NSW GOVERNMENT Department of Primary Industries

primefact

Merino bloodlines: a comparison based on wether trial results 2006 - 2016

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Introduction

The relative performance of commonly used Merino bloodlines has been updated with the 2016 analysis of 25 wether trials conducted in NSW (23), Victoria (1) and Tasmania (1) and one ewe productivity trial located in WA between 2006 and 2016.

The 2006 – 2016 Merino Bloodline Performance information is presented as follows:

- Table 1 describes the presentation of the traits and provides an explanation of the Table 2 headings.
- Table 2 reports 77 bloodlines for the 11 individual traits and two financial performance indicators.
- Figure 1 depicts the clean fleece weight and fibre diameter performance of each bloodline listed in Table 2.
- Figure 2 shows the range in liveweight and fibre diameter of the 77 bloodlines.
- Figure 3 shows the performance of (a) staple strength, (b) staple length, (c) style and (d) colour versus fibre diameter.
- Table 3 contains the median wool prices used to determine the financial performance of the bloodlines.
- Figure 4 depicts the deviations in financial performance of the bloodlines, calculated as $/head, and fibre diameter.
- Figure 5 represents the deviations in financial performance of the bloodlines, calculated as $/dry sheep equivalent (DSE), and fibre diameter.
- Figure 6 shows the deviations in financial performance ($/DSE) with clean fleece weight.
- Figure 7 represents the deviations in financial performance ($/DSE) with liveweight.

The trends

The relative performance of 77 bloodlines involved in wether and ewe comparisons across Australia are provided for clean fleece weight, fibre diameter, liveweight and both objectively measured (staple length and staple strength) and assessed wool quality traits (style and colour). Fibre diameter and clean fleece weight stability traits, which quantify the annual changes in these two traits with age, are also presented along with two measures of financial performance of the bloodlines, expressed on a $/head and $/DSE basis. A measure of the variability in financial performance of the bloodlines has been included in the 2016 analysis. The standard deviation of profit provides an indication of the variation around the average profit on both a $/hd and $/DSE basis.

The 77 bloodlines reported in this Primefact have information that is of high to medium accuracy. Only those bloodlines with a standard error of less than 3% for clean fleece weight are reported, which ensures the reliability of the relative performance of each bloodline.

The previous 2004 - 2014 analysis (Primefact 1381), reported data from 22 trials with 1 high and 70 medium accuracy bloodlines. Compared with the previous analysis, there are 57 common and 20 new bloodlines represented in the 2016 analysis.

The Genetic Differences

The relative performance of each of the teams of sheep in the different wether and ewe trials is a combination of the genetics of the sheep and the environment in which they were run. For any group of sheep, the performance we can see and measure (the phenotype) is a result of their genetics and the environment in which they have been raised. This is represented by the following equation:

Phenotype = Genetics + Environment

The Merino Bloodline Performance analysis removes the differences in environments between years in a trial and between trials. Bloodlines with multiple teams, both within and across trials, provide the linkage that allows variation between trials and across years within a trial to be accounted for, leaving only the genetic differences between bloodlines.

Table 1 Explanation of the headings used in Table 2

Table heading	Explanation
Bloodline	The bloodline nominated by the entrant of each team in the individual wether and ewe trials.
Code	Number used to locate a bloodline in Figures 4, 5, 6 and 7.
CFW & LWT	Clean fleece weight (CFW) and liveweight (LWT) reported as the percentage deviation from the average.
FD, YLD and FDCV	Fibre diameter (FD), yield (YLD) and coefficient of variation in fibre diameter (FDCV) reported as deviations from the average.
CFWST	Clean fleece weight stability is the annual change in clean fleece weight with age, reported as a percentage deviation. For example, if the CFWST is 1.25 it is expected that as a sheep gets older its clean fleece weight will genetically increase by 1.27 % per year (0.02 + 1.25), where 0.02 % is the average expected increase in CFW as a wether ages.
FDST	Fibre diameter stability is the annual change in fibre diameter with age, reported in microns per year. For example, if the FDST is 0.1 it is expected that as a sheep gets older its fibre diameter will increase genetically by 0.6 µm per year (0.5 + 0.1), where 0.5 µm is the average expected increase in FD as a wether ages.
SL	Staple length reported as a deviation from the average in mm.
SS	Staple strength reported as a deviation from the average in N/ktex.
STYLE	Wool style – spinners (MF3), best (MF4), good (MF5), average (MF6) and inferior (MF7) grades (coded 1 to 5 respectively). Reported as deviation from the average. For more information go to http://www.awex.com.au/standards/awex-id-appraisers/
COL	Fleece colour – no colour, light unscourable and medium unscourable grades (coded 1 to 3 respectively). Reported as deviation from the average. For more information go to http://www.awex.com.au/standards/awex-id-appraisers/
Profit $/hd	GrassGro™ financial performance from simulations over 53 years reported as the average profit on a dollar per head ($/hd) basis.
St dev $/ha	The standard deviation of profit ($/hd) which indicates the amount of variation around the average profit per head. A larger standard deviation indicates greater variation in profit.
Proft $/DSE	GrassGro™ financial performance from simulations over 53 years reported as the average profit on a dollar per dry sheep equivalent ($/DSE) basis.
St dev $/DSE	The standard deviation of profit ($/DSE) which indicates the amount of variation around the average profit per DSE. A larger standard deviation indicates greater variation in profit.
No. of teams	The number of wether or ewe teams representing the bloodline in the analysis. Bloodlines can be represented by teams from the ram breeding flock itself and/or by clients' teams.
No. of records	The number of records for a bloodline. This includes repeated evaluation of the same sheep.
ACC	Accuracy: H = High accuracy (the standard error for CFW is less than 2%), M = Medium accuracy (the standard error for CFW is between 2% and 3%).

