graham Wells	Sue Street
Alison Tancred	Emily Pitt	Greg Sawyer	Megan Rogers

MerinoLink, NSW

MerinoLink Ltd - Bathurst Site Committee and MLP Site Committee

Chair / AMSEA Representative: Rich Keniry

Site Manager(s): MSE - Laura Broughton   MLP - Lexi Cesnik

MSE - Bathurst	MLP - Temora	
Rich Keniry	Rich Keniry	Simon Coddington
Laura Broughton	Lexi Cesnik	Adele Offley
Stuart Kelly	Craig Wilson	Will Clark-Dickson
Andrew Kelly	Mark Mortimer	Andrew Bouffler
Matthew Coddington	Rick Baldwin	Greg Sheather
Simon Ross	Mal Peake	Mark Teiedemann
Matt Crozier	John Sutherland	Tim Westblade
Cam & Kate Munro	Rachael Gawne	
Graham Ross	Marty Moses	

Muresk, WA

Stud Merino Breeders Association of Western Australia

Site Chair / AMSEA Representative: Brett Jones

Site Manager: Steve Wainwright

Brett Jones
Kristen Lefroy
Steve Wainewright
Mike Kirk
Steven Bolt
Wayne Button
Bill Sandilands

New England, NSW

New England Sire Evaluation Association

Site Chair: Duncan Lance   AMSEA Representative: Jock McLaren   Secretary: Todd Willock

Site Manager: MLP - Jen Smith

Duncan Lance	Angus Carter	Luke Stephen	Kim Barnet
Andrew Swan	Steve Ward	Jock McLaren	Katrina Blomfield
Chris Clonan	Tom Henry	Brent McLeod	Peta Bradley
Harold Manttan	Jen Smith	Hugh Nivison	Rob Powell
Jock Nivison	Fiona MacArthur	John Croake	Todd Whillock
Mark Elliott			Martin Oppenheimer

North East Victoria, VIC

North East Victoria Sire Evaluation

Site Chair: Murray McKenzie   Site Manager: Anna Tolland

Murray McKenzie	Paul Cheng
Anna Toland	Jane Court
Phil Toland	Lisa Warn
Simon Riddle	Paul Wallace
Nathan Anderson	Lyndon Kubeil
John Geddes	Paddy McCarthy

Pingelly, WA

Federation of Performance Sheep Breeders (WA)

Site Chair / AMSEA Representative: Brett Jones   Secretary: Mark Allington

Site Manager: MLP - Bronwyn Clarke

Brett Jones	Murray Hall
Lynley Anderson	Ashley Hobbs
Steven Bolt	Nathan King
Wayne Button	Bill Sandilands
Bronwyn Clarke	Graeme Martin
Craig Dewar	Andrew Thompson
Melanie Dowling	David Thompson
Richard McKenna	Daniel Gooding
James Evans	Ashley Herbert
Mark Allington	

South Australia

South Australian Merino Sire Evaluation Trial on behalf of Merino SA

Site Chair: Roger Fiebig   AMSEA Representative: Stephen Lee   Site Coordinator: Anna Cameron

Roger Fiebig	Anna Cameron
Joe Keynes	Stephen Lee
Michelle Cousins	Duane Simon
Bill Walker	Matt Ridgway
Hansi Graetz	David Eckert
Jennifer Light	Stephen Kellock

Yardstick, WA

Federation of Performance Sheep Breeders (WA)

Site Chair: Richard Coole   AMSEA Representative: Bill Sandilands   Secretary: Mark Allington

Site Manager: John Paul Collins

Richard Coole	Brett Jones
Bill Sandilands	Cam Clifton
Bob Hall	Ian Robertson
Mark Allington	Dougal Young
John Paul Collins	Michael Campbell

Sire Evaluation Trial Methodology

Sire Evaluation sites, trials and drops are managed according to a strict national quality control framework titled and presented as the *Merino Sire Evaluation Site Requirements*. These requirements are managed and reviewed by the AMSEA Executive Committee. The *Requirements* outline the set-up of a trial and site, the overall management approach, trial design options along with data collection details including required traits, collection protocols and age stages. Additional resources and support are provided both within the *Requirements* document and on the AMSEA website www.merinosuperiorsires.com.au/resources.

This national framework ensures the robustness of Sire Evaluation results, enabling individual trial / drop reporting plus submission of the results into the MERINOSELECT database for the generation of sire ASBVs and Indexes.

Each trial drop includes Link Sires. These are sires that are joined at a minimum of 2 sites and have 25 or more progeny reported at their first shearing. Link sires enable the direct comparison of all entered sires across sites and years. Sites are required to include two or more link sires when joining up to 14 sires, three link sires when 14 - 21 sires are joined and four if over 21 sires are to be joined. Link Sires are funded by AWI through a separate Link Sire agreement.

Results

Sire Entries

During 2019-2021, a total of 275 sires were entered in sire evaluation throughout Australia. These 275 compare to 339 sires in the previous three years, however this was during the period that the MLP project was commencing and sire joinings were historically high.

The three years prior to that (2013-2015) resulted in 215 sires being entered in MSE trials (including the Balmoral 2015 MLP joining). The increase in the number of sires entered between 2013-2015 (215 sires) and then 2019-2021 (275 sires) demonstrates the increased demand for sire evaluation services and the continued interest in the program.

Table A (below) shows the number of sires entered in sire evaluation trials between 2007 and 2021, with the blue records denoting MLP joinings. It can be seen from Table A, that the demand for sire evaluation services has steadily increased over the 15 year period and additionally, that drought conditions can have a significant impact on the number of sites and sires joined in each year.

Table A: Sires entered by Site by Year   *Key:* **MLP sites**

Sites	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total
Badgingarra	9	10														19
Balmoral	11	17	14	17	18	19	19	20	25	25	20	20	21	22	20	288
Bluechip				10												10
Bluechip - YSP					15	10	10									35
Dohne															15	15
Longreach			9													9
Macquarie		12				12	12		15		15	16				82
Merinolink								12	17	12	16		15		16	88
Merinolink - B												17				17
Merinolink -MLP										13	13					26
Muresk										12	12	12	12	12	12	72
New England	14	12	14	9	11	15	13	14	14	17	15	15				163
North East Vic	12	12	13	9	10	11		10	13	11	10	11	11			133
Pingelly										15	15					30
Queensland			9		9											18
South Australia											16	16	16	18	15	81
Sth West Slopes		14													15	29
Tasmania	10		10		10		8									38
Yardstick	18	15	19	12	12				13			12	12	14	12	129
Total	**74**	**101**	**79**	**47**	**95**	**67**	**62**	**56**	**97**	**105**	**132**	**102**	**104**	**66**	**105**	**1282**

A full list of sires entered at each site during the 2019-2021 period is included further on this section as Tables D-F.

Of interest is the number of entrants (or breeders) utilising sire evaluation services each year over the past 15 years. Table B shows the number of entrants between 2007-2021 for each trial. As expected, the number of entrants is lower than the number of sires entered as some entrants join more than one sire at each site. This is often the case where an entrant owns both a link sire and a commercially entered sire.

Regardless, Table B shows the same trends as Table A in that the period between 2016-2018 saw the highest number of entrants due to the MLP Project. The latest three years (2019-2021) has seen these increased levels maintained with a total of 205 entrants being involved in the program, versus 181 during the corresponding period prior to the MLP Project.

Table B: Entrants by Site by Year   *Key:* **MLP Sites**

Sites	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total
Badgingarra	8	9														17
Balmoral	10	17	12	17	17	19	17	18	23	24	18	19	19	21	12	263
Bluechip					9											9
Bluechip - YSP					8	8	1									17
Dohne														12		12
Longreach		8														8
Macquarie		12				11	10		13		14	16				76
Merinolink								12	13	12	13		12		11	73
Merinolink - B													9			9
Merinolink -MLP										13	13					26
Muresk										12	12	12	11	10	9	66
New England	12	11	12	8	3	14	11	13	14	15	15	15				143
North East Vic	9	9	12	7	7	10		8	10	9	6	9	5			101
Pingelly										15	15					30
Queensland			8		5											13
South Australia											15	16	13	14	15	73
Sth West Slopes		14													11	25
Tasmania	10		10		6		7									33
Yardstick	16	14	17	11	7			11				10	7	5	9	107
Total	65	94	71	43	62	62	46	51	84	100	121	97	76	50	79	1101

AMSEA's ability to attract new entrants has also continued successfully during the past three years. Table C shows the number of new entrants between 2007-2021 for each MSE trial.

It can be seen that over the last 15 years, AMSEA has consistently attracted new entrants every year. Again the 3-year period between 2016-2018, when the MLP Project was commencing, an increase is observed with 71 new entrants during the period. In the following period, between 2019-2021, new entrants have

continued to commence involvement, with 62 breeders entering a site for the first time. This is compared to 50 in the corresponding period prior to the MLP Project.

Table C: New Entrants by Site by Year   KEY: *MLP Site*

Sites	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total
Badgingarra	2	1														3
Balmoral	1	5	5	3	6	2	2	4	*2*	*4*	5	3	3	3	6	54
Bluechip					2											2
Bluechip - YSP					6	2	10									18
Longreach		2														2
Macquarie		3				5	4		4		*3*					19
Merinolink								2	5	1	4		1		4	17
Merinolink - B													5			5
Merinolink -MLP										*2*						2
Muresk										4	2	4	2	2		14
New England	5	3	2	2		2	2	2	2	3	*3*	*4*				30
North East Vic	3	4	2	4	2	1		2	4	3	5	2	5			37
Pingelly										*2*	*1*					3
Queensland			3		4											7
South Australia											8	4	5	5	4	26
Sth West Slopes		4												2		6
Tasmania	2				4		1									7
Yardstick	5	3	4	5	3				4			4		2	2	32
Dohne															11	11
Grand Total	**18**	**25**	**16**	**14**	**27**	**12**	**19**	**10**	**21**	**19**	**31**	**21**	**21**	**12**	**29**	**295**

Tables D-F list the sires entered at each site in 2019, 2020 and 2021. Also noted for each sire are their <u>weaning</u> progeny numbers plus the progeny count at their last assessment (or the latest count if the trial is still in progress) and survival for that sire and trial. Link sires are denoted as selected for their MLP high Clean Fleece Weight (CFW) results or those links nominated by the industry Sire Advisory Group (SAG) who provide guidance to AMSEA around industry sires of note who would be of interest to industry and contribute to the MSE program.

Table D: 2019 Site Joinings

Balmoral, VIC Status: Complete	Progeny # W	Last # A	Survival	Link Type
Anderson Poll, 170660	52	51	98%	
Baderloo Poll, 150171	58	53	91%	
Conrayn, MVB1231	56	51	91%	SAG
Curlew, 170111	53	51	96%	
Glen Holme, 162503 (Dohne)	56	54	96%	
Gunallo Poll, 170295	53	51	96%	SAG
Jigsaw Farms, 160270	54	51	94%	
Kerin Poll, 140137	41	36	88%	
Kerin Poll, 171646	26	24	92%	
Kerrsville, 166010	56	51	91%	
Kia Ora, 150608 (Rex)	58	55	95%	
Kiandra Poll, 160793	65	57	88%	
Kurra-Wirra, 170039	45	43	96%	
Miramoona, 140012	58	52	90%	MLK High CFW
Moorundie Poll, NE73	56	49	88%	MLP High CFW
Mumblebone, 170709	64	61	95%	
Pendarra Poll, 160028	41	40	98%	
Trigger Vale Poll, 170929	48	44	92%	
Turkey Lane, 170060	44	42	95%	
Willera Poll, 175584	55	51	93%	
Yiddinga, 170576	44	42	95%	

Merinolink (B) Status: Complete	Progeny # W	Last # H	Survival	Link Type
Anderson Poll, 160729	30	30	100%	
Bogo, 170018	36	34	94%	
Brooklyn, 170112^	35	34	97%	
Bundilla, 150009	44	42	95%	
Curlew, 170116^	37	37	100%	
GRASS, 161406	41	40	98%	
Grassy Creek, 160253	48	48	100%	
Greendale, 170002	40	39	98%	
Grogansworth 170402	50	49	98%	
Kambah, 626033^	41	38	93%	
Kenilworth WH17314	41	41	100%	
Langdene, 140700	33	31	94%	SAG
One Oak 17-15050	49	48	98%	
Petali Poll, 150697	49	46	94%	MLP High CFW
Pooginook Poll, 161153	39	39	100%	
Wattle Dale 170632	36	35	97%	
Yarrawonga, 170193^	37	35	95%	SAG

