

MLP Sire Selection Process and Stocktake of Outcomes

The 167 sire spaces across the five Merino Lifetime Productivity (MLP) project sites are filled by 134 unique Merino sires that were supplied from 95 different studs or ram breeding flocks. Repeat use of some sires (termed as Link Sires) across the sites and years enables data to be collated across sites and ewe genotypes. Each of the five sites joined via artificial insemination for two years using between 13 to 25 industry sires each year.

MLP sires were carefully selected from hundreds of sire nominations to allow a comprehensive examination of factors that might influence lifetime productivity, and to generate results that will be both industry representative and relevant.

Collaborating sites from across Australia play a critical role in the project by allowing Merino sires to be compared for a wide range of traits under different environmental conditions and ewe bases. The five sites were selected to represent a range of environmental and production conditions. In particular, sites of contrasting climatic factors and pasture types were included. The provision of ewe bases that offered diverse genetics and Merino types was also taken into consideration to evaluate sire performance across varied genetics and Merino types.

Table 1: Five MLP Sites, environment and ewe base type

Site	Hosts	Rainfall mm	Ewe Base
Balmoral, Harrow, Vic	Balmoral Breeders, Tuloona Pastoral	470 winter dominant	Fine wool base sourced from a single commercial flock.
MerinoLink, Temora, NSW	Moses and Son/Bluechip Livestock, MerinoLink	500 winter dominant	Fine-Medium wool base sourced from three performance recorded studs, plus progeny from a previous sire evaluation, evenly allocated to sires.
Pingelly, WA	Murdoch University, University of WA, Federation of Performance Sheep Breeders (WA)	440 winter dominant	Medium wool, large framed, meat focussed, plain bodied, highly fertile animal with moderate wool cut. Sourced from two commercial flocks of the same bloodline and evenly allocated to sires.
Macquarie, Trangie, NSW	NSW Department of Primary Industries, Macquarie Sire Evaluation Association	500 evenly distributed	Fine-Medium wool ewes from two Central West NSW types, evenly allocated to each sire. One type was large framed and heavy cutting, the other has an all-purpose focus.
New England, Uralla, NSW	CSIRO, New England Sire Merino Evaluation Association	800+ summer dominant	Superfine wool base sourced from a commercial flock and research flock evenly allocated to sires.

Sire selection was targeted to achieve a balance across each site and drop, along with an overall strategy that the project's full sire list across all sites would meet the following criteria:

- **Industry representative:** a balance between horn and poll rams, different skin/wool types, rams with and without Australian Sheep Breeding Values (ASBVs).
- **Impact rams:** Significant show performance results or widely used AI sires in industry (with or without ASBVs).
- **Genetically representative:** Selected from four main genetic performance groups within the MERINOSELECT database. These groups were identified using a unique analysis of the MERINOSELECT database that included progeny of sires used between 2006 and 2016.
- **Performance range:** High and low performance for key traits based on ASBV percentile band tables.
- **Fleece value:** Sires predicted to maintain, increase or decrease fleece value over time.
- A balance of young (progeny yet to be evaluated) and older rams.

AWI commissioned a dedicated Sire Advisory Group who were specifically tasked with identifying industry impact rams that were suitable for the sites and that had performed well in shows and or multivendor sales. The final sire lists at each site were generated in consultation with each sire evaluation site committee, plus the MLP Industry Steering Committee.

Most owners of the 134 sires paid an entry fee that covered the first two years of the F1 daughter's evaluation (the standard sire evaluation component). AWI, in partnership with the five site hosts and site committees, supports the collection of data through the next four to five years of joining and annual assessments. Several sires were funded by AWI to be included in the project to provide linkage across sites and/or fill specific performance gaps.

A stocktake of sires was completed following each sire selection phase to determine if the sire listing was meeting the requirements of the project. Once all sire selection was completed, a comprehensive stocktake of sires was undertaken to assess if the original sire selection aims had been achieved.

This stocktake is reported below and has been updated to report April 2020 breeding values that utilise all available repeat MLP data collected to that date.