Table 2 Bloodline performance for key production traits, components of wool type and financial performance for the 77 bloodlines

Bloodline	Code	CFW	LWT	FD	YLD	FDCV	CFWST	FDST	SL	SS	STYLE	COL	Profit	St dev	Profit	St dev	No. of	No. of	ACC
		(%)	(%)	(µm)	(%)	(µm)	(%/yr)	(µm/yr)	(mm)	(N/ktex)			$/hd	$/hd	$/DSE	$/DSE	Teams	Records	
A.M.S.	1	-12.1	1.7	-1.2	-3.6	-1.8	0.02	-0.04	2.4	1.6	0.04	0.09	44.83	13.63	29.04	8.83	3	210	M
Alfoxton	2	-10.5	-3.8	-1.0	-1.8	-1.2	0.03	-0.03	-4.2	1.5	-0.08	-0.03	44.38	13.22	29.88	8.90	5	164	M
AMM	3	-8.8	-0.2	0.8	1.8	-1.5	0.03	-0.20	8.5	3.6	0.11	-0.10	38.32	12.89	25.21	8.48	2	58	M
Avenel	4	0.2	1.2	-0.5	-0.4	2.0	0.01	0.29	3.1	-6.8	0.06	-0.02	48.84	13.81	31.66	8.95	2	56	M
Avonside	5	-2.4	-3.8	-0.2	-0.9	0.9	0.04	0.10	-1.2	-0.3	0.08	0.01	46.77	13.33	31.43	8.96	6	226	M
Barrackville	6	-9.1	-3.7	-0.9	-1.4	-0.7	0.02	-0.18	-6.3	1.2	-0.08		43.89	13.14	29.56	8.85	3	62	M
Billa Burra Burra	7	-6.7	-4.2	0.0	-3.4	1.2	0.03	-0.08	-1.9	1.0	-0.06	0.21	44.61	13.12	30.04	8.84	2	49	M
Blink Bonnie	8	1.8	1.3	-0.2	0.5	0.4	0.03	0.09	0.6	0.9	0.01	-0.04	48.31	13.73	31.29	8.89	3	95	M
Bobingah	9	0.0	-5.2	-0.7	-0.9	1.3	0.04	0.27	9.1	-6.1	0.02	0.02	49.19	13.48	33.34	9.14	2	90	M
Bogo	10	-3.6	-0.6	-0.9	-1.3	-0.3	0.03	-0.11	2.6	2.1	-0.11	-0.02	48.66	13.64	31.94	8.95	24	668	H
Bungoona	11	1.4	0.9	0.5	3.7	-0.6	0.02	0.14	4.0	0.9	0.00	-0.02	43.06	13.28	28.09	8.66	4	168	M
Bungulla	12	-4.6	-3.5	0.3	-1.4	-0.9	0.03	0.04	1.8	0.3	0.03	-0.02	43.78	12.87	29.37	8.64	4	132	M
Cara	13	-3.0	-2.4	-0.1	0.0	-0.1	0.02	-0.32	-3.8	0.3	0.02	0.00	45.34	12.90	30.18	8.58	2	60	M
Cassilis Park	14	-4.2	-0.4	0.3	0.5	0.0	0.03	-0.07	-0.9	-1.5	0.01	0.08	43.28	13.07	28.41	8.58	4	131	M
Centre Plus	15	-5.4	5.8	-0.7	-4.8	-0.8	0.02	-0.18	6.5	1.8	0.07	0.24	50.27	14.93	31.42	9.33	13	353	H
Charinga	16	16.6	9.0	1.0	3.4	-2.0	-0.20	0.38	4.7	4.4	0.16	0.03	53.93	16.29	32.88	9.93	3	48	M
Corella	17	-2.7	-4.9	0.2	-1.9	0.7	0.06	-0.14	3.5	-3.4	0.22	-0.75	46.41	13.44	31.34	9.07	2	56	M
Corroboree	18	-5.5	-3.0	-0.9	-0.7	-0.2	0.02	-0.10	5.3	0.2	-0.05	-0.08	46.17	12.98	30.91	8.69	5	185	M
Cottage Park	19	4.5	0.1	-0.6	-0.7	1.1	0.03	0.09	-1.0	-6.1	0.23	0.13	52.69	14.09	34.27	9.16	3	118	M
Averages		*4.4 kg*	*59.9 kg*	*18.6 µm*	*73.4 %*	*17.8 $%*	*0.02 %*	*0.5 %*	*90.7 mm*	*40.0 N/ktex*	*2.8*	*1.1*	*46.49 $/hd*	*13.66 $/hd*	*30.53 $/DSE*	*8.96 $/DSE*			