Merinolink (Y) Status: Complete	Progeny # W	Last # H	Survival	Link Type
Bogo, 170003	48	47	98%	
Bogo, 170018	54	53	98%	
Bundilla Poll, 171495	43	43	100%	
Centre Plus Poll, 707040	42	42	100%	
Hazeldean, 000113	46	46	100%	
Hilltop, 160156 (HT156)	60	59	98%	
Langdene, 140700	50	48	96%	SAG
Miramoona, 140012	39	38	97%	MLP High CFW
Moorundie Poll, NE73	50	48	96%	MLP High CFW
One Oak Poll, W17002	47	46	98%	
Pooginook Poll, 170364	39	39	100%	
Rocklyn, 170184	48	48	100%	
Tallawong Merinos, 170511	39	39	100%	
Wattle Dale, 170625	48	44	92%	
Woodpark Poll, 160058	51	51	100%	

Muresk, WA Status: Complete	Progeny # W	Last # H	Survival	Link Type
Barloo, 170475	11	11	100%	
Calcaling Poll, 160074^	28	27	96%	
Claypans Poll, 170632	18	17	94%	
Eastville Park Poll, 160611 (Bomber)	17	17	100%	
Ejanding Poll, 186367	32	28	88%	
Gunallo Poll, 170295	24	22	92%	SAG
Karabein Poll, 150145	23	22	96%	
Nepowie Poll, 170002	20	20	100%	
Nerstane, 150073	23	20	87%	MLP HIGH CFW
Parakeelya Poll, 150286	39	39	100%	
Pyramid Poll, 170388	28	28	100%	
Seven Oaks South Poll, 170711	31	31	100%	

Yardstick, WA Status: Complete	Progeny # W	Last # H	Survival	Link Type
Anderson Poll, 170660	44	42	95%	
Billandri Poll, 160972	47	47	100%	
Boolading Blues Poll, 151011	54	54	100%	
Cranmore Park, 170958	46	46	100%	
Glenlea Poll, 170418	48	48	100%	
Hazeldean, 000113	41	41	100%	
Merinotech WA Poll, 155081	46	46	100%	
Mulloorie, 160059	54	54	100%	SAG
Nerstane, 150073	47	47	100%	MLP High CFW
Nerstane, 160022	28	27	96%	
Wattle Dale, 170625	49	49	100%	
Woolkabin Poll, 150007	36	34	94%	

AMSEA Admin & Reporting Project ON557 Final Report

Sth Australia Status: Complete	Progeny # W	Last # Y	Survival	Link Type
Anderson Poll, 160390	42	35	83%	
Calcookara Poll, 170400	35	30	86%	
Challara Poll, 150245	48	45	94%	
Flairdale Poll, 170070^	40	36	90%	
Greenfields Poll, 160079^	46	41	89%	
Gunallo Poll, 170295^	26	24	92%	SAG
Hilton Heath Poll, 150817	51	47	92%	
Kelvale Poll, 170004	56	50	89%	
Leahcim Poll, 173114	40	36	90%	
Malleetech Poll, 177141	45	44	98%	
Moorundie Poll, NE73	29	25	86%	MLP High CFW
Pepper Well Poll, 177031	42	40	95%	
Pimbena Poll, 170509	40	39	98%	
Ridgway Poll, 170005	51	43	84%	
Roemahkita Poll, 160018^	37	37	100%	
Wallaloo Park Poll, 172070	42	40	95%	

North East VIC Status: Complete	Progeny # W	Last # A	Survival	Link Type
Anderson Poll, 170390	46	44	96%	
Cahirblonig, 170325	49	46	94%	
Hazeldean, 000113	53	49	92%	
Kilfeera Park, 180211	49	48	98%	
Kilfeera Park, 180705	45	41	91%	
Melrose, 044871	29	26	90%	
Mulloorie, 160059	40	37	93%	SAG
Petali Poll, 150697	50	45	90%	MLP High CFW
Toland Poll, 181147	54	52	96%	
Well Gully Poll, 174573	45	41	91%	
White River Poll, 170913	21	18	86%	

Table E: 2020 Joinings

Balmoral, VIC Status: In progress	Progeny # W	-	Survival	Link Type
Blyth, 180901	32		-	
Curlew, 180144	39		-	
East Loddon, 180062	45		-	
Flairdale Poll, 180015*	34		-	
Glen Donald, 180868*	35		-	SAG
Glen Holme, 172565 (Dohne)	40		-	
Hannaton Poll, 150093	24		-	
Hazeldean, 13.4936*	31		-	MLP High CFW
Jigsaw Farms, 160271	36		-	
Macquarie Dohne Stud, 180230	37		-	
Melrose, 7BN304	34		-	
Merinotech WA Poll, 177026	36		-	
Mumblebone, 160547	27		-	
Poll Boonoke, 160536	34		-	
Poll Boonoke, 160612	38		-	
Stirling Dohne, 140079^	47		-	
The Mountain Dam, WPD034	44		-	
Trefusis, 170436	32		-	
Turkey Lane, 170055	40		-	
Weedington Poll, 153061	35		-	
Willandra Poll, 170447	35		-	SAG
Yarrawonga, 170193*	41		-	SAG

(W column: Not yet analysed.)

Muresk, WA Status: In progress	Progeny # W	Last # H	Survival	Link Type
Anderson Poll, 160390	11	11	100%	
Arra-dale Poll, 170950	28	27	96%	
Calcaling Poll, 180652	18	17	94%	
Cranmore Poll, 180071	17	17	100%	
Ejanding Poll, 186034	32	28	88%	
Glen Donald, 180868*	24	22	92%	SAG
Hazeldean, 13.4936*	23	22	96%	MLP High CFW
Nepowie Poll, 180004	20	20	100%	
Rhamily Poll, 180104^	23	20	87%	
Wattle Dale, 172100	39	39	100%	
Wiringa Park, 180755	28	28	100%	
Woodyarrup, 170313	31	31	100%	

Yardstick, WA Status: In progress	Progeny # W	Y	Survival	Link Type
Anderson Poll, 160729*	38	37	97%	
Billandri, 180705	46	44	96%	
Boolading Blues Poll, 160046	54	52	96%	
Borondi Poll, 180002	49	47	96%	
Collinsville Poll, 130545 (Apollo)*	52	51	98%	MLP High CFW
Cranmore Poll, 180116	36	33	92%	
Edale, 15Z158	41	41	100%	
Glenerin, 170429^	46	43	93%	
Merinotech WA Poll, 177257	44	42	95%	
Nepowie Poll, 170008	38	37	97%	
Wattle Dale, 182067	52	48	92%	
Willandra Poll, 170447*	38	37	97%	SAG
Woodyarrup, 120175*	42	41	98%	MLP High CFW
Woodyarrup, 181019	41	41	100%	

South Australia Status: Complete	Progeny # W	Last # H	Survival	Link Type
Baderloo Poll, 180049^	42	40	95%	
Calcookara Poll, 170060^	57	55	96%	
Caroonboon, 181395	42	40	95%	
Challara Poll, 181063^	49	46	94%	
Collandra North, 180645	41	38	93%	
Collinsville Poll, 130545 (Apollo)*	48	46	96%	MLP High CFW
Flairdale Poll, 180015*	55	53	96%	
Glenville Poll, T88018^	57	54	95%	
Hazeldean, 000113*	44	41	93%	
Malleetech Poll, 188039	53	50	94%	
Mernowie Poll, 180500	51	44	86%	
Mumblebone, 170129	41	39	95%	
Old Ashrose Poll, 150445*	50	45	90%	SAG
Pepper Well Poll, 188187	43	40	93%	
Ramsgate, 180451^	43	41	95%	
Ridgway Poll, 180157	47	46	98%	
Stockton, DB0074	43	39	91%	
Willandra Poll, 180080	44	40	91%	

PROJECT FINAL REPORT

Table F: 2021 Site Joinings

Balmoral, VIC Status: In progress	Progeny # W -	Survival	Link Type
Anderson Poll, 190669		-	
Austral Park, 190003^		-	
Centre Plus Poll, 707350		-	
Deep Dene Poll, 170472^		-	
Forest Springs, 190193		-	
Gelton Poll, 190140^		-	
Glen Holme Dohne, 194902*		-	
Glendamar, 190612	Not yet analysed	-	
Konsortium Merino, 180459		-	
Kurra-Wirra, 191190		-	
Langdene, 140700*		-	SAG
Maquarie Dohne, 191457		-	
Mumblebone, 191128		-	
Nerstane, 160404		-	
Roseville Park Poll, 180043		-	
Stud Park South, 082348^		-	
Turkey Lane, 190180		-	
Willandra, 170447*		-	SAG
Wood Park Poll, 160058		-	
Woodyarrup, 120175*		-	MLP High CFW

Merinolink (Bx) Status: In progress	Progeny # W -	Survival	Link Type
Blink Bonnie, 180080^		-	
Bogo, 170182		-	
Boudjah, 180074		-	
Conrayn, MVB123*		-	SAG
Egelabra, 174143		-	
Glenwood, 170026^		-	
Greenland, 170615		-	
Miramoona, 140012*	Not yet analysed	-	MLP High CFW
Mumblebone, 191128		-	
Nerstane, 190315		-	
Poll Boonoke, 160612		-	
Pooginook, 190311		-	
Redlands, 180102^		-	
Richmond, 170013^		-	
Rocklyn, 190271		-	
Roseville Park Poll, 190072		-	

Dohne, NSW Status: In progress	Progeny # W -	Survival	Link Type
Anderson Poll, 160729*		-	MLP High CFW
Calga, 173301^		-	
Chirniminup, 171069^		-	
Glen Holme, 141077*		-	
Glen Holme, 172565		-	MLP High CFW
Glenaroua, 152131^		-	
Harewood, 173019^		-	
Harold Park North, 170116^	Not yet analysed	-	
Kardinia, 181917^		-	
Kintail Park, 132345^		-	
Kintail Park, 171478^		-	
Macquarie, 162966^		-	
Mumblebone, 130850*		-	MLP High CFW
Stirling, 180040^		-	
Ulooloo, 170164^		-	

Muresk, WA Status: In progress	Progeny # W -	Survival	Link Type
Calcaling Poll, 191738		-	
Claypans, 170632		-	
Claypans, 191110		-	SAG
Cranmore Poll, 190033		-	
Ejanding Poll, 196347		-	
Nepowie Poll, 190004	Not yet analysed	-	
Nerstane, 150073		-	MLP High CFW
Poll Boonoke, 190678		-	
White River Poll, 191087		-	
Willandra Poll, 180013		-	
Woodyarrup, 171883		-	

Yardstick, WA Status: In progress	Progeny # W -	Survival	Link Type
Belmont Park Poll, 190553		-	
Billandri Poll, 192604		-	
Boolading Blue Poll, 182541		-	
Coromandel Poll, 180193		-	
Cranmore Poll, 190125		-	
Edale, 15X370		-	
Hill Padua Poll, 191060	Not yet analysed	-	
Merinotech WA Poll, 177676		-	
Miramoona, 140012		-	MLP High CFW
Nepowie Poll, 200146		-	
Wattle Dale, 190730		-	
Yarrawonga, 170193		-	SAG

<table>
<thead>
<tr><th colspan="2">South Australia
Status: In progress</th><th colspan="2">Progeny #
W   -</th><th>Survival</th><th>Link Type</th></tr>
</thead>
</table>

South Australia — Status: In progress	Progeny # (W / -)	Survival	Link Type
Anderson Poll, 160723		-	MLP High CFW
Callowie Poll, 190055^		-	
Claypans Poll, 170632		-	SAG
Flairdale Poll, 190401		-	
Forest Springs Poll, 190193^	Not yet analysed	-	
Hazeldean, 002529		-	
Kelvale Poll, 191148		-	
Lorelmo Poll, 160172^		-	
Malleetech Poll, 199100		-	
Mumblebone, 191150		-	
Nantoura Poll, 190061		-	
O'Brien Poll, 190455		-	
Ridgway Poll, 190240^		-	
The Yanko, 190068		-	
Wallaloo Park Poll, 172032		-	

Sth West Slopes — Status: In progress	Progeny # (W / -)	Survival	Link Type
Anderson Poll, 160729*		-	MLP High CFW
Brooklyn, 191277		-	
Bundilla, 191826		-	
Grassy Creek, 180553		-	
Greendale, 190435		-	
Hazeldean, 18.2529	Not yet analysed	-	
Hazeldean, 19.0266		-	
Kerin Poll, 190902		-	
Lach River, 140366^		-	
Mulloorie, 160059 (Elliot)*		-	SAG
Pooginook Poll. 190453		-	
Rocklyn, 190146		-	
Wantana Hills, 180008^		-	
Yarrawonga, 171162		-	

AMSEA Admin & Reporting Project ON557 Final Report

Reporting of results

AMSEA undertakes a significant amount of reporting through publications and the hosting of field days.