MLP Sire Stocktake (April 2020)

Summary

The project has achieved its goal of including sires that are industry relevant and representative - and that offer extremes and combinations of performance that will help us to explore drivers of lifetime productivity. Sires involved are a mixture of horn/poll, a range of wool and skin types, young and old rams, rams with/without ASBVs, a diverse range in performance, those that have been used extensively in industry or have made an industry impact - and finally – those that were predicted to increase, decrease or maintain fleece value over time (based on performance information collected prior to the project).

Stocktake Detail

The project had a sire selection principles document that outlined the sire selection criteria for the project. The following final stocktake compares the sire selection criteria against the profile of sires involved in the project.

In the following, the abbreviation ASBV refers to Australian Sheep Breeding Values. A glossary of trait names can be found here:

e= early **y**=yearling **a**=adult **cfw**=fleece weight **fd**=fibre diameter **sl**=staple length **ss**=staple strength
wt=weight **fat**= fat depth at the C site **emd**=eye muscle depth **wec**=worm egg count **ebwr**=breach wrinkle
dag=dag **DP+**=Dual Purpose index **MP+**=Merino Production index **FP+**= Fine Wool Production index

To ensure that the sires selected reflected existing industry genetic populations, a unique analysis of the MERINOSELECT database was completed by the Animal Genetics Breeding Unit to identify the distinct genetic populations within MERINOSELECT. These populations were identified from examining the progeny of sires used in MERINOSELECT between 2006 and 2016. The MERINOSELECT populations, or groups are described here:

- **Group 1:** Tended to be higher fat and muscle, lower worm egg counts, lower wrinkle, higher reproduction, moderate fleece weights
- **Group 2:** Tended to be high performers across industry indexes
- **Group 3:** Tended to be primarily wool focussed
- **Group 4:** Tended to be animals that didn't fit in groups 1 to 3

The average performance for each genetic group within the fine to medium MERINOSELECT types is reported in Table 2. The table also includes the number and portion of the 6000 sires represented within these groups. Note that the breeding values for the groups reported in this table are from an analysis completed in February 2018 and have not been updated since that time. One of the MLP sire selection aims was to select sires from each of these groups at a similar proportion to their representation in MERINOSELECT.

A separate population within MERINOSELECT reflected the Ultrafine type that was also broken down into four groups. The Ultrafine type was a much smaller population involving 1000 MERINOSELECT sires and only 17 MLP sires fell within this population.

Table 2: Average ASBVs for each Group (Grp) for sires used in MERINOSELECT fine - medium types between 2006 – 16 (Feb 2018).

Grp	No	%#	ycfw	acfw	yfd	ysl	ywt	yfat	yemd	ywec	ebwr	nlw	DP+	MP+	FP+
1	1078	18	9	3.0	-0.3	11.0	7.2	1.0	1.7	-14	-0.7	2	141	127	118
2	1998	34	19	14.0	-0.9	7.5	6.0	0.0	0.1	-1	0.0	1	149	149	137
3	1401	24	14	12.4	-1.5	2.7	1.5	-0.7	-0.8	4	0.4	-1	130	141	137
4	1460	25	4	2.9	-1.2	3.5	1.9	0.1	0.3	-4	-0.1	-1	122	123	123

#Denotes the percentage of sires that fall into this group.

Of the 134 sires in the project, 104 rams were able to be profiled into the four groups as they had data in MERINOSELECT prior to their involvement in the project. These was a range in breeding value accuracy across the 103 sires which suggests that the groupings for some sires may change as more data becomes available.

Table 3 suggests that the current ASBV performance of MLP rams in each of these group is in general alignment with the average group from which they were originally selected (Table 2). Note that these averages also contain the 17 MLP sires that fell into the Ultrafine population in MERINOSELECT. Table 4 shows that these rams were distributed across the four groups within the Ultrafine population, although the number in each group is low.

Note that adult fleece weight mean used in MERINOSELECT was recently increased following a review of the current adult performance in MERINOSELECT. In light of this adjustment, it's not possible to compare the adult fleece weight breeding values from the original groups (generated in 2018) with the current adult fleece weight means estimated for project sires.