Bloodline	Code	CFW (%)	LWT (%)	FD (µm)	YLD (%)	FDCV (µm)	CFWST (%/yr)	FDST (µm/yr)	SL (mm)	SS (N/ktex)	STYLE	COL	Profit $/hd	St dev $/hd	Profit $/DSE	St dev $/DSE	No. of Teams	No. of Records	ACC
Cressbrook	20	-8.1	-1.2	-1.2	0.3	-1.1	0.02	-0.10	-2.8	2.1	-0.19	-0.04	43.61	12.98	28.89	8.60	15	535	H
Darriwell	21	3.8	0.9	0.7	-0.8	0.5	0.02	0.12	2.0	1.5	0.25	0.35	49.64	14.48	32.13	9.38	3	95	M
East Loddon	22	11.3	6.8	0.7	1.8	-0.7	-0.19	0.37	-1.5	2.1	0.24	0.00	52.40	15.94	32.60	9.92	3	50	M
Egelabra	23	-2.5	-0.3	-0.1	-0.7	-0.2	0.03	-0.16	2.1	0.1	0.01	-0.02	46.16	13.27	30.28	8.71	18	740	H
Ellerina	24	-6.0	-5.8	-0.7	-0.5	0.4	0.02	0.04	-1.6	-3.1	-0.11	-0.10	44.26	12.88	30.26	8.81	2	46	M
Fosterfield	25	-8.2	-1.8	-1.6	-2.5	-0.4	0.02	0.00	0.9	0.6	-0.20	-0.06	47.99	13.46	31.81	8.92	2	75	M
Glen Donald	26	3.1	3.9	1.7	-3.2	0.6	0.04	0.31	1.0	0.6	0.29	0.06	51.67	15.53	32.68	9.83	3	48	M
Glendemar	27	-6.8	5.7	1.1	-0.1	-0.8	0.02	-0.12	16.9	4.8	0.44	0.19	42.12	14.77	26.57	9.32	2	73	M
Gowandale	28	6.3	3.6	1.4	2.6	-0.3	0.03	0.88	10.0	0.8	0.04	-0.03	47.23	14.74	30.10	9.39	3	48	M
Grassy Creek	29	-5.8	0.1	-1.2	-4.0	-0.7	0.03	-0.08	-2.1	3.4	-0.03		50.51	14.01	32.90	9.13	3	92	M
Grathlyn	30	-19.1	-7.0	-2.1	-2.9	-0.8	0.04	-0.22	-13.5	-2.8	-0.18	-0.01	40.21	12.34	27.89	8.56	2	74	M
Greendale	31	2.1	-2.9	-0.7	-1.6	0.7	0.03	0.00	1.2	-1.9	0.06	0.04	51.79	13.66	34.46	9.08	15	473	H
Greenland	32	-4.2	-2.0	-0.1	-2.5	0.2	0.02	-0.21	-6.9	1.2	-0.17	-0.02	45.76	13.08	30.36	8.67	3	132	M
Grogansworth	33	0.9	-0.3	0.1	1.2	1.7	0.03	0.02	3.0	-4.2	0.07	0.07	45.91	13.24	30.09	8.68	6	222	M
Haddon Rig	34	-0.7	-0.5	0.6	-0.1	0.6	0.02	0.06	-0.9	-0.7	0.07	0.09	45.01	13.56	29.53	8.89	16	690	H
Havilah North	35	-5.1	-0.7	-1.4	-1.5	-1.0	0.03	-0.10	-4.0	0.2	-0.18	0.01	48.80	13.65	32.10	8.98	2	89	M
Hazeldean	36	0.2	-1.0	-0.3	-0.8	0.6	0.04	0.11	6.0	-2.8	0.10	-0.02	49.14	13.52	32.24	8.87	29	1067	H
Karori	37	-17.1	-7.0	-2.1	-1.4	-1.4	0.00	-0.34	-5.3	0.8	-0.45	-0.08	40.37	12.34	28.02	8.57	3	101	M
Leahcim Poll	38	-5.2	3.6	0.8	-0.3	-0.1	0.05	-0.12	8.0	5.4	0.16	-0.10	42.86	14.05	27.41	8.98	2	52	M
Longford	39	-7.5	0.4	-1.2	-0.9	-1.4	0.01	-0.21	-1.9	0.2	-0.20	-0.02	46.08	13.48	30.14	8.82	3	90	M
Averages		*4.4 kg*	*59.9 kg*	*18.6 µm*	*73.4 %*	*17.8 $%*	*0.02 %*	*0.5 %*	*90.7 mm*	*40.0 N/ktex*	*2.8*	*1.1*	*46.49 $/hd*	*13.66 $/hd*	*30.53 $/DSE*	*8.96 $/DSE*			