AMSEA publications are based on the Merino Superior Sires annual report and Site Reports.

Merino Superior Sires

Merino Superior Sires (MSS) is the annual publication of AMSEA that combines all of the data collected at all sites during the previous 5 years. Results for sires, regardless of where they were entered, are directly compared to each other through the use of ASBVs and AMSEA's across-site visual analysis. Supporting information such as owner contact details and material is also included to help readers understand the results. Throughout this project 6.4K hard copies of MSS were printed with most copies distributed, in addition there were over 4.5K downloads of the various MSS reports from the website.

The following editions of Merino Superior Sires were published during the period since 1 July 2018.

2020   Edition #26

    MSS26 - Full Report

    MSS26 - All Time Top 50 Sires

    MSS26 - Top 50 Sires

    MSS26 - Percentile Bands

    MSS26 - Sire and Owner Contact Details

    Inaugural module: MSS26 - High Use Sires

2019   Edition #25

    MSS25 - Full Report

    MSS25 - All Time Top 50 Sires

    MSS25 - Top 50 Sires

    MSS25 - Percentile Bands

    MSS25 - Sire and Owner Contact Details

2018   Edition #24

    MSS24 - Full Report

    MSS24 - All Time Top 50 Sires

    MSS24 - Top 50 Sires

    MSS24 - Percentile Bands

    MSS24 - Sire and Owner Contact Details

Site Reports

Site Reports are published for each site at the conclusion of each trial assessment period. The number of Site Reports published for each trial ranges from one - two and is dependent on the design of the trial. Site Reports include results generated from AMSEA's within-site and within-drop analysis of both measured and visual traits. Results are reported as Flock Breeding Values (FBVs), Adjusted Sire Means and Raw Data. Contact details for owners' and information on how to understand the results are also included.

The following list notates all Site Reports that were published during the project period. Downloads of these reports from the Merino Superior Sires website totalled over 13.6K during the project timeframe.

Balmoral

2017 Drop Adult Sire Evaluation Site Report, June 2019

2018 Drop Adult Sire Evaluation Site Report, April 2020

2019 Drop Adult Sire Evaluation Site Report, July 2021

Macquarie

2017 Drop Post Weaning Sire Evaluation Site Report, October 2018

2017 Drop Hogget Sire Evaluation Site Report, February 2019

2018 Drop Post Weaning Sire Evaluation Site Report, November 2019

2018 Drop Hogget Sire Evaluation Site Report, April 2020

MerinoLink

2016 Drop Adult Sire Evaluation Site Report, November 2019

2017 Drop Adult Sire Evaluation Site Report, November 2019

2019 Drop (Boorowa) Post Weaning Sire Evaluation Site Report, July 2020

2019 Drop (Yass) Post Weaning Sire Evaluation Site Report, May 2020

2019 Drop (Boorowa) Adult Sire Evaluation Site Report, August 2021

2019 Drop (Yass) Adult Sire Evaluation Site Report, August 2021

Muresk

2017 Drop Hogget Sire Evaluation Site Report, January 2019

2018 Drop Hogget Sire Evaluation Site Report, October 2019

2019 Drop Hogget Sire Evaluation Site Report, September 2020

New England

2016 Drop Adult Sire Evaluation Site Report, March 2019

2017 Drop Yearling Sire Evaluation Site Report, January 2019

2017 Drop Adult Sire Evaluation Site Report, February 2020

2018 Drop Yearling Sire Evaluation Site Report, February 2020

North East Victoria

2016 Drop Adult Sire Evaluation Site Report, September 2018

2017 Drop Adult Sire Evaluation Site Report, August 2019

2018 Drop Adult Sire Evaluation Site Report, August 2020

2019 Drop Adult Sire Evaluation Site Report, August 2021

Pingelly

2016 Drop Adult Sire Evaluation Site Report, September 2019

2017 Drop Adult Sire Evaluation Site Report, September 2019

South Australia

2017 Drop Hogget Sire Evaluation Site Report, November 2018

2018 Drop Yearling Sire Evaluation Site Report, July 2019

2019 Drop Early Results Update, March 2020

2019 Drop Yearling Sire Evaluation Site Report, April 2020

2019 Drop Adult Sire Evaluation Site Report, December 2020

2020 Drop Hogget Sire Evaluation Site Report, July 2021

Yardstick

2018 Drop Early Results Update, July 2019

2018 Drop Hogget Sire Evaluation Site Report, December 2019

2019 Drop Early Results Update, January 2020

2019 Drop Hogget Sire Evaluation Site Report, December 2020

2020 Drop Early Results Update, April and July 2021

Field Days

All MSE sites are required to host at least one field day during each trial. Field days allow the public to inspect sire progeny groups (which are individually penned), compare the results between sires and hear from a range of speakers on topics relating to MSE and other sheep industry topics of interest.

The following Field Days were hosted during the project period:

Balmoral
February 2019 (MSE + MLP)
March 2020
March 2021 (Entrant inspection day).

Macquarie
July 2018 (MLP)
July 2019 (MLP)
March 2020 (MLP).

MerinoLink
March 2019 (MLP)
May 2019 (MLP)
October 2020 (MLP)
February 2021 (MSE - Yass + Boorowa)

Muresk
August 2018
August 2019

New England
July 2018
August 2018 (MLP)
June 2019 (MLP)
August 2020 (MLP - Online)

North East Victoria
September 2018

Pingelly
October 2019 (MLP)
October 2020 (MLP)

South Australia
June 2019
October 2020.

Yardstick
October 2019
October 2020.

In addition to the above publications and field days, the AMSEA website (www.merinosuperiorsires.com.au) hosts a large amount of information on the activities and results of MSE. All reports are publicly and freely available to download. Furthermore, results for individual sires can be accessed on the website using an online sire search function. During the course of this project the website hosted more than 13.3K individual visitors who were online for more than 27.7K sessions viewing over 53.0K pages as they visited. Users predominantly originated from Australia (76%) with almost half

(49%) arriving directly at the website, 35% arrived via a search function, 19% were referred on from another website and 5% arrived via social media.

The AMSEA website was subject to a complete review in September 2019 in order to make the content more accessible, as well as easier to navigate and understand.

The website is supported by a direct email communication program that pushes new reports and information to a list of 723 subscribers on a regular basis. During the course of this project period 73 emails were sent out to the AMSEA subscription list. Emails include notice of the latest Sire Evaluation report releases, advice on Site's calling for sire nominations and entries as well as relevant industry events and information. The email network is carefully managed to ensure integrity is maintained and subscribers remain engaged.

AMSEA is also often requested to provide presentation at industry key events. With the incursion of COVID, online events are becoming more common and AMSEA has participated in several of those.

In addition, AMSEA staff often contribute content to AWI's Beyond the Bale publication and during the project period have contributed to seven Beyond the Bale articles, these are included as Appendix 10.

Discussion

The project was very successful in leveraging breeder funds to add value to the long running sire evaluation program and standardising the results that are generated in various publicly available formats.

As an independent and breeder governed association, AMSEA has been able to provide a forum for the discussion and development of ideas and projects relevant to a wide range of breeder and industry interests. The 2019 update to the Visual Sheep Scores publication (Commercial and Researcher versions) and the Merino Lifetime Productivity (MLP) Project are both significant outcomes of this process.

In this capacity, AMSEA has operated as a key consultation body for Sheep Genetics and has been involved in the review and ongoing improvement of the MERINOSELECT services, including indexes. The development of the Wool Production Plus index was an AMSEA funded R&D outcome which is now available to all MERINOSELECT users. AMSEA has also worked closely with a range of genotyping services providers to develop and validate their products in order to generate competition in the market place.

At the site level, sire evaluation has offered a cost-effective process of collecting and sharing valuable Research and Development (R&D) data on a wide range of both measured and visual traits that are used in the development of breeding values. These include those traits directly related to flystrike, such as Breech Wrinkle, Breech Cover, Dag, Urine, Body Wrinkle, Wool Colour and Fleece Rot. Several sites have also recently commenced recording Faecal Consistency which has assisted in the development of a visual score for this trait.

Hard to measure and expensive traits, such as WEC, EMD, FAT, Staple Length and Strength have also been collected at all sites. When reported in the various AMSEA formats available, this information has allowed both stud and commercial breeders to benchmark and improve their genetics.

AMSEA has also focused on the collection of adult stage records for a wide range of traits which are not generally collected on-farm.

Over the past three years, welfare has also been a major focus of AMSEA and sites with both continuing to work hard to ensured that where welfare issues have been encountered, they have been thoroughly reported and addressed. The most significant welfare issue encountered during this project period was a footrot outbreak at the Dookie site. At an AMSEA level, reporting of progeny losses has also commenced which enables AMSEA to focus on sites were welfare may be a concern and addressing such issues before they become significant.

The number of sites that are not mulesing progeny continues to grow. Approximately 50% of sites operating over the past 3 years have been non mulesed. The increase in non mulesed sites has required site committees to take additional care in both managing the progeny throughout the trial process, as well as selecting suitable sires for entry. Positively, the increase in non mulesed sites has exposed many breeders to the management of non mulesed animals in a range of environments.

The data collected at sire evaluation sites has proven critical to the ongoing R&D of MERINOSELECT. When combined via link sires between sire evaluation and other research projects (such as the MLP Project), the sire evaluation database has been regularly used by researchers to create add-on benefits for the industry.

AMSEA has ensured that all results are reported in a public and freely available manner, ensuring all breeders have had access to a range of data that will help improve their profitability. This has included a wide range of visually assessed traits that are collected. Sire evaluation sites are the only flocks collecting large amounts of visual information outside of other R&D flocks, which also use the AMSEA developed standards. Of particular value is the AMSEA Visual Classing Grade which is unique to sire evaluation and can only be found in AMSEA publications. Recently the integrity of Site Reports has been strengthened through entrants no longer being able to withdraw their sire's identity from publication.

These publications are also of critical importance to those breeders relying on within-flock breeding objectives (FBVs) and adjusted sire means, which again are only published by AMSEA. The results are aimed at those breeders operating in environments or with sheep types that mean the Australian Sheep Breeding Values (ASBVs) may not be accurate enough for specific traits such as WEC.

By combining a wide range of visual trait and classing information with objective measurements, reported in a range of formats (from raw data to ASBVs), AMSEA offers an inclusive information network where breeders of all types can come together to pursue genetic gain in both visual and objective traits.

One of the key benefits of the project has been the ability for breeders to form local networks (site committees) and to gain first-hand experience in the measurement and appraisal of sheep, collection of data and reporting of results. This is experience that would be otherwise only be gained by attending heavily subsidised industry funded workshops. This is particularly important for next generation breeders enabling them to gain practical experience and become engaged with skills and technology.

One of the challenges for site committees has been to remain active and engaged. Whilst many sites have taken on these challenges positively, others have struggled to remain viable. 2021 has seen the conclusion

of the North East Victoria Sire Evaluation site committee. Whilst others have commenced to take its place, it is disappointing when a long-term site closes due to a lack of breeder engagement at the site committee level.

Beyond the site level, AMSEA itself has operated as a network for ram breeders and those involved in servicing the ram breeding industry. With an extensive email and mailing list that includes the majority of Merino ram breeders and related service providers in Australia, AMSEA has offered an opportunity for AWI to extend targeted information directly to this group very cost effectively.

Sire evaluation has offered breeders a pathway to MERINOSELECT for new entrants, as well as validated new technologies, such as pedigree system, sheep identification and data collection systems, that will increase profitability in both commercial and stud sheep breeding enterprises.

Impact on Wool Industry – Now & in 5 years' time

Sire evaluation activities are playing a significantly positive role in the increase in productivity created through genetic gain across industry. Benchmarking of genetics is a key role of sire evaluation and the links between benchmarking and productivity increases are well recognised, thus sire evaluation activities continue to be paramount to increase productivity in the Merino breed.

In order to demonstrate the genetic gain that sire evaluation has contributed to, ASBVs for sires entered over the past 15 years have been analysed and are shown in the below charts, the charts are expressed as change on ASBV over time for each trait titled in the chart.