Table 3 suggests that the project achieved good representation in groups 1, 2 and 3, although group 4 is not well represented in the project. Group 4 animals were often older sires, or lower index performance sires, and it was unsurprising that these sires were not readily nominated to be involved in the project.

Table 3: Average Current ASBV Performance (April 2020) of MLP Sires based on their MERINOSELECT group (Grp)

Grp	No	%#	ycfw	acfw	yfd	yss	ysl	ywt	yfat	yemd	ywec	ebwr	edag	nlw	DP+	MP+	FP+
1	27	20	14	7	-0.7	0.3	12.1	7.2	1.2	1.8	-27	-0.6	-0.10	5%	157	143	134
2	43	32	26	22	-1.4	0.9	7.9	7.3	-0.3	0.0	12	-0.1	-0.02	-1%	167	171	155
3	27	20	23	22	-1.7	0.1	2.8	3.0	-0.9	-1.1	34	0.6	0.09	-4%	146	161	151
4	6	4	15	15	-2.2	0.3	-2.4	3.2	-0.4	0.5	3	0.6	0.11	-8%	144	151	148
Ukn	31	23	21	21	-1.1	1.5	0.3	5.4	-0.6	-0.3	20	0.2	0.04	-1%	154	158	146
Tot	134		21	19	-1.3	0.7	5.5	5.8	-0.2	0.1	9	0.0	0.00	-1%	157	159	148

#Denotes the percentage of sires that fall into this group.

Table 4 shows sires in the project based on their MERINOSELECT types. The MERINOSELECT types are Dohne, Ultrafine (U/F), Fine (F/FM) and Medium wool (M/S). These MERINOSELECT types or categories may differ slightly to types as described by industry, and to the types used in Table 9 later in the document. Table 4 is then split into groups based on where the sires sat prior to involvement in the project (their MERINOSELECT group).

The portion of animals in the ultrafine, fine and medium wool types had a target of approx. 15:60:25. Table 4 shows that this is closely aligned to the target (14:65:20).

Table 4: Number of sires in each group and type in MERINOSELECT

Type	Group 1	Group 2	Group 3	Group 4	Unknown	Total	Type %
Dohne					1	1	1%
Ultra-Fine/Fine	3	7	5	2	2	19	14%
Fine/Fine Medium	15	27	20	4	21	87	65%
Medium/Strong	9	9	2		7	27	20%
Total	27	43	27	6	31	134	

The project target was to have a balance of horn and poll rams. Table 5 highlights that this has been achieved.

Table 5: Number of sires per genomic poll status, and based on the sires' flock code

Horn/Poll	Count	Percentage	Breed	Count	
HH	51	38%	Merino 50	74	55%
PH	38	28%			
PP	45	33%	Poll Merino 60*	60	45%
Total	134		Total	134	

*Includes one Dohne

The project target was for 20% of rams entered without ASBV information. This was achieved with 26% (35 out of 134 sires) originating from ram breeding flocks that were not members of MERINOSELECT (Table 6). Some of these sires did have ASBVs available (they may have been entered into a sire evaluation or used by a MERINOSELECT member), however there were 31 sires that didn't have any ASBVs available at the commencement of the project (23% of MLP sires). This is also shown in Table 3.

Table 6: Average Current ASBVs of sires based on MERINOSELECT membership status (April 2020)

Status	No	ycfw	acfw	yfd	yss	ysl	ywt	yfat	yemd	ywec	ebwr	edag	nlw	DP+	MP+	FP+
Non	35	22	23	-1.1	1.2	0.6	5.2	-0.7	-0.5	32	0.2	0.05	-3%	152	158	146
Member	99	21	17	-1.3	0.6	7.3	6.0	0.0	0.3	2	0.0	-0.01	0%	159	160	149
Total	134	21	19	-1.3	0.7	5.5	5.8	-0.2	0.1	9	0.0	0.00	-1%	157	159	148

Table 7 highlights that a balance in young and older sires was achieved. The older sires were assumed to be "proven", whilst the younger rams have less information about their own and progeny performance.