Bloodline	Code	CFW (%)	LWT (%)	FD (µm)	YLD (%)	FDCV (µm)	CFWST (%/yr)	FDST (µm/yr)	SL (mm)	SS (N/ktex)	STYLE	COL	Profit $/hd	St dev $/hd	Profit $/DSE	St dev $/DSE	No. of Teams	No. of Records	ACC
Lorelmo	40	-9.3	-2.2	-1.8	-0.6	-1.0	0.02	-0.21	-1.2	0.8	-0.13	0.05	45.02	13.06	30.07	8.73	3	90	M
Merrignee	41	-8.4	-4.7	-0.5	-1.4	-0.5	0.03	-0.70	-0.5	0.7	-0.09	0.04	43.74	12.88	29.67	8.74	2	51	M
Merrinjuck	42	-15.8	-5.2	-0.4	-4.9	-0.4	0.01	-0.47	-10.6	-1.2	0.01	-0.13	40.50	12.52	27.55	8.51	2	60	M
Merryshiels	43	-9.1	-0.7	-1.4	-3.1	-1.6	0.03	-0.11	3.2	0.0	0.02	-0.06	47.65	13.54	31.35	8.91	2	59	M
Merryville	44	-12.5	-4.6	-1.8	-1.9	-0.4	0.03	-0.23	-10.3	-1.2	-0.23	-0.07	44.74	13.15	30.36	8.93	11	306	M
Middle View	45	-4.8	-1.8	-0.9	-2.2	-0.3	0.03	-0.14	-5.1	1.1	-0.13	-0.05	48.77	13.44	32.31	8.90	14	456	H
Mt Buffalo	46	-13.5	-4.7	-1.8	-3.7	-0.4	0.01	-0.27	-11.6	-5.7	-0.11	-0.04	44.83	13.22	30.38	8.96	2	42	M
Myocum	47	-8.8	-3.4	-0.7	-2.4	-0.4	0.03	-0.10	-7.1	1.7	-0.15	-0.04	44.09	12.68	29.60	8.52	3	121	M
Nerstane	48	-4.4	-2.7	-0.8	-0.5	-0.9	0.01	-0.09	5.8	2.3	-0.04	0.02	45.92	12.99	30.70	8.69	9	326	M
One Oak	49	4.7	2.7	1.0	1.9	0.3	0.02	0.00	5.6	-1.3	0.11	0.01	47.25	14.52	30.30	9.31	8	207	M
One Oak No 2	50	0.7	1.5	0.2	0.0	0.6	0.01	-0.14	2.8	2.0	-0.12	-0.02	46.77	13.74	30.25	8.89	2	90	M
Panorama	51	13.1	7.3	1.9	2.8	-0.9	-0.20	0.38	5.9	1.0	0.12	-0.02	52.14	16.37	32.33	10.15	3	46	M
Pastora	52	-3.8	1.4	-0.9	-1.8	0.0	0.02	-0.06	-0.3	-0.2	-0.01	0.02	48.79	13.94	31.56	9.02	47	1589	H
Pomanara	53	-13.6	-3.0	-1.9	-1.6	-0.3	0.01	-0.20	-13.0	-2.9	-0.26	-0.08	43.61	12.81	29.30	8.61	2	44	M
Pooginook	54	2.8	1.3	0.6	1.8	0.3	0.03	0.09	4.9	0.4	0.12	0.22	46.24	13.93	29.98	9.03	9	272	M
Quamby Park Poll	55	-8.6	-2.3	-1.6	-0.1	-0.9	0.02	-0.30	-7.7	0.7	-0.12	-0.08	44.60	12.95	29.84	8.66	2	73	M
Rockdale	56	-3.2	0.2	-0.6	-0.6	0.2	0.02	-0.31	1.2	1.7	0.03	0.12	46.80	13.44	30.59	8.79	3	77	M
Rogara	57	-7.7	-0.1	-1.2	-0.3	-1.0	0.03	-0.27	-5.4	2.1	-0.08	-0.03	45.16	13.32	29.65	8.74	2	50	M
Roseville Park	58	-2.2	0.2	-0.8	-1.7	0.2	0.03	0.21	0.0	-2.0	0.00	0.01	49.62	13.81	32.37	9.01	8	270	M
Averages		*4.4 kg*	*59.9 kg*	*18.6 µm*	*73.4 %*	*17.8 $%*	*0.02 %*	*0.5 %*	*90.7 mm*	*40.0 N/ktex*	*2.8*	*1.1*	*46.49 $/hd*	*13.66 $/hd*	*30.53 $/DSE*	*8.96 $/DSE*			