AMSEA Admin & Reporting Project ON557 Final Report
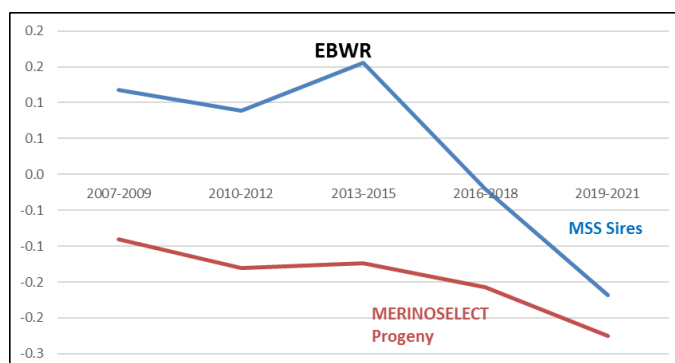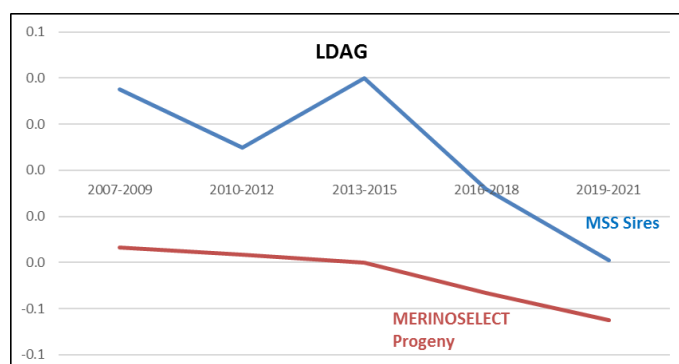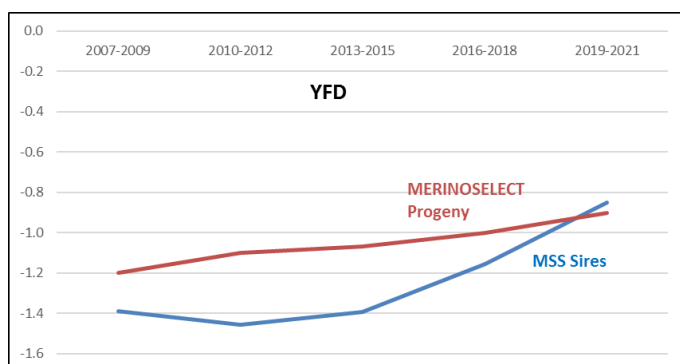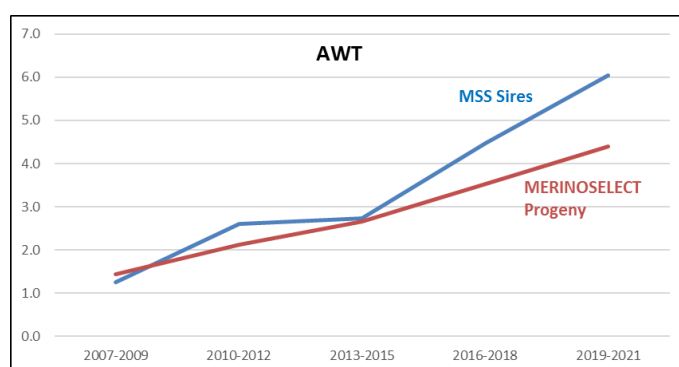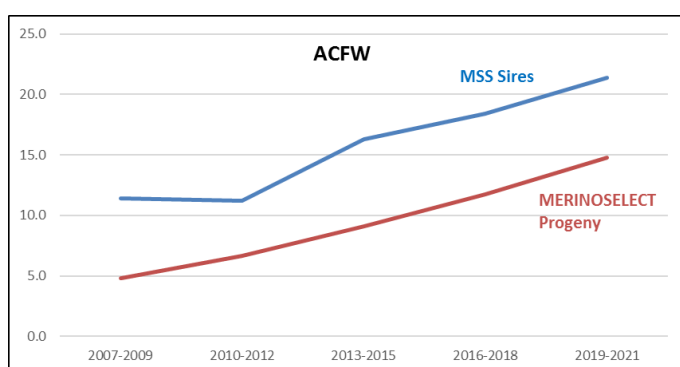
As can been seen from the charts the key production traits of body weight and fleece weight have both seen increases during the period. Fibre diameter has also seen an increase and whilst traditionally associated with negative genetics gain, this has occurred throughout a period when there have been limited micron premiums and increasing fleece weight has been the major focus of many woolgrowers.

Very positively, sire evaluation has seen significant decreases in the key flystrike indicator traits of breech wrinkle and dag during the period, with the majority of gain made in the second half of the period.

Further analysis has been carried out on other visual traits and is reported below in Table G. Analysis shows the average visual trait scores of sire evaluation progeny recorded in 2009 and then as recorded in 2009.

Table G: Comparison of Visual Traits Scores between 2009 and 2019.

Merino Sire Evaluation - All Sites - Visual Trait Scores (1-5)											
2009 Drop Average	Sire No. 79	FLROT 1.8	COL 2.3	CHAR 2.5	DUST 2.4	WEATH 2.4	SSTRC 2.3	JAW 1.0	LEGS 1.7	BACK 1.6	FACE 2.7	BDWR 2.3

Merino Sire Evaluation - All Sites - Visual Trait Scores (1-5)											
2019 Drop Average	**Sire No. 104**	FLROT 1.9	COL 2.1	CHAR 2.5	DUST 2.6	WEATH 3.1	SSTRC 2.4	JAW 1.4	LEGS 1.9	BACK 1.5	FACE 2.4	BDWR 2.0

As reported, sire evaluation progeny have got plainer, with more open faces, whilst retaining or slightly improving wool quality. Body structure has remained relatively constant, however feet and leg structure appears to have regressed.

It is hoped that within the next 3 years, this work will be extended to be able to look at visual trait trends across years using breeding values that will be developed using data collected by AMSEA.

It's extremely positive to note that wool quality is remaining consistent even though fleece weights have increased. Furthermore, the subjective assessment of body wrinkle correlates well with the decrease in the ASBVs for breech wrinkle.

Whilst body structure has remained constant, it is of concern that feet and leg structure has appeared to have regressed, which raises a potential area for focus moving forward.

To continue to drive genetic gain in the industry, AMSEA strives to ensure that results from those sires that will have the greatest impact on the industry are widely and freely available. A recent addition to the suite of reports published has aided in this process. The Merino Superior Sires High Use Sire List (see Appendix

9) showcases the top 25 sires, by number of progeny in MERINOSELECT, and reports on their key production traits as well as their overall visual grade. Providing easy access to this type of information allows all breeders to be aware of such sires and consider them in their breeding program. It is interesting that the average Tops and Culls results for the top 25 sires, was close to the average of all sires entered. This demonstrates that breeders may not necessarily be looking at visual traits when selecting semen sires. During the next 3 years, the aim will be to continue this work to more closely examine this trend. A report of the top 25 visual sires is being considered for development.

At a site level, AMSEA aims to continue to be at the forefront of collecting important industry traits, including those expensive and hard to measure traits, that will continue to drive genetic gain in the industry. Specifically, in relation to flystrike, further data collected at sites may aid in the development of another flystrike indicator trait breeding value. Other traits that will become more of focus for AMSEA over the next five years are those relating to reproduction and lamb survival as well and meat-eating quality. Furthermore, there is scope for AMSEA to collect an even wider range of data that may relate to traits such as feed intake, feed efficiency and methane output

AMSEA will continue to be in a unique position to work with other industry organisations for the benefit of the entire industry. Over the past several years AMSEA has worked formally with the Sheep CRC and now MLA to significantly increase the number of Merino sires that are genotyped and has recently mandated the genotyping of all sires entered in sire evaluation. AMSEA also worked closely with the Sheep CRC and commercial partners to lead the industry in the adoption of Tissue Sampling Units (TSUs) as a more efficient and robust DNA collection process. These types of innovations will continue to be pursued by AMSEA over the coming years. Such outcomes that are currently being investigated and could conceivably benefit from AMSEA's involvement include smart tags and sexed semen.

AMSEA's ongoing management of sire evaluation will ensure that the provision of industry resource flocks for the development and validation of genomic technology continues. This will be a key focus of AMSEA moving forward as it believes that the sire evaluation model has a tremendous amount to offer in this area. Whilst in the short-term this may involve the collection of traits specific to a flystrike reference population, across the longer term other traits of importance could also be included.

Potentially the largest impact that AMSEA may have over the coming years is that of general industry leadership and the oversight of technology such as MERINOSELECT. Having AMSEA as a strong and vibrant organisation allows for a robust independent review process and will provide AWI will a solid partner who

is well equipped to not only deliver sire evaluation programs throughout Australia but also related projects. These may include projects such as the ongoing development of the Visual Sheep Scores, oversight of Wether Trials and management of future industry building projects similar to the MLP Project.

Conclusions and Recommendations

AMSEA continues to add value to the Australian sheep industry through the management, administration and reporting of Merino Sire Evaluation in Australia. By providing a platform to measure and record hard and expensive to measure traits, including adult traits, sire evaluation continues to act as a key component of genetic improvement in the sheep industry.

Through AWI's continued funding of the core management, administrative and reporting function of AMSEA, this benefit will continue into the future and become more significant as more functions are performed that cannot be routinely carried out on-farm.

In order to achieve this outcome, it is recommended that AWI continues the core funding of AMSEA along with the separately funded link sire program that ensures individual site data is able to be amalgamated and used for extensive research purposes.

Furthermore, it is recommended that AMSEA and AWI together, consider the functions that can be added to the list of services that AMSEA provides. This will allow the sheep industry to further leverage off the investment already made in AMSEA and to make effective use of the very sound management, financial and governance processes that AMSEA already has in place. Services that should be considered include management of Merino specific genomic reference populations with an initial focus on flystrike, oversight of wether trials, development of the Visual Sheep Scores and the management of research projects in areas such as smart tags and sexed semen.

List of Abbreviations and/or Glossary

AGBU	Animal Genetics and Breeding Unit
ASBV	Australian Sheep Breeding Value
AMSEA	Australian Merino Sire Evaluation Association
AWI	Australian Wool Innovation
BACK	Back; the visual trait.
BDWR	Body Wrinkle; the visual trait.
CHAR	Character; the visual trait.
COL	Colour; the visual trait.
DUST	Dust; the visual trait.
EMD	Eye Muscle Depth; the carcase trait.
FACE	Face; the visual trait.
FAT	Fat; the carcase trait.
FBV	Flock Breeding Value.
FLROT	Fleece Rot; the visual trait.
JAW	Jaw; the visual trait.
LEGS	Legs; the visual trait.
MLA	Meat & Livestock Australia
MLP	Merino Lifetime Productivity; the project.
MLP High CFW	Link Sire selected for High CFW after use in the MLP project.
MSE	Merino Sire Evaluation; the national program of.

R&D   Research and Development.

SAG   Sire Advisory Group: advising on link sire allocations to sites.

SG   Sheep Genetics

SSTRC   Staple Structure; the visual trait.

WEATH   Weather; the visual trait.

VSS   Visual Sheep Scores; the publication guide.

AMSEA Admin & Reporting Project ON557 Final Report

Appendix 1 - Merino Superior Sires High Use Sire List

Top 25 High Use Sires – Entered in Merino Sire Evaluation (2015-2019)