Table 7: Year of birth for sires in the MLP project

Year of Birth	Count
2001	1
2007	1
2008	1
2009	3
2010	5
2011	10
2012	23
2013	29
2014	29
2015	23
2016	9
Total	134

Table 8 shows the excellent range in performance of MLP sires based on ASBVs in the project as of April 2020. Whilst there is a good range in performance (from the top 1% to the bottom 2% of performance in MERINOSELECT), the average performance of the MLP sires compared to the average of MERINOSELECT slightly differs. This is unsurprising given that entrants are likely to have nominated their better animals to enter the lifetime evaluation. The average of MLP sire performance is slightly higher for yearling fleece weight, body weight and breech wrinkle, along with slightly lower averages for fibre diameter, carcass traits, worm resistance and reproduction.

Despite the good range in performance, when traits are combined into an index, the average index values of MLP sires sits in the top 20% of industry compared to the average of the MERINOSELECT 2018 drop (the comparative drop at the time of writing). Once again this is unsurprising as entrants will have nominated their better performing sires for evaluation in the project.

Table 8: Range in performance of MLP sires based on current ASBVs (April 2020)

	ycfw	acfw	Yfd	yss	ysl	ywt	awt	yfat	yemd	ywec	ebwr	edag	nlw	DP+	MP+	FP+
Min	-23	-30	-4.3	-6.4	-17.3	-3.8	-4.4	-2.9	-3.0	-78	-1.6	-0.5	-24%	88	96	93
Max	43	43	2.2	11.1	26.4	12.9	12.1	2.9	3.9	141	1.4	0.7	23%	230	226	195
Ave	21	19	-1.3	0.7	5.5	5.8	4.5	-0.2	0.1	9	0.0	0.0	-1%	157	159	148
MS#	15	13	-1.0	0.6	7.1	4.8	3.9	0.1	0.3	-16	-0.2		1%	144	143	136

the average of the 2018 drop Merino progeny in MERINOSELECT

Tables 9 and 10 show the average breeding value performance of sires based on a number of groupings. **It is important to note that the amount of data in MERINOSELECT for each sire varies considerably.** The ASBVs reported are from the April 21, 2020 MERINOSELECT run which includes all the available repeat adult MLP records that the analysis currently utilises. **Prior to drawing conclusions, it is also very important to look at the number of animals in each category.**

Table 9: Average ASBV Performance of MLP Sires Based on Fibre Diameter (FD) ASBV Type (April 2020)

FD ASBV*	Count	ycfw	acfw	yfd	yss	ysl	ywt	awt	yfat	yemd	ywec	ebwr	edag	nlw	DP+	MP+	FP+
SF <-2.8	12	8	5	-3.2	-1.4	-4.0	2.6	1.2	-0.4	-0.2	-11	0.8	0.08	-8%	129	144	151
F -2.7 to -1.8	33	20	19	-2.2	-0.5	2.3	4.7	3.2	-0.3	-0.1	15	0.2	-0.03	0%	162	167	158
FM -1.7 to -0.8	47	23	21	-1.2	0.6	5.2	5.9	4.6	-0.5	-0.3	22	0.0	0.05	-1%	155	160	147
M -0.7 to +0.3	34	24	20	-0.3	2.2	10.1	7.4	6.2	0.2	0.6	-2	-0.2	-0.04	1%	164	159	143
S > +0.4	8	26	20	0.8	3.2	15.5	7.9	6.9	0.7	1.4	3	-0.7	-0.04	1%	159	147	126
Total	134	21	19	-1.3	0.7	5.5	5.8	4.5	-0.2	0.1	9	0.0	0.00	-1%	157	159	148

*SF=Superfine, F=Fine, FM=Fine Medium, M=Medium, S=Strong

Table 10: Average ASBV Performance of MLP Sires Based on Wrinkle (EBWR) ASBV (April, 2020)