Bloodline	Code	CFW (%)	LWT (%)	FD (µm)	YLD (%)	FDCV (µm)	CFWST (%/yr)	FDST (µm/yr)	SL (mm)	SS (N/ktex)	STYLE	COL	Profit $/hd	St dev $/hd	Profit $/DSE	St dev $/DSE	No. of Teams	No. of Records	ACC
Roxanna Poll	59	-1.1	0.2	0.8	1.4	0.5	0.03	0.12	0.0	0.6	0.32	0.04	43.91	13.59	28.72	8.89	3	138	M
Salt Creek	60	-7.4	-0.5	0.1	1.3	0.6	0.02	-0.58	-6.2	0.6	0.08	-0.03	40.53	12.62	26.72	8.32	3	47	M
Severn Park	61	-4.1	2.4	0.1	0.1	-0.8	0.03	0.02	5.8	0.5	0.14	-0.15	43.91	13.46	28.29	8.67	7	262	M
Shalimar Park	62	-8.9	-1.2	-1.6	-0.6	-0.8	0.02	-0.22	-6.5	-0.5	-0.30	-0.04	45.69	13.22	30.29	8.77	4	120	M
Tallawong	63	-3.0	-2.9	-1.7	-1.1	-0.7	0.03	-0.10	3.0	0.7	-0.14	0.01	50.80	13.62	33.89	9.08	9	278	M
The Lagoons	64	-0.6	-0.4	0.3	-0.9	0.2	0.03	-0.08	-0.1	-1.2	-0.11	-0.06	46.34	13.58	30.35	8.90	3	84	M
Towalba	65	2.1	-0.8	1.5	-0.3	2.5	0.03	0.70	2.2	-4.9	0.02	0.00	47.08	14.18	30.91	9.31	2	77	M
Wallaloo Park	66	-4.0	-0.3	-0.2	-0.1	-0.6	0.03	-0.01	7.5	0.8	0.16	0.22	44.36	13.08	29.12	8.58	3	89	M
Wanganella	67	12.1	7.0	1.6	2.6	-0.6	-0.19	0.37	1.7	1.0	0.16	0.03	51.00	16.09	31.70	10.00	3	45	M
Wantana	68	-1.9	-3.3	0.2	-2.6	0.8	0.04	-0.04	-0.4	0.3	0.06	0.12	47.35	13.30	31.61	8.88	3	102	M
West Vale	69	-7.4	-5.6	-0.8	0.0	-0.1	0.02	-0.18	-7.5	0.5	-0.23	-0.08	43.45	12.82	29.70	8.77	4	120	M
Weston Park	70	-11.5	-4.4	-1.6	-4.3	-0.2	0.02	-0.53	-5.3	-2.6	-0.05	-0.04	46.80	13.47	31.61	9.09	3	66	M
Willandra	71	11.0	5.4	1.6	4.6	0.3	0.01	0.03	2.2	1.8	0.01		48.34	15.23	30.44	9.59	2	56	M
Woodpark	72	8.6	7.5	0.6	0.4	-2.1	-0.23	-0.29	4.3	2.7	0.10	-0.02	51.35	15.84	31.80	9.81	3	46	M
Woodpark Poll	73	-2.8	3.7	-0.3	-1.4	0.0	0.02	-0.12	2.5	-0.2	0.07	0.25	46.82	13.99	29.86	8.92	9	248	M
Woolaroo	74	-2.2	-2.0	-1.1	-1.7	0.7	0.03	-0.19	-4.5	-1.3	-0.13	-0.02	50.29	13.64	33.34	9.04	11	373	M
Wyuna	75	0.4	-2.7	1.1	1.6	1.0	0.02	0.24	2.5	-2.6	0.36	0.24	44.78	13.49	29.83	8.98	2	75	M
Yalgoo	76	-12.4	-3.6	-2.1	-1.0	-1.3	0.02	-0.22	-3.1	1.3	-0.10	-0.08	44.36	13.34	29.89	8.99	12	363	H
Yarrawonga	77	0.3	-1.8	-0.8	-2.2	0.3	0.01	-0.15	1.9	-1.1	-0.03	-0.02	51.73	13.76	34.17	9.09	10	346	H
Averages		*4.4 kg*	*59.9 kg*	*18.6 µm*	*73.4 %*	*17.8 $%*	*0.02 %*	*0.5 %*	*90.7 mm*	*40.0 N/ktex*	*2.8*	*1.1*	*46.49 $/hd*	*13.66 $/hd*	*30.53 $/DSE*	*8.96 $/DSE*			

Clean fleece weight vs. fibre diameter

The distribution of bloodlines based on clean fleece weight and fibre diameter is depicted in Figure 1. The high accuracy bloodlines are represented by the dark squares and the medium accuracy bloodlines by the grey triangles. Moving from right to left identifies bloodlines with lower fibre diameter, while moving from bottom to top identifies those with higher fleece weights.

Each bloodline is represented by a code that can be matched with the bloodline named in Table 2 which is reported in alphabetical and code order.

Table 2 provides detailed results for clean fleece weight, fibre diameter, liveweight and wool quality traits including both fibre diameter and clean fleece weight stability traits. The average performance for all bloodlines (high and medium accuracies) is reported at the bottom of each page in Table 2

The average values for clean fleece weight and fibre diameter for the bloodlines from the 2016 analysis were 4.4 kg and 18.6 µm respectively. Note that it is not advisable to use these average values to define bloodline performance as the actual performance of a bloodline for clean fleece weight and fibre diameter will vary according to the environment in which the sheep are run.

There was a strong relationship between clean fleece weight and fibre diameter across bloodlines (Figure 1), with clean fleece weight tending to increase by 5 % with every 1 µm increase in fibre diameter. However, there was significant genetic variation in clean fleece weight across the fibre diameter range, particularly within plus or minus 1 µm of the average fibre diameter, where there were differences in clean fleece weight between bloodlines of up to 20 %. This genetic variation between bloodlines in clean fleece weight provides producers with two key options to use when evaluating one or more bloodlines depending on the breeding objective of their commercial flock:

1. a finer bloodline can be chosen that will reduce fibre diameter without compromising clean fleece weight, or;
2. a bloodline with heavier clean fleece weight can be chosen while maintaining fibre diameter at the current level.

Liveweight vs. fibre diameter

There was a 23 % difference in liveweight between the lightest (52.9 kg) and heaviest (68.9 kg) bloodlines. Finer bloodlines tend to have lower liveweight than broader bloodlines, the overall relationship being an increase of 2.3 kg liveweight for each 1 µm increase in fibre diameter. However, there was significant genetic variation in liveweight (between 5 and 10 kg) at a given fibre diameter, again within plus or minus 1 µm of the average fibre diameter (Figure 2). This indicates that at a given fibre diameter, it is possible for producers to select bloodlines with heavier liveweight if that is a component of their breeding objective.

Wool quality vs. fibre diameter

Differences between the bloodlines in staple length, staple strength, style and colour are presented in Table 2. The average staple length and staple strength were 90.7 mm and 40.0 N/ktex respectively. The average style was 2.8, which is representative of good or MF5 style. The average colour was 1.1 indicative of little to no colour evident in the fleece.