Sire name / Sire ID	Sire of sire / Sire of sire ID	MSS entries - Site:Year (betw.2015-2019)	MERINOSELECT No. Flocks: No. Progeny	Poll/ Horn	YCFW (%)	ACFW (%)	AFD (µm)	ADCV (%)	ASL (mm)	ASS (Nktex)	YWT (kg)	AWT (kg)	YEMD (mm)	YFAT (mm)	YWEC (%)	EBRWR (score)	LDAG (score)	NLW (%)	Classing YTOP% YCULL%	DP+	MP+	FP+	WP+
Hazeldean, 11.3542 (Hugh) 500383-2011-003542	*Stockman Poll, 020603 (Jim)* 601050-2002-020603	BL:16 MAQ:18 ML:15/17 Y:15 MLP	26 5402	PH	35.5 / 99	28.2 / 99	-2.6 / 99	-0.1 / 98	0.7 / 98	0.5 / 98	3.5 / 98	0.8 / 98	-0.2 / 98	-0.2 / 98	76 / 93	0.7 / 98	-0.2 / 97	10 / 96	5 / 15	202 / 95	207 / 96	181 / 96	194 / 96
Moojepin, 120652 504637-2012-120652	*Moojepin, 100248* 504637-2010-100248	MAQ:17 PIN:17 MLP	30 3216	PH	21.2 / 98	12.1 / 98	-0.9 / 99	-0.4 / 98	26.9 / 99	-3.5 / 99	9.9 / 99	6.6 / 98	4.1 / 98	2.8 / 98	-23 / 94	-1.1 / 98	-0.4 / 97	19 / 95	-6 / 12	214 / 94	174 / 96	145 / 96	167 / 96
Woodyarrup, 120175 500412-2012-120175	*Woodyarrup, 091162* 500412-2009-091162	BL:16 MUR:16/17 MLP	12 3152	HH	40.7 / 97	38.2 / 97	-0.6 / 98	0.4 / 97	4.8 / 97	-0.3 / 96	11.1 / 99	7.1 / 98	-0.5 / 98	-1.1 / 98	13 / 79	-0.2 / 97	1.1 / 92	-2 / 88	11 / -8	187 / 89	193 / 91	167 / 91	188 / 93
Yalgoo, 160070 501552-2016-160070	*Centre Plus Poll, 307204* 601250-2013-307204	NE:18 MLP	20 2216	PP	30.3 / 98	20.1 / 97	-3.3 / 97	-1.2 / 96	3.9 / 96	-3.7 / 95	2.9 / 98	-0.7 / 97	0.2 / 96	-0.9 / 95	-18 / 90	0.9 / 98	-0.1 / 91	14 / 74	2 / 12	200 / 78	200 / 82	187 / 85	168 / 78
Yarrawonga, 140961 503534-2014-140961	*Yarrawonga, 112222* 503534-2011-112222	ML:16 MLP	15 2176	PP	27.4 / 96	15.6 / 97	-1.8 / 98	-2.1 / 97	2.6 / 91	2.9 / 90	5.1 / 99	3.5 / 97	-0.8 / 96	-0.8 / 95	10 / 60	0.8 / 96	-0.1 / 72	-8 / 77	5 / 5	135 / 80	158 / 83	149 / 85	149 / 86
Leahcim Poll, 152775 600815-2015-152775	*Leahcim Poll, 122899* 600815-2012-122899	SA:17	20 1866	PP	21.1 / 98	14.7 / 95	-1.3 / 95	-1.5 / 94	9.6 / 92	-2.6 / 91	11.7 / 99	9.9 / 98	0.2 / 96	1.1 / 96	38 / 78	-0.7 / 98	-0.1 / 93	-7 / 82	17 / -15	143 / 84	146 / 86	134 / 87	149 / 89
Hazeldean, 12.4030 500383-2012-004030	*Nerstane, 080121* 503298-2008-080121	BL:17 ML:17 MLP	6 1849	HH	41.3 / 96	39.7 / 96	-1.8 / 97	0.0 / 96	16.6 / 95	1.0 / 94	4.0 / 98	1.9 / 96	-1.5 / 95	-0.9 / 93	-12 / 81	0.5 / 97	0.3 / 90	7 / 89	21 / -7	196 / 89	204 / 91	186 / 91	192 / 91
Bundilla Poll, 150009 601435-2015-150009	*Billandri Poll, 121391* 600571-2012-121391	MLB:19	8 1836	PP	37.2 / 98	31.8 / 91	-0.6 / 94	-0.1 / 94	12.9 / 91	-0.6 / 88	9.7 / 98	9.2 / 98	1.4 / 98	1.1 / 98	16 / 84	0.0 / 98	0.1 / 97	9 / 87	-5 / 10	207 / 87	190 / 89	162 / 88	192 / 86
Leahcim Poll, 090918 600815-2009-090918	*Leahcim Poll, 070319* 600815-2007-070319	BL:15/16 ML:16 ML2P:16 PIN:16 MLP	24 1810	PP	13.8 / 98	6.9 / 98	-0.8 / 98	-1.4 / 98	12.3 / 98	0.4 / 98	5.3 / 99	4.0 / 98	0.0 / 98	0.2 / 97	5 / 94	-1.6 / 98	-0.6 / 96	0 / 93	10 / -8	133 / 93	135 / 94	129 / 94	130 / 95
Anderson Poll, 170660 609147-2017-170660	*Anderson Poll, 150200* 609147-2015-150200	BL:19 Y:19	15 1733	PP	44.7 / 97	30.2 / 97	0.9 / 92	-1.6 / 90	11.5 / 86	7.1 / 85	10.7 / 98	5.8 / 97	1.2 / 97	1.1 / 97	-75 / 84	-0.3 / 98	-0.7 / 91	11 / 54	Not yet analysed	209 / 62	194 / 68	164 / 74	193 / 76
Anderson Poll, 140474 609147-2014-140474	*Anderson Poll, 120103* 609147-2012-120103	PIN:17 MLP	27 1700	PP	24.8 / 98	18.9 / 97	0.1 / 98	-0.3 / 97	10.7 / 97	2.6 / 97	10.6 / 98	6.1 / 98	3.7 / 98	2.0 / 97	-66 / 89	-0.7 / 98	-0.6 / 96	8 / 89	8 / -14	198 / 89	167 / 91	146 / 92	165 / 92
Leahcim Poll, 123153 600815-2012-123153	*Leahcim Poll, 101009* 600815-2010-101009	BL:15 MLP	17 1530	PH	14.3 / 98	10.6 / 98	-0.9 / 98	-1.6 / 97	14.4 / 96	-4.4 / 95	8.2 / 98	6.0 / 98	2.9 / 97	1.6 / 97	48 / 78	-1.1 / 97	0.2 / 94	-3 / 91	-5 / -3	150 / 91	128 / 93	119 / 92	134 / 94
Centre Plus Poll, 407185 601250-2014-407185	*Centre Plus Poll, 207058* 601250-2012-207058	ML:17 ML2P:17 MLP	25 1483	PP	22.7 / 98	14.2 / 97	-2.4 / 98	-1.0 / 97	6.3 / 97	-3.7 / 96	6.9 / 98	5.6 / 98	1.7 / 97	0.4 / 97	-3 / 87	-0.4 / 98	-0.4 / 92	-14 / 91	1 / -8	137 / 91	140 / 93	135 / 93	142 / 93
Poll Boonoke, 150026 600001-2015-150026	*Poll Boonoke, 130028* 600001-2013-130028	SA:17	13 1444	PH	32.8 / 96	26.0 / 94	-0.6 / 94	1.2 / 92	4.2 / 88	-3.8 / 84	10.7 / 98	9.4 / 95	-1.2 / 97	0.7 / 96	27 / 68	-0.5 / 94	-0.3 / 84	-8 / 55	-15 / 21	144 / 63	157 / 69	133 / 73	162 / 77
Centre Plus Poll, 707115 601250-2007-707115	*Centre Plus Poll, 407373* 601250-2004-407373	BL:16 MAQ:17/18 MLP	23 1439	PH	22.1 / 98	7.4 / 98	-1.0 / 98	-0.6 / 98	12.5 / 98	-3.0 / 97	7.9 / 98	6.3 / 98	1.6 / 97	1 / 97	-75 / 94	-0.2 / 98	0.0 / 95	21 / 92	-1 / 0	198 / 92	175 / 93	152 / 94	166 / 94
Moojepin, 100248 504637-2010-100248	*Moojepin, 081206* 504637-2008-081206	BL:15 MLP	13 1418	PH	15.9 / 98	7.06 / 97	0.35 / 98	-0.2 / 97	25.6 / 97	-1.5 / 96	11.0 / 98	9.0 / 98	3.2 / 98	2.1 / 97	-38 / 94	-1.4 / 97	-0.4 / 96	13 / 88	-10 / 12	180 / 89	148 / 91	124 / 92	148 / 93
Bundilla Poll, 171495 601435-2017-171495	*Bundilla Poll, 150009* 601435-2015-150009	ML:19	11 1404	PP	39 / 97	37.8 / 86	-0.6 / 98	0.3 / 90	9.3 / 85	-3.9 / 81	10.6 / 98	9.5 / 92	-0.1 / 98	-0.7 / 97	-4 / 79	0.2 / 98	0.0 / 97	-1 / 56	-6 / 16	185 / 63	183 / 68	159 / 71	195 / 75
Leahcim Poll, 132624 600815-2013-132624	*Leahcim Poll, 110490* 600815-2011-110490	ML2P:17 SA:18 MLP	19 1285	PP	18.1 / 98	15.0 / 97	-1.4 / 98	-1.5 / 97	10.5 / 97	-2.8 / 96	7.3 / 98	6.8 / 98	0.9 / 98	1.3 / 97	9 / 84	-0.6 / 97	-0.3 / 95	-14 / 90	-11 / -11	124 / 90	130 / 92	128 / 93	134 / 94
Moorundie Poll, NE73 601502-2015-150073	*Moorundie Poll, 110020* 601502-2011-110020	BL:17 NE:17 PIN:17 SA:19 MLP	18 1260	PP	40.7 / 97	37.5 / 97	-1.1 / 98	1.5 / 97	8.8 / 97	-3.7 / 95	8.4 / 98	6.1 / 97	-0.5 / 97	-0.5 / 96	58 / 80	-0.1 / 98	-0.4 / 95	-8 / 77	-4 / 9	165 / 80	177 / 83	153 / 87	178 / 87
Merinotech WA Poll, 122121 609040-2012-122121	*Merinotech WA Poll, 100048* 609040-2010-100048	Y:18	6 1191	PP	7.53 / 97	2.0 / 93	-1.0 / 95	-1.7 / 95	0.1 / 97	10.5 / 96	5.2 / 98	5.2 / 95	1.8 / 97	1.1 / 96	-46 / 95	-0.3 / 95	-0.2 / 95	30 / 87	-13 / -7	218 / 87	189 / 89	171 / 90	165 / 91
Poll Boonoke, 160612 600001-2016-160612	*Collinsville Poll, 120102* 600105-2012-120102	BL:20	11 1185	PP	31.3 / 94	31.2 / 89	-0.5 / 91	0.4 / 89	7.6 / 90	-1.8 / 81	9.1 / 97	6.9 / 92	2.0 / 95	0.4 / 93	56 / 67	-0.4 / 96	0.0 / 62	-4 / 68	Not yet analysed	178 / 72	164 / 75	140 / 77	165 / 79
Trigger Vale Poll, 140477 609251-2014-140477	*Trigger Vale Poll, 110511* 609251-2011-110511	MAQ:17 ML2P:16/17 NE:17 PIN:17 MLP	15 1157	PP	16.7 / 98	14.0 / 98	1.0 / 98	-2.4 / 98	12.4 / 98	0.6 / 97	11.6 / 98	11.2 / 98	1.5 / 98	1.9 / 98	-10 / 87	-1.5 / 98	0.0 / 96	-10 / 93	-2 / -3	128 / 93	120 / 94	111 / 94	133 / 95
Bundilla Poll, 140055 601435-2014-140055	*Bundilla, 110107* 504081-2011-110107	ML:16/17 ML2P:17 MLP	10 1111	PP	17.1 / 97	15.7 / 97	-1.2 / 98	-0.7 / 98	4.0 / 98	-2.0 / 96	8.0 / 98	7.9 / 98	1.8 / 97	-0.6 / 97	39 / 84	-0.2 / 97	-0.1 / 92	5 / 91	8 / -19	177 / 91	160 / 92	144 / 93	157 / 93
Stockman Poll, 090853 (Stilts) 601050-2009-090853	*Stockman Poll, 020603 (Jim)* 601050-2002-020603	BL:16 NE:15 MLP	10 1105	PP	19.9 / 96	18.1 / 96	-1.5 / 97	-0.1 / 96	2.2 / 96	2.0 / 95	3.2 / 98	2.9 / 97	-0.4 / 96	-0.5 / 94	76 / 90	0.0 / 97	-0.3 / 93	7 / 80	5 / -18	169 / 82	170 / 85	154 / 87	156 / 88
Tallawong Merinos, 150280 505011-2015-150280	*Hazeldean, 11.3542 (Hugh)* 500383-2011-003542	NE:18 ML2P: 17 MLP	9 1105	PP	28.5 / 97	24.4 / 97	-2.8 / 98	-2.2 / 97	0.3 / 97	9.0 / 95	5.5 / 98	3.4 / 97	-2.2 / 93	-0.9 / 92	17 / 85	0.7 / 98	-0.2 / 92	0 / 74	4 / -5	189 / 78	209 / 82	198 / 86	184 / 86
Top 25 High Use Sires Average					26.7 / 97	20.9 / 95	-1.1 / 97	-0.6 / 96	8.5 / 95	-0.2 / 93	7.9 / 98	5.9 / 97	0.8 / 97	0.5 / 96	3.6 / 84	-0.3 / 97	-0.1 / 92	3 / 83	1 / -1	174 / 84	169 / 87	151 / 88	164 / 89

BL=Balmoral MAQ=Macquarie ML=MerinoLink ML2P=MerinoLink MLP MLB=MerinoLink Boorowa MUR=Muresk NE=New England NEV=North East Victoria PIN=Pingelly SA=South Australia Y=Yardstick MLP=Merino Lifetime Productivity Project

Australian Merino Sire Evaluation Association: March 12, 2021

For more information visit merinosuperiorsires.com.au/resources

Appendix 2 – Beyond the Bale Articles

WORLD'S OLDEST SPERM STILL SWIMMING STRONG

Woolgrowers last month gathered at the Balmoral Sire Evaluation Field Day in Victoria to see first-hand the progeny of ewes inseminated with thawed 50-year-old frozen ram semen. The old semen achieved similar pregnancy scanning results and live births to the recently collected semen.