EBWR ASBV	Count	ycfw	acfw	yfd	yss	ysl	ywt	awt	yfat	yemd	ywec	ebwr	edag	nlw	DP+	MP+	FP+
< -0.7	17	19	12	-0.1	0.5	18.0	7.9	6.6	1.0	1.6	-7	-1.1	-0.07	5%	160	146	129
-0.6 to -0.1	43	20	17	-1.2	1.1	7.4	7.2	6.0	0.2	0.6	-1	-0.3	-0.06	2%	163	160	147
0 to +0.3	28	27	24	-1.2	1.0	6.1	6.3	5.0	-0.5	-0.2	25	0.1	0.01	0%	164	169	152
+0.4 to +0.7	28	22	21	-1.8	1.0	-0.1	4.3	3.0	-0.6	-0.7	14	0.5	0.01	-2%	154	165	155
>0.8	18	16	18	-2.2	-0.7	-2.9	2.0	0.5	-1.0	-0.8	19	1.0	0.22	-10%	131	149	148
Total	134	21	19	-1.3	0.7	5.5	5.8	4.5	-0.2	0.1	9	0.0	0.00	-1%	157	159	148

The following sires were actively approached and funded by AWI to be involved in the project in order to meet the sire selection criteria.

Alfoxtton, 150430
 Charinga, 130240 (Doc)
 Conrayn, MVB123
 Darriwell, 130941 (Buddha)
 East Mundulla, 090137 (Jonty)
 Eilan Donan, 5145 (Harvey)
 Glenpean, 120042

Glen Donald, 120014
 Greenfields Poll, 130599
 Lewisdale Poll, Monty 10
 One Oak No.2, R56
 Orrie Cowie, 140050 (Trojan)
 Rhamily Poll, 110330 (Benny)
 Wurrook, 130149

Finally, in order to investigate patterns of lifetime fleece value for difference sires, the project aimed to involve sires that were predicted to maintain, reduce or increase in fleece value over time. It was possible to screen sires on the basis of yearling and adult fleece value based on ASBVs, but it is important to recognise that MERINOSELECT fleece data is dominated by early measurements, post-weaning, yearling and hogget, and these have a considerable impact on adult ASBVs because the assumed (estimated) genetic correlations are high.

Fleece value calculations were generated by Andrew Swan of AGBU using the sire ASBVs that were available prior to entry in the project. Given the adult fleece values are largely assumed from early data, the usefulness of this selection criterial will not be known until the MLP project generates greater volumes of adult measurements.

The fleece values were sub-indexes of the MERINOSELECT standard indexes created by summing the product of economic values and the sires ASBVs for the relevant fleece traits. Fleece values for sires in the project are reported in Chart 1 with the assumptions used in the calculations outlined in Table 11.

Table 11: Wool price and production assumptions for the MERINOSELECT MP+ standard index

Index	CFW (kg)		FD (μm)		Price (\$/kg clean)		Fleece value (\$)		Micron premium %	SS premium %
	Y	A	Y	A	Y	A	Y	A		
MP+	3.0	3.5	18.5	19.5	12.50	11.00	37.50	38.50	7.0	0.6

Chart 1 shows the distribution of sires in the MLP project comparing their yearling fleece value (\$/ewe/year) with a change in fleece value over time (a singular Adult Fleece Value minus their Yearling Fleece value).

Very few sires were nominated that had a low yearling fleece value with increasing fleece value over time and several rams were specifically funded to meet this objective (namely Haddon Rig, 2.715 and Melrose, 12UGB060).



Chart 1: Distribution of sires in the MLP project based on a yearling fleece value estimate compared to their predicted fleece value change over time, using a medium micron premium market (Table 11) and ASBVs from before their use in the project.

Including sires with a range of predicted fleece value change over time, in combination with sires that have a range in fleece trait performance, will generate data that can be used to better understand the factors affecting total fleece value, one of the many contributors to Merino lifetime productivity.

Conclusion

The project has achieved its goal of including sires that are industry relevant and representative. The sires included also offer extremes and combinations of performance that will help to explore drivers of lifetime productivity.