There was evidence of significant genetic variation in both staple length and staple strength at a given fibre diameter (Figures 3 a & b). This means that for a given fibre diameter, there is scope for producers to choose a bloodline with increased staple length and/or strength to complement their particular breeding objective.

For the 77 bloodlines analysed, there was less genetic variation in either style or colour at a given fibre diameter (Figures 3 c & d). Therefore, the choice of bloodline will have little influence on either the style or colour that is able to be achieved.

Figure 1 Performance of 77 bloodlines for clean fleece weight (CFW) relative to fibre diameter (FD)

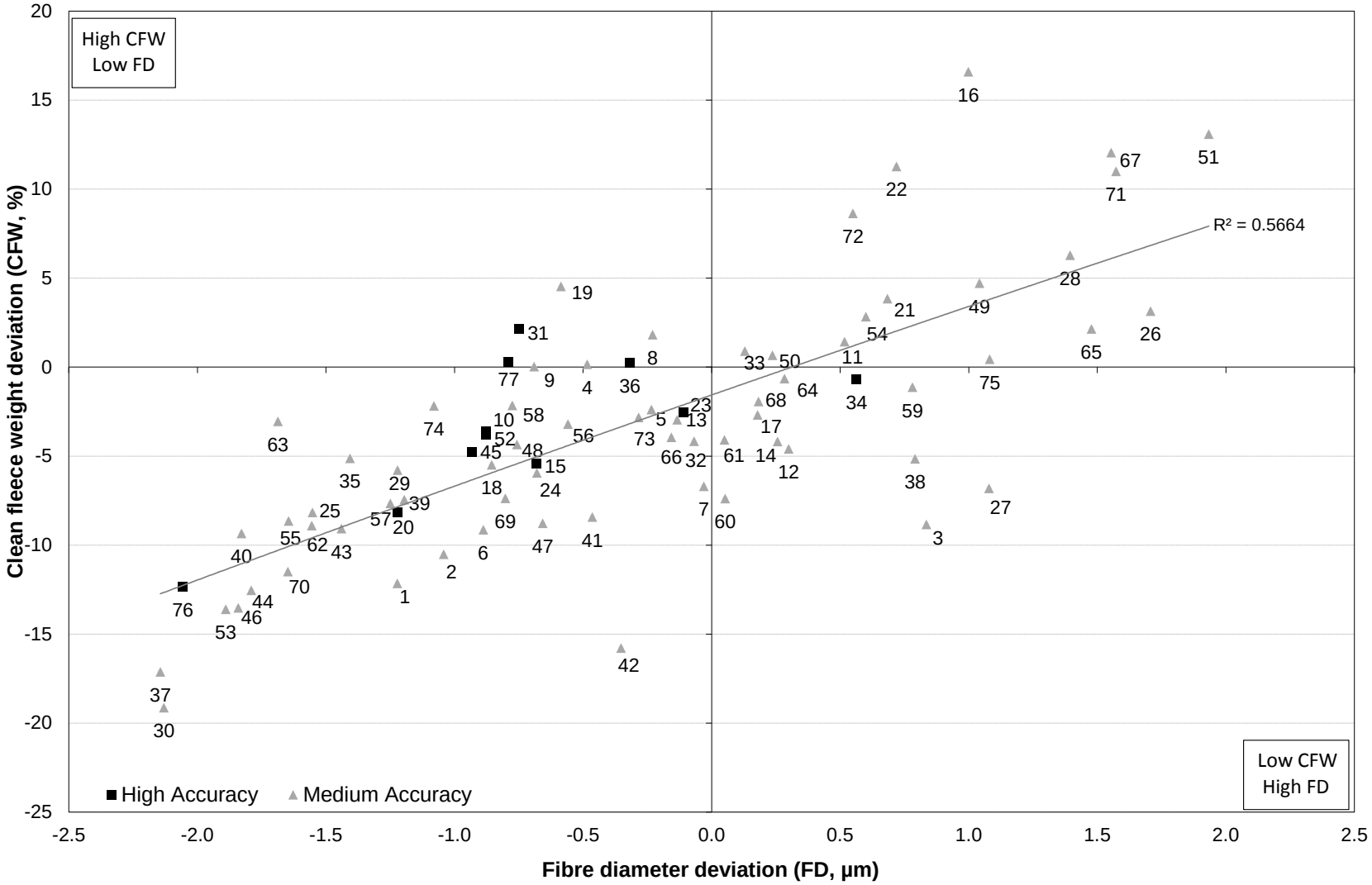


Figure 2 Performance of 77 bloodlines for liveweight (LWT) relative to fibre diameter (FD)