Frozen in 1968 by Dr Steven Salamon of The University of Sydney, the 50-year-old semen comprises a pool of semen from four rams: a 1959 drop Bonooke ram, a 1963 drop Merryville ram and sons of them that were born in 1963 and 1965 owned at the time by the Walker family of Ledgworth (and latterly Woolaroo), Yass. Peter Walker has been a long-time supporter of the R&D and attended the Field Day along with current and former researchers from The University of Sydney.

Originally frozen to prove sperm could survive storage in liquid nitrogen (-196˚C) for several years, this bank of semen is to the best of our knowledge the oldest in existence of any species (human or animal) anywhere in the world.

For researchers Associate Professor Simon de Graaf and Dr Jessica Rickard at The University of Sydney, looking down the microscope at sperm cells swimming for the first time in 50 years, is a reminder of the remarkable discoveries their predecessors made to enable the commercial development of artificial insemination of sheep.

Despite 50 years of storage, the semen is as fertile as the day it was frozen, with pregnancy and scanning rates no different to the overall average of all sires (also artificially inseminated) in the Balmoral program. The fertility of this semen demonstrates that long term frozen storage of sperm is safe and reliably preserves genetics for future use, not just for agriculture but also human medicine.

This is of particular importance to young male cancer patients, who have stored semen prior to radiation treatment and/or chemotherapy and may want to start a family decades later but are unable to conceive naturally. This brought international media attention to the Field Day.

Much of the early artificial breeding work in sheep informed the development of many human reproductive technologies, often only applied in human medicine long after their availability in sheep. Peter Walker and his sheep were also involved in some of the pre commercialisation work for the human contraceptive pill, first released in the late 1960s.

The 2018 drop lambs on display were only six months old with six months wool but the lambs by the pooled semen certainly looked different to the progeny of current sires.

The comparison of the performance and visual traits will be of great interest to woolgrowers, researchers and the wider industry as the lambs are assessed over the next two years. They will be shorn for the first time in April 2019 and will again be on display for the 2020 Balmoral Field Day before being shorn for the second time in April 2020.

Reports on the 2018 drop Sire Evaluation will be available on the Merino Superior Sires website merinosuperiorsires.com.au in May 2019 after their first shearing.

AWI's predecessors, the Australian Wool Board, Australian Wool Commission, Australian Wool Corporation and Australian Wool Research and Promotion Organisation (AWRAP), co-funded much of the pioneering work into oestrus synchronisation, frozen semen and laparoscopic insemination technology with The University of Sydney's former researchers, Professors Terry Robinson, Gareth Evans, Chis Maxwell and Dr Steven Salamon.

Continuing investment from AWI in The University of Sydney's current research projects support Associate Professor Simon de Graaf (a student of both Evans and Maxwell) and Dr Jessica Rickard (a student of de Graaf; current McCaughey Research Fellow) to build on this legacy and deliver the next generation of assisted reproductive

Associate Professor Simon de Graaf, Peter Walker and **Dr Jessica Rickard** inspecting the progeny from the 50-year-old semen.

technologies for the sheep industry in a changing world where consumers are increasingly sensitive to laparoscopic AI and the use of PMSG (Pregnant Mare Serum Gonadatropin) to stimulate the ewe to cycle.

At the Balmoral Merino Sire Evaluation Field Day, held at 'Kooringal' in Coleraine, woolgrowers also heard from guest speakers including AWI Director Don Macdonald, Merino Lifetime Productivity project manager Anne Ramsay, Dr John Steinfort of Steinfort AgVet Pty Ltd and Associate Professor Simon de Graaf of The University of Sydney.

MORE INFORMATION
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17 of the 26-member **Balmoral Breeder Committee** who put on the Sire Evaluation Field Day led by Chairman and site host Mark Bunge.

AWI ARTIFICIAL BREEDING WORKSHOP

AWI convened an Artificial Breeding Workshop in December – attended by more than 30 invited researchers, woolgrowers, AI practitioners and commercial providers – to discuss the current PMSG shortage and help guide AWI's artificial breeding R&D strategy.

The AWI-hosted workshop was in response to several matters affecting the industry. Of immediate concern is the sudden shortage in Australia of PMSG, on which the industry relies for oestrus synchronization for AI and embryo transfer programs. The meeting concluded that there is a reasonable chance that PMSG will be available for the next breeding season (ie late 2019) but it is still unclear as to who will be the new importer. With increasing animal welfare concerns regarding how the PMSG is collected and used in other species, it is prudent for the sheep industry in the long term to look at PMSG-free AI and ET protocols.

Laparoscopic AI using frozen semen has for many years produced highly variable results. The good results have been good,

but the low results have led producers to walk away from the technology. Not only are falling conception rates restricting the adoption of artificial breeding and the growth of the artificial breeding industry, they are restricting the rates of Merino genetic gain.

AWI-funded research being run through SARDI aims to address several of these issues by developing new treatment protocols that are able to consistently produce improved levels of synchrony of oestrus. The workshop heard from the researchers who said that preliminary observations suggest there may indeed be ways to improve the synchrony protocols.

The workshop also heard that the results from an AWI-funded project undertaken by The University of Sydney have determined

that 'sexed semen' technology is effective enough to enable woolgrowers to choose whether they want male or female lambs via AI. Work on an appropriate diluent for frozen sexed sperm in a commercial environment is in the final stages of trialling. It is expected that it will be commercially available mid 2019.

Another AWI-funded project being undertaken by the University of Sydney is seeking to improve the function of frozen ram semen so that it can be effectively used in low cost, non-surgical, 'cervical' AI programs.

The workshop also heard about two new projects proposed by the University of Sydney: one to examine advanced in vitro tests that might provide an industry standard for semen quality, and the second to utilise new ear tag sensing technologies that provides the possibility of detecting oestrus, ovulation and joining remotely.

NSW DPI Livestock Research Officer Dr Gordon Refshauge also reported to the workshop on Australian research showing the negative impact of heat stress on embryo survival. **B**

MORE INFORMATION
The report on the workshop is available on the AWI website at **www.wool.com/artificialbreeding.**

WORLD'S OLDEST FROZEN SEMEN
TRIALLED IN MERINO SIRE EVALUATION AND RESULTS ARE NOW AVAILABLE

The progeny of 50-year-old frozen ram semen have been assessed for visual, wool and carcase performance and trialled against contemporary Merino sires currently in use in the industry, at Balmoral Breeders' 2018 Merino Sire Evaluation trial in Victoria.

The Balmoral Breeders' trial used artificial insemination (AI) to join 20 sire entries for a 2018 drop of progeny. One of these entries came from semen frozen in 1968 at the University of Sydney when the science of using frozen semen was being developed by Dr Steven Salamon. It is understood to be the oldest semen in the world, of any species. The entry costs of the 50-year-old semen was funded by AWI.

The semen was a mix from four rams including a purchased sire from Boonoke (1959 drop), another from Merryville (1963 drop) and a son from both rams out of Woolaroo stud ewes. The rams were owned by the Walker family of Ledgworth, Yass NSW (formerly 'Woolaroo').

The other 19 sires used in the Balmoral trial were rams currently used in the industry and nominated by Merino breeders to be benchmarked against other genetics. This trial combination of current and historical genetics has allowed the direct comparison of genetics that are more than 50 years old to current industry sires.

SEMEN VIABILITY

The 50-year-old semen was used to AI 56 Merino ewes. Of these, 34 conceived achieving a 61% pregnancy rate. At pregnancy scanning, 46 foetuses were scanned giving a 82% scanning rate.

The overall trial averaged a pregnancy rate of 59% and a scanning rate of 80%. So it seems as though the 50-year-old semen viability was not impacted by its long-term storage and it was as good as the day it was frozen!

Pregnancy and scanning rates from 50-year-old semen compared to the trial average

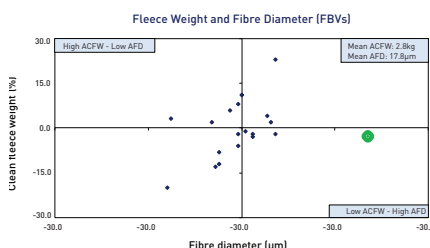| SEMEN TYPE	PREGNANCY RATE	SCANNING RATE
50-YEAR-OLD SEMEN	61% (34/56)	82% (46/56)
TRIAL AVERAGE	59% (652/1104)	80% (888/1104)

REPORT RESULTS

Assessment of the trial progeny was completed under the Australian Merino Sire Evaluation Association (AMSEA) framework. Assessment commenced at lamb marking with breech traits being scored, then visual classing and wool measurements were undertaken at the Post Weaning and Adult stages plus carcase measurements collected at the Yearling stage.

Below is a snapshot of the Balmoral Breeders' 2018 Merino Sire Evaluation trial results with the 50-year-old semen results highlighted in green. Fleece weight, fibre diameter and body weight are reported as flock breeding values (FBVs) and breech wrinkle as a deviation (Dev) from the average score of the drop.
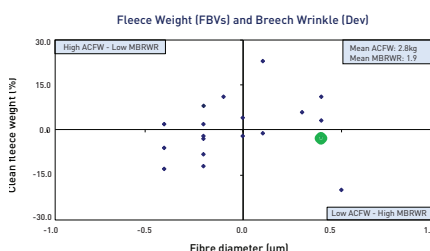
ADULT CLEAN FLEECE WEIGHT (ACFW) AND ADULT FIBRE DIAMETER (AFD)

The 50-year-old genetics (green marker) are significantly higher in fibre diameter than the other sires, whilst being just below average for fleece weight.

Fleece Weight and Fibre Diameter (FBVs)

ADULT CLEAN FLEECE WEIGHT (ACFW) AND MARKING BREECH WRINKLE (MBRWR)

The 50-year-old genetics (green marker) carry more wrinkle than most of the other sires.

Fleece Weight (FBVs) and Breech Wrinkle (Dev)

ADULT CLEAN FLEECE WEIGHT (ACFW) AND ADULT BODY WEIGHT (AWT)

The progeny carrying the 50-year-old genetics (green marker) are the smallest animals in the trial.
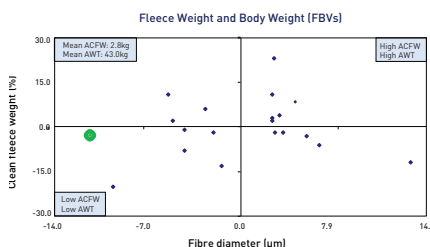
Fleece Weight and Body Weight (FBVs)

Visual scores for fleece rot, wool colour, wool character, body wrinkle, breech wrinkle and breech cover indicate that there has been significant progress in these traits over the past 50 years. This progress can be seen when comparing the scores of current genetics to the average for the four sires from the 1960s.

The 2018 Balmoral Breeders' trial was hosted by the Mark Bunge and his family on 'Kooringal' near Coleraine in Victoria. Mark was eagerly anticipating the results of the trial as he had noticed a significant difference in the paddock. "The visual difference in the progeny was obvious, so it is interesting to see that the measured results confirm the productivity differences between this group and other entrants," Mark said.

MORE INFORMATION
Download the full Balmoral Breeders' 2018 Drop Adult Assessment Site Report at **www.merinosuperiorsires.com.au.**

Peter Walker, whose family owned the rams that provided the semen 50 years ago, inspecting the progeny.

Left: The new Producer Version of the **Visual Sheep Scores** booklet.

Below: An excerpt from the updated Visual Sheep Scores booklet, displaying the newly included **Teeth Eruption** (TE) trait page.

VISUAL SHEEP SCORES
NEW VERSION NOW AVAILABLE

An updated Producer Version of the Visual Sheep Scores (VSS) booklet is now available. VSS is a pocket guide for commercial and stud breeders, providing a standardised framework for assessing and scoring visual sheep traits.

UPDATES IN THE LATEST VERSION INCLUDE:

- improvements to the usability of the booklet
- inclusion of scores for Teeth Eruption (TE) and Horn (HORN)
- allowance for both undershot and overshot jaw scores
- inclusion of scores for the new lambing traits Maternal Behaviour (MB) and Lambing Ease (LE)
- further clarifications to trait definitions and scoring diagrams.

The Visual Sheep Scores (VSS) booklet has been redeveloped after receiving industry feedback which was incorporated into an extensive review process. Sheep classers along with commercial and stud breeders across the industry were involved. Recent experience with Merino Sire Evaluation and the Merino Lifetime Productivity (MLP) project was also considered in the review. The Research Version is now being updated to include the changes made to the Producer Version.

The review of the Producer Version included clarifications to trait descriptions and diagrams to bring them up to date with industry requirements, along with the

consideration of a number of new traits. Some new traits were included in this version and others will require further development as additional research is completed.

The result is a set of current and applicable scores of fresh descriptions and diagrams all presented in a user-friendly booklet, with sections now separated with a tab for easy look-up. New scores are outlined for the now-included visual traits: Teeth Eruption (TE), Horn (HORN) and lambing scores for Maternal Behaviour (MB) and Lambing Ease (LE). Classing grades have also been further defined into Overall Selection Grade (SGRADE) and Classer's Visual Grade (GRADE).

A standardised scoring framework enables visual assessment results to be compared between sites and locations, as well as across industry. Commercial and stud breeders can use the Visual Sheep Scores as a selection tool in their own operations by focusing on selecting traits that have commercial value for their operation. However, it is important to maintain a selection balance and be mindful of all the traits that determine profitability and quality in the flock.

VSS is extensively used by members of MERINOSELECT, DOHNE and LAMBPLAN to score a range of traits. It is also used for Merino Sire Evaluation classing for a wide range of visual assessments completed under the Australian Merino Sire Evaluation Association (AMSEA) banner and is also used

by classers at each of the five MLP project sites and for MLA's Genomic Resource Flock. Classing activities include scoring wool quality, conformation, breech cover and wrinkle, plus pigmentation assessments.

Updates will be used in 2020 classing activities at AMSEA and MLP sites, with the collected data then able to be submitted to the Sheep Genetics MERINOSELECT database as visual score data and genetic information. This is then used to progress development of Australian Sheep Breeding Values (ASBVs). Developed by Sheep Genetics, ASBVs enable ram breeders and commercial sheep producers to compare the genetic potential of rams and ewes for a range of production traits, independent of the environment and location.

VSS was first developed by AWI and MLA in 2007 to be used across the sheep industry by stud and commercial sheep breeders by providing a standard set of scores to assess the phenotypic or visual sheep traits. The review in 2012 has now been superseded by this 2019 update. B

MORE INFORMATION
Download the VSS booklet at **www.wool.com/genetic-evaluation**, or at **www.merinosuperiorsires.com.au/resources** where you can view additional information outlining the newly incorporated changes. You can request a hard copy by emailing merinosuperiorsires@bcsagribusiness.com.au.

MERINO SUPERIOR SIRES 2020

The 2020 Merino Superior Sires No 26 publication has been published by the Australian Merino Sire Evaluation Association (AMSEA) reporting the results of the 350+ sires entered in Merino Sire Evaluation between 2015 and 2019. Results include MERINOSELECT ASBVs for both wool and carcase traits, alongside widely used indexes. These results add to the within-site classing, visual and measured results reported by trial sites on the Merino Superior Sires website.
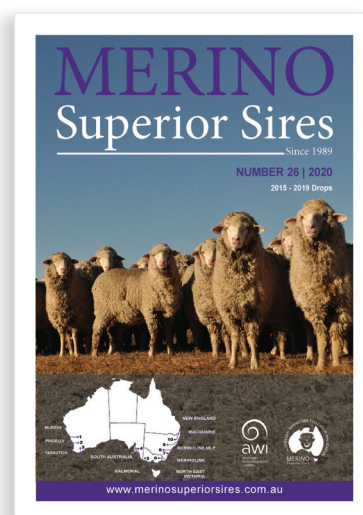
Merino Superior Sires No.26 was released in October and is available, along with other Merino Sire Evaluation program information, at **www.merinosuperiorsires.com.au**

The crowd at **Balmoral's 2020 Field Day.** *PHOTO:* Balmoral Breeders.

Merino Superior Sires reports Australian Sheep Breeding Values (ASBVs) for each sire for a range of measured traits including, clean fleece weight, fibre diameter, staple strength, body weight, eye muscle depth, fat depth, plus worm egg count. Breeding Values are also included for the visual trait of early breech wrinkle and the percentages of progeny classed as Tops and Culls. Three standard industry indexes are reported, DP+, MP+ and FP+, plus the index developed specifically for AMSEA, WP+ (Wool Production Plus).

The *Top 50* sires are also reported in Merino Superior Sires for each index, along with individual trait ASBVs, Classer Grade and Poll/Horn status. In addition, an online version reports the *All Time Top 50* sires for these indexes and, for the first time, a report outlining industry's high use sires will be available online. Merino Superior Sires is available for download, as are the corresponding within-site Merino Sire Evaluation reports, at www.merinosuperiorsires.com.au.

Merino Sire Evaluation takes sire nominations from any ram breeder or purchaser (with breeder permission) for entry at trial sites across Australia. Sire Evaluation provides benchmarking against other leading industry sires by providing the same ewes, and then the same management and environment for their progeny at each site.

Entry enables:

- benchmarking of a sire's genetics against the best in the industry

- assessment at older stages such as hogget and adult

- creation or improvement of flock linkage with MERINOSELECT

- promotion of semen, stud ram and flock ram sales.

Entered sires are joined via artificial insemination with the resulting progeny evaluated for a range of traits relative to the progeny of other entered sires. All progeny are visually classed, measured and assessed without sire identification by independent, specialised operators for a wide range of traits including wool, carcase, breech conformation and parasite resistance.

A site field day enables inspection of the sire progeny groups alongside their current results. Sire results are reported at the site level as within flock breeding values (FBVs) as well as in Merino Superior Sires and via MERINOSELECT as ASBVs. The publication of ASBVs is made possible by using strong link sires at each site that allow the direct comparison of sires across all sites and years. **B**

MORE INFORMATION

- **Download** Merino Superior Sires #26 and within-site reports at **www.merinosuperiorsires.com.au**

- **Nominate** a sire for entry in AMSEA's Sire Evaluation program by emailing **merinosireevaluation@ bcsagribusiness.com.au**

- **Subscribe** to trial results and upcoming field day notices via **www.bit.ly/AMSEA_Subscription**

Genetics update

Breeding productive, naturally breech strike resistant Merinos

From recent R&D we know that Merinos with actual (phenotypic) Wrinkle score 2 and less, Dag score 2 and less, and Breech Cover score 3 and less, have low risks of breech strike similar to mulesing, while even lower scores lower the risk further.

We also know that mulesing, on average, reduces the natural wrinkle by 1.0 score, reduces urine stain by 0.5 score and reduces dag by 0.4 score. The higher the starting natural score, the greater the reduction.

Trials have also shown that to achieve the required wrinkle score to move to a naturally non-mulesed enterprise without an increased reliance on chemical prevention, the target Wrinkle ASBV in high wrinkle country is around minus 1.0, in moderate wrinkle country minus 0.6, and in low wrinkle country minus 0.3. There is consensus among most non-mulesed ram breeders regarding these targets, but there is considerable variability between country and sheep types, and each grower needs to arrive at targets specifically relevant to their sheep and country.

In low dag country, a target Dag ASBV is a lower priority as they are much less frequently expressed. In high dag country a Dag ASBV of -0.4 is required but it is a tough target as only 5% of all MERINOSELECT animals measured for dag meet this performance target (see Table 4).

Armed with an increasing amount of breech trait scoring and Adult fleece assessments, Merino ram breeders are increasingly breeding more productive sires with high adult fleece weight and fertility along with natural resistance to breech strike. This is evidenced by the fact that the leading sires come from relatively recent drops of progeny tested sires and the momentum is building.

Tables 1 to 3 are generated using the MERINOSELECT animal search function (April 2021) and are examples of the leading breech strike trait sires for some high, moderate and low diameter sires. While only an indicative selection, they show that breeding high performance, naturally resistant Merinos is harder in lower fibre diameter Merinos and for breeders in high dag regions. See how the low diameter sires have higher wrinkle scores, a function of past Merino types and breeding. Some of these leading sires will be too high in Worm Egg Count or Adult body weight or low in fat for some breeders.

During the past 15 years, a range of new traits has been added to Merino breeding objectives such as Worm Egg Count, Fat, Muscle, Wrinkle, Cover, Dag and Polled Genotypes. Whilst these additional traits are more important in some production systems than others, it has added further complexity to breeding programs. For an enterprise to move away from mulesing, important measures to consider are both the average performance of all sires in the flock as well as their consistency in type. Without consistency, the result will be wider variation in welfare risk, diverse management and costly culling.

Table 1. High micron, high index sires with leading breech trait ASBVs. There are sires in top 10% for wrinkle and top 10% for adult fleece weight.

DROP	ACFW	YFD	YFAT	YWt	WEC	NLW	EBWR	ECOV	LDAG	DP+
2016	34	0.6	1.1	17	-71	2.0	-1.4	-0.3	-0.3	210
2016	27	-0.5	0.6	11	18	0	-1.0	-0.3	0.1	187
2017	40	-0.1	-0.6	11	–	4	-1.1	-0.2	0.0	192
2017	25	-0.7	1.5	16	-17	20	-0.7	-1.3	-0.5	255
2019	21	-0.6	1.0	11	–	10	-1.0	-0.7	-0.3	204

Table 2. Moderate micron, high index sires with leading breech trait ASBVs. Leading sires are top 30% for breech wrinkle.

DROP	ACFW	YFD	YFAT	YWt	WEC	NLW	EBWR	ECOV	LDAG	MP+
2015	12	-1.8	0.7	8	-48	17	-0.5	-0.8	-0.1	193
2017	26	-1.7	0.8	10	–	10	-0.5	-0.8	–	201
2018	16	-1.4	0.6	17	–	15	-0.6	-1.4	0.1	198
2018	34	-1.8	-0.4	16	-6	0	-0.4	0.2	-0.1	202

Table 3. Low micron sires with leading breech trait ASBVs. Leading Sires are in the top 50% for breech wrinkle.

DROP	ACFW	YFD	YFAT	YWt	WEC	NLW	EBWR	ECOV	LDAG	FP+
2013	8	-2.9	-0.4	4	–	–	-0.2	-0.1	0.0	155
2014	14	-3.0	-0.5	5	-8	3	-0.2	0.0	0.1	160
2015	17	-3.0	-1.0	5	10	-9	0.0	0.0	-0.1	149
2018	2	-2.7	1.0	5	–	14	-0.2	-0.4	-0.2	164

Table 4. MERINOSELECT ASBV percentile table (7th April 2021)

PERCENTILE	ACFW	YFD	NLW	EBWR	ECOV	LDAG	DP+	MP+	FP+
Top 1%	35	-3.2	14	-1.3	-0.8	-0.5	197	192	177
Top 5%	29	-2.5	10	-1.1	-0.6	-0.4	181	178	163
Top 10%	26	-2.2	8	-0.9	-0.5	-0.3	173	170	157
Top 20%	22	-1.7	5	-0.7	-0.4	-0.2	163	162	150
Average	15	-1.0	1	-0.2	-0.1	-0.1	146	146	137
Top 70%	9	-0.5	0	+0.1	+0.0	+0.1	137	136	129

Trait leaders show the ASBV is `top 10%`

ACFW Adult Clean Fleece Weight   YFD Yearling Fibre Diameter   NLW Number of Lambs Weaned   EBWR Early Breech Wrinkle   ECOV Early Breech Cover
LDAG Late Dag   DP+ Dual Purpose Plus Index   MP+ Merino Production Plus Index   FP+ Fibre Production Plus Index

Merino Sire Evaluation new sites

List of high use Merino Superior Sires

The Australian Merino Sire Evaluation Association (AMSEA) oversees Sire Evaluation sites across Australia. These sites provide opportunities for ram breeders to compare the genetic performance of individual rams with those from other ram breeding flocks.

AMSEA has collated the ASBV and classing results of the 25 most-used industry sires that have been entered in Merino Sire Evaluation between 2015–2019. This report is available for download in the 'Latest Updates' section of www.merinosuperiorsires.com.au.

These 25 most-used sires are drawn from the 351 sires entered in Merino Sire Evaluation and the Merino Lifetime Productivity (MLP) project between 2015 and 2019. Eighteen of the 25 sires have been used in the MLP project, highlighting the popularity of many of the MLP sires.

Together, these 25 rams have sired more than 46,000 progeny across Australia, averaging 1,800 progeny per sire. All 25 have more than 1,000 progeny, with the most-used sire having nearly 5,500 progeny in 26 flocks. The average number of flocks directly using the genetics of these 25 sires is 16 flocks per ram.

Recent results for both wool and carcase traits are reported as ASBVs from MERINOSELECT. AMSEA classing results are also incorporated with the Tops and Culls which are reported as percentage deviations from the average.

Traits that are ranking in the top 10% are **highlighted**. Sires entered in the MLP project are denoted with the tag **MLP**.

Yearling (Y) and Adult (A) stages are reported where possible to provide an important older age perspective on results. Early Breech Wrinkle (EBRWR) and Late Dag (LDAG) scores plus Number of Lambs Weaned (NLW) are reported as per MERINOSELECT. Accuracies for these ASBV and index results are high, as would be expected with such large numbers of progeny.