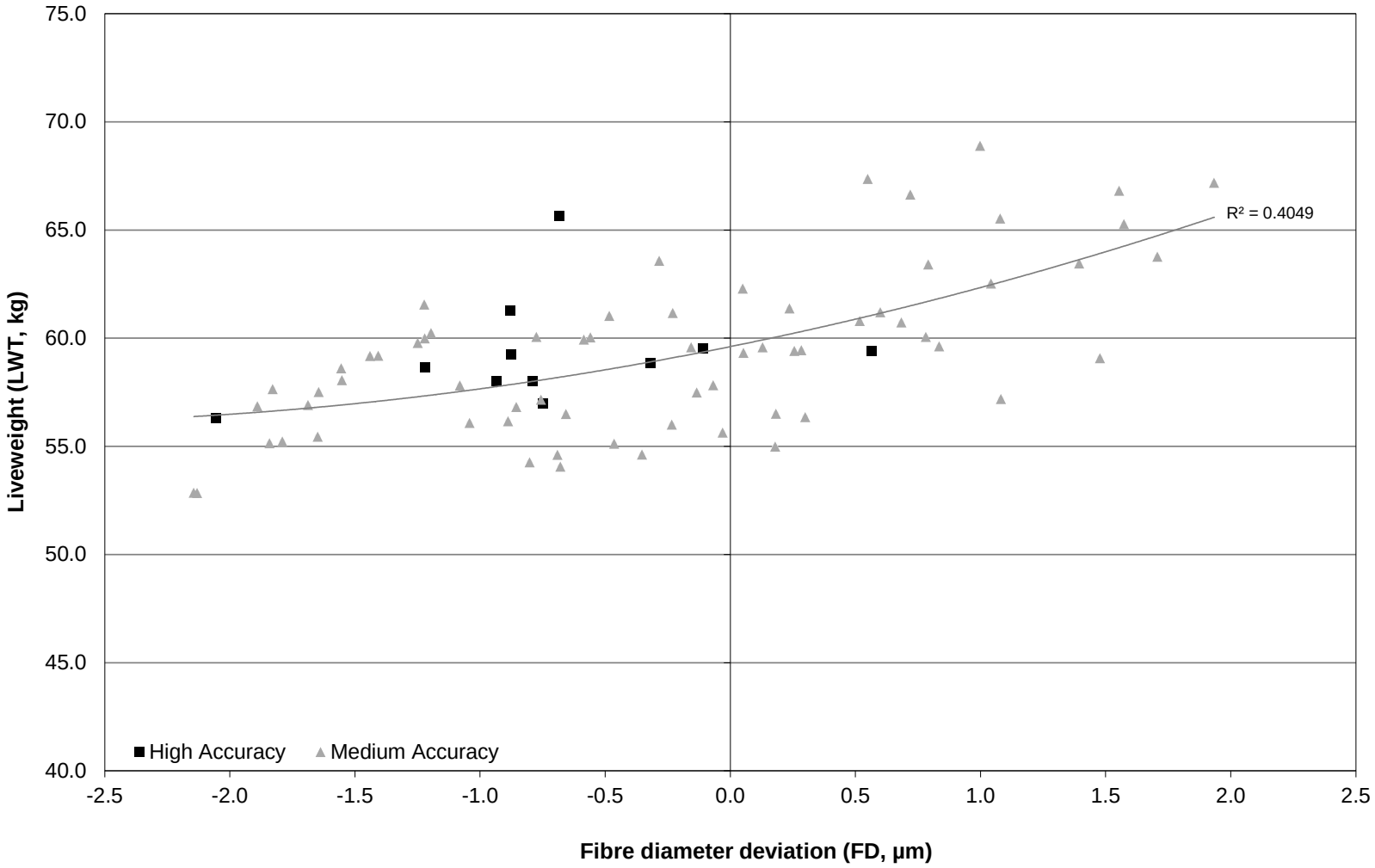
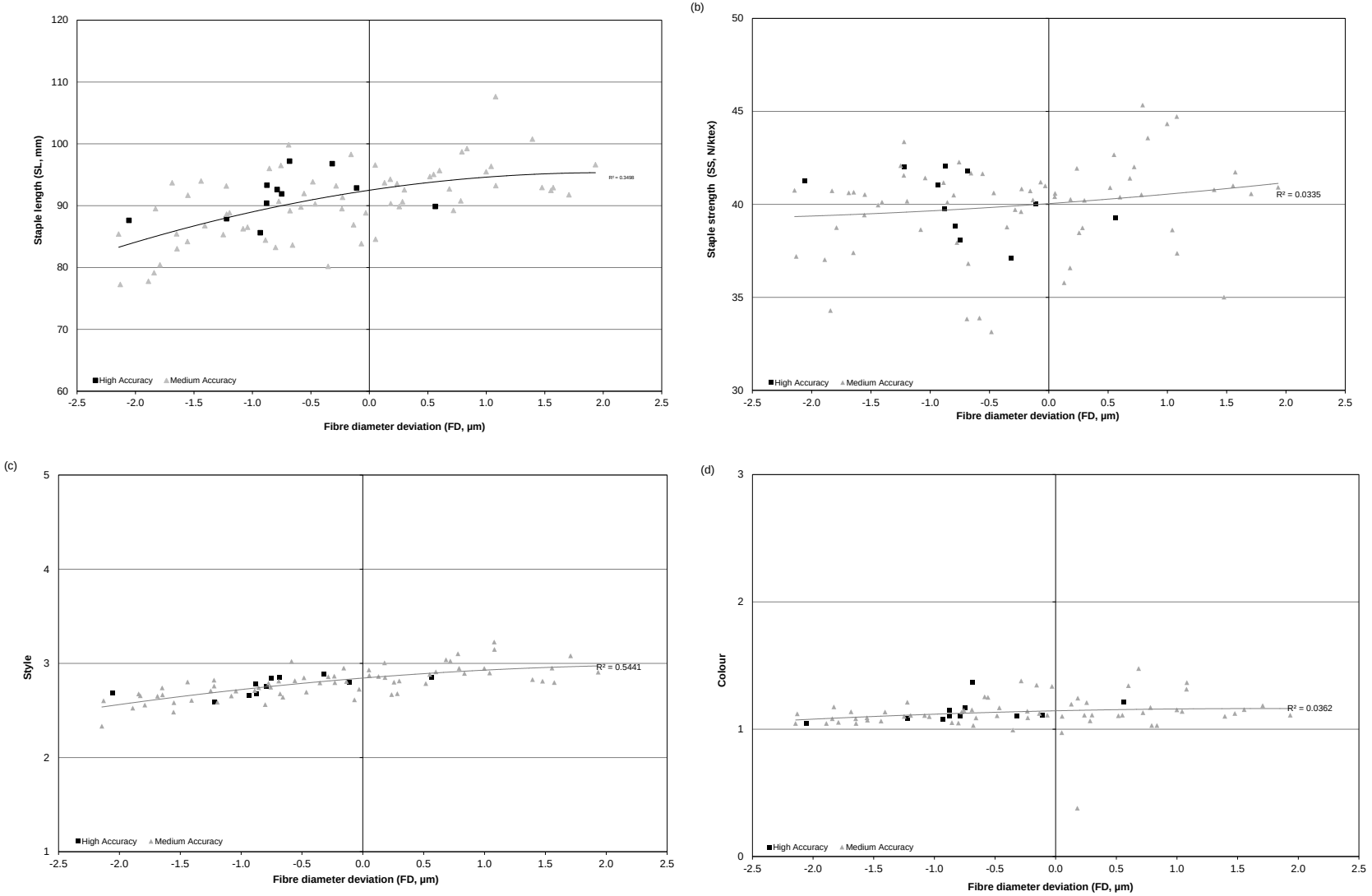