If you would like any further Merino Sire Evaluation information or the 25 High Use Sires report, please email merinosireevalution@bcsagribusiness.com.au.

Top 25 High Use Sires – Entered in Merino Sire Evaluation (2015-2019)

New Dohne Sire Evaluation site

A new Dohne site has commenced this year at 'Coonong Station', Urana, with the Australian Dohne Breeders' Association acting as the Site Committee. This is the first time a specific Dohne site has been established, although Dohnes have been evaluated in Merino sites previously. Fifteen sires, including three link sires, were artificially inseminated (AI) to 90 ewes each in January 2021. Lambing will

be in June this year with the first field day planned for September 2022 and the final field day in September 2023. The site is planning to run all the ewe progeny through and assess them for their maiden lambing performance.

New Bathurst Merino Sire Evaluation site

A new Bathurst Merino Sire Evaluation site has started at 'Ferndale', Bathurst. MerinoLink will take on the responsibility as the Site Committee with Bathurst Merino Association working alongside. Sixteen sires including two link sires have been joined by AI to 55 ewes.

The number of high rainfall sites has expanded in recent years to now include New England, NSW; Bathurst, NSW; Boorowa, NSW; Yass, NSW; and Balmoral, Victoria.

There is also increasing interest at Sire Evaluation sites to additionally assess the sire's ewe progeny for their maiden lambing performance.

Each Sire Evaluation site is run by a Sire Evaluation Site Committee. If you are interested in joining a committee and actively keen to assist in providing good oversight for the animal assessment protocols needed to obtain the high quality breeding value data, please contact Emma Grabham from AMSEA via merinosireevalution@ bcsagribusiness.com.au.

Where to for wether trials?

The last Merino Bloodline Performance was conducted in 2018. It was an across wether trial site analysis of trials conducted in the previous 10 years. There has been a long-term decline in the number of wether trials in recent times and they are now only conducted in NSW. There has also been a significant increase in the number of mixed bloodline teams (wether flocks with multiple ram sources) that are difficult to describe as a single "bloodline or stud".

AWI, NSW DPI and Animal Genetics and Breeding Unit (AGBU) are reviewing the impact of these changes on the validity of conducting another across trial analysis. If an across site analysis is no longer robust/cost effective, the aim will be to find the best way to support the individual wether trials at Glen Innes, Bathurst, Australian National Field Days (Orange), Bookham, Parkes, and the Peter Westblade trial at Wagga and

Condobolin. The DNA Flock Profile test may be able to replace or complement wether trial evaluations and at a lower cost, but this also is being investigated. **B**

More information:
AWI Program Manager Genetics and Animal Welfare Advocacy, Geoff Lindon at Geoff.Lindon@ wool.com

MERINO SUPERIOR SIRES 2019 RELEASED

The 25th annual edition of Merino Superior Sires, released in October, includes results from 305 sire entrants entered at 10 sites across Australia. An additional feature of Merino Superior Sires is the online publication of the All Time Top 50 sires for each of the main industry Indexes. Sires entered in the past five years dominate the Index rankings.

Merino Superior Sires No.25 was released in October and is available, along with other Merino Sire Evaluation program information, at www.merinosuperiorsires.com.au

The Merino Sire Evaluation (MSE) program has operated in Australia for 30 years and continues to evolve under the management of the Australian Merino Sire Evaluation Association (AMSEA), with support from AWI.

The MSE program is the longest running progeny testing program in the world. MSE compares the breeding performance of a sire through the evaluation of his progeny compared to other sires. Progeny are evaluated for a large number of traits including those measured for wool, carcase and resistance to parasites, as well as a large range of visually assessed traits, including classing grade.

Every year the results of sire entrants from the preceding five years are collated into one report. This year the 25th edition of Merino Superior Sires (MSS) was produced in October 2019 by AMSEA and includes results from 305 sire entrants entered at 10 sites across Australia.

Results in MSS25 have been collated from across the main wool producing regions of Australia: three sites in Western Australia, one in South Australia, two in Victoria and four located in NSW. The five Merino Lifetime Productivity Project sites are numbered amongst this group with their results also reported within MSS25.

Published results include Australian Sheep Breeding Values (ASBVs) generated from MSE trials and other data submitted to MERINOSELECT, along with visual classing results recorded at all MSE sites.
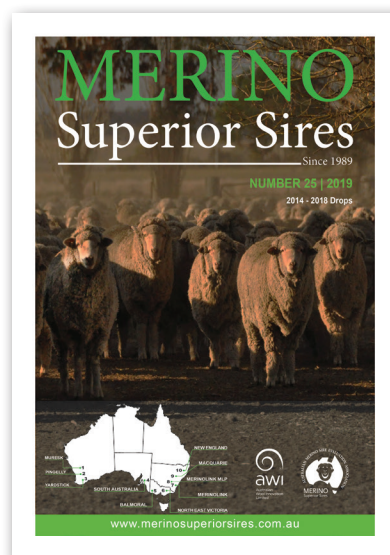
MSS also reports the Top 50 sires for each of the main industry Indexes along with owner and breeder contact details.

ALL TIME TOP 50

An additional feature of MSS is the online publication of the All Time Top 50 sires for each of the main Indexes. Each Top 50 reports both the Index result and the ASBVs of some of the traits that are included in each Index. These All Time Top 50s draw from all sires ever entered in MSE. This year's All Time Top 50 results are reporting from more than 850 sires who have been entered in MSE and are available for publication since the program commenced in 1989. Each Index has a filter applied to best match sire wool types to the Index.

Sires entered most recently have a *MSS25* notation; this denotes the current 25th edition as the first time their results have been published in MSS.

Interestingly, the 2019 All Time Top 50 sires include a significant number of new entrants in Merino Sire Evaluation. This year, eight new sires are listed in the Top 50 for the DP+ Index, five in the MP+ Index, three in the FP+ and five for the WP+ Index. One recently entered sire has topped the WP+ Index ranking, reordering the list of prominent industry sires.

Also, of note is the proportion of sires entered in the past five years (2014-2018) when compared to the proportion of sires entered pre-2014. The MP+ Index list comprises 66% of sires entered since 2014 and the WP+ Index more than 70%. Sires entered in the past five years are dominating the Index rankings. This highlights the increasing genetic merit of Merino sires. B

MORE INFORMATION

Visit www.merinosuperiorsires.com.au to download MSS25 and the All Time Top 50s, find further MSE information or to subscribe to reports and updates. Site reports using site only data 'Flock Breeding Values' can also be found on the website in the 'Reports' tab.

Merino Superior Sires extract: All Time Top 50 Sires ranked on MP+ Index

Table 2: All time top 50 sires ranked on MP+ index
Sires entered between 1989 and 6 sires New in MSS25 indicated
All MERINOSELECT Wool Types included (600 sires in total)

Rank	Sire		MP+	YCFW	ACFW	YFD	YWT	YTOP	YCULL	POLL	TYPE
1	Hazeldean, 11.3542 (Hugh)		234	36.4	26.6	-2.4	3	6	12	PH	F/FM
2	Woodyarrup, 140149	MSS25	220	59.8	47.2	-1.1	14	5	-1	HH	F/FM
3	Greendale, 150018		216	31.5	25.7	-2.5	2	-1	8	PH	F/FM
4	One Oak No. 2, 170004		210	34.1	27.6	-1.2	6	-3	-6	PP	U/F
5	Tallawong Merinos, 150280		210	27.3	19.7	-2.4	5	3	-5	PP	U/F
6	Hazeldean, 13.4936		206	32.3	27.1	-2.1	2	1	-1	PH	F/FM
7	Centre Plus WA Poll, 831327		201	40.0	25.8	-2.5	7	20	-12	PH	M/S
8	Merinotech WA Poll, 2295		199	31.9	20.0	-0.5	12	1	-8	PP	F/FM
9	Bindawarra, 400		192	22.8	21.5	-1.3	5	21	7		F/FM
10	Hazeldean, 8.3561		191	25.4	22.2	-2.1	4	-5	-1	HH	F/FM
11	GRASS, 141924 (R15)	MSS25	191	34.7	30.8	-1.1	4	-5	-1	PH	F/FM
12	Centre Plus WA Poll, 337919		190	26.5	21.2	-2.3	11	1	1	PH	M/S
13	Collodoora, Garrett		190	21.2	19.6	-0.6	7	-7	11	PH	F/FM
14	Stockman Poll, 020603 (Jim)		190	23.5	15.6	-1.9	3	18	-5	PH	F/FM
15	Roseville Park Poll, 064113		188	3.6	6.2	-2.8	3	8	-18	PH	F/FM
16	Tuckwood Poll, W26		188	32.6	23.8	-0.2	8	24	-5	PP	F/FM
17	Tuckwood Poll, 121021		187	32.7	17.6	-1.0	11	-13	-6	PH	F/FM
18	Merinotech WA Poll, 6533		186	31.8	16.2	1.0	8	10	-21	HH	F/FM
19	GRASS, 142000 (R5)		186	37.7	26.9	-0.4	1	-21	0	HH	F/FM
20	Roemahkita Poll, 150092		185	27.5	22.8	-1.7	8	-10	15	PP	F/FM
21	Pooginook Poll, 140961		185	36.7	25.1	-0.9	10	9	5	PP	M/S
22	Hazeldean, 12.4030		183	36.3	31.3	-1.3	3	21	-7	HH	F/FM
23	Moorundie Poll, NE73		183	38.5	31.1	-1.2	7	8	-5	PP	F/FM
24	Centre Plus, 307364		183	28.2	10.3	-1.0	11	4	-10	PP	F/FM
25	Merinotech WA Poll, 133399		182	37.6	24.1	1.2	10	35	-21	PH	F/FM
26	Centre Plus, 407445	MSS25	182	22.5	14.9	-2.1	7	-2	-3	PH	F/FM
27	Merinotech WA Poll, 122041	MSS25	181	17.9	8.7	-0.7	7	5	-18	PH	F/FM
28	Rocklyn, Joey		180	27.1	23.7	-1.3	-0	13	-8		F/FM
29	Orrie Cowie, 140050 (Trojan)	MSS25	180	25.3	19.8	-1.8	11	8	-14	HH	M/S
30	Hyfield Poll, 3723		180	28.5	23.2	-1.7	7	9	-7	PH	F/FM
31	Hazeldean, 2.3558		180	19.5	17.6	-2.9	1	3	6		F/FM
32	Connewarran, 8002		179	24.3	25.7	-1.2	4	12	-3	HH	F/FM
33	Melrose, 12UGB060		179	21.4	23.9	-1.4	1	3	-2	HH	U/F
34	Centre Plus, 807300		178	22.2	10.5	0.1	11	3	-24	PP	F/FM
35	SARDI, SDF 1		178	28.6	26.0	-1.4	5	0	9		M/S
36	Kerin Poll, 151911		178	26.9	28.6	-1.6	10	13	-3	PP	M/S
37	Corroboree, 382		178	16.4	14.1	-1.5	2	-4	-3		F/FM
38	Connewarran, 0040		177	24.9	23.7	-1.8	6	10	-8	HH	F/FM
39	Bogo, 500300		177	24.4	16.6	-2.0	6	6	-6	PH	F/FM
40	Kerin Poll, 130980		177	42.1	38.9	0.3	8	1	-5	PH	M/S
41	Yalgoo, 150013		176	25.0	18.4	-2.8	4	7	-13	HH	U/F
42	Petali Poll, 110562		176	19.8	12.0	-2.5	4	36	-22	PH	F/FM
43	Ejanding Poll, 075006		175	24.0	15.8	-0.7	12	-1	-10	PH	F/FM
44	GRASS, 122165		175	30.2	18.3	-0.9	5	-15	-0	HH	F/FM
45	Hazeldean, 1.10014		175	27.2	28.2	-1.4	1	-9	3		F/FM
46	Petali Poll, 150697		174	30.0	16.8	-0.6	7	9	-23	PP	F/FM
47	Wattle Dale, 140754		174	25.4	18.2	-2.6	4	16	3	PH	F/FM
48	Hazeldean, 8.4092		174	19.3	14.8	-3.8	-3	-10	7	HH	F/FM
49	Merinotech WA Poll, 011218		174	12.2	7.1	-0.6	1	7	-12	HH	F/FM
50	GRASS, 122190 (P47)		174	35.1	20.4	0.7	6	2	-25	HH	F/FM

1 Further information on the POLL results can be found on pages 55 and 64.
2 Further information on the Wool Types can be found on pages 54 and 65.

Merino Superior Sires MSS25   Australian Merino Sire Evaluation Association: October 9, 2019   2

Callout labels:
- MSS25; first published results for this sire
- Index results
- Index component traits
- Visual classing results