Figure 3 Performance of 77 bloodlines for (a) staple length (SL, mm), (b) staple strength (SS, N/ktex), (c) style and (d) colour relative to fibre diameter deviation (FD, µm)



Bloodline Financial Performance

The financial performance of each bloodline was determined using the GrassGro™ decision support tool. GrassGro™ uses historical daily weather data to drive models of interacting pasture growth and animal production, with day-to-day changes in the water content of the soil, pasture growth and decay and responses to grazing simulated for a particular location.

The greasy fleece weight, yield, fibre diameter and liveweight for each of the 77 bloodlines provided the livestock production parameters for 77 GrassGro™ simulations. The same farm system was used for each simulation, with parameters for soil, pasture and weather provided by a site at Bookham, near Yass, in NSW.

Enterprise structure, prices and costs were held constant for all simulations and were reflective of a wether enterprise at Bookham, with wethers shorn three times and then sold.

The simulations ran from 1962 to the end of 2015, providing a quantitative assessment of the performance of each bloodline across the full spectrum of seasonal conditions from drought through to long wet years.

The stocking rate (9.4 wethers/ha) used in the GrassGro™ simulations for all bloodlines was chosen such that the bloodline with the median liveweight would achieve the rule of maintaining a minimum ground cover of 70% in 71% of the years. This ground cover rule ensured the sustainability of the pasture over the long term. As the bloodlines were run at the same stocking rate, there was a difference in ground cover of 5%. Bloodlines with lower liveweight had higher ground cover, with the heavier bloodlines the lower ground cover.

Median wool and mutton prices for the 5 years from 2011 to the end of 2015 were used to determine the financial performance of each bloodline as this provided a better indication of the prices likely to be achieved by producers than the average wool and mutton prices. The median wool prices for that time period are presented in Table 3 and the median mutton price used was 304c/kg carcass weight. Changes in the wool and mutton prices would have an impact on the bloodline rankings. The greatest change would result from a change in the per micron price.

Measures of financial performance

GrassGro™ outputs include profit per head ($/hd), per hectare ($/ha) and per dry sheep equivalent ($/DSE). Each of these outputs includes typical enterprise costs and an overhead cost per hectare calculated by the program for the environment in which the simulations were run. As the same stocking rate was used for each of the 77 GrassGro™ simulations the $/hd and $/ha outputs are essentially the same.

Table 3 Average and median wool prices (c/kg clean) for the period 2011 – 2015

Fibre diameter	Median price
16	1473
17	1419
18	1349
19	1292
20	1230
21	1218

The two measures of financial performance of the bloodlines reported here are:

- *profit per head ($/hd)* which partially accounts for differences in liveweight between bloodlines as GrassGro™ allocates more supplementary feed to those bloodlines with higher liveweight to maintain the required minimum fat score of 1.5.
- *profit per dry sheep equivalent ($/DSE)* which accounts for the impact that differences in liveweight will have on grazing pressure. The DSE rating calculated by GrassGro™ over the 53 years of simulations is based on the consumption of feed for a given liveweight and fleece production. Profit per DSE is calculated as follows:

$$\frac{\$/\text{hd}}{\text{DSE rating}}$$

Figure 4 shows the bloodline distribution of profit/hd and fibre diameter, while Figure 5 depicts the relationship between profit/DSE and fibre diameter. The relationship with fibre diameter was relatively weak for both measures of financial performance, particularly at the broader end of the fibre diameter range.

The relationship between profit/DSE and clean fleece weight is stronger than that between profit/DSE and fibre diameter (Figure 6). Under the current market scenario, profit/DSE tends to be higher at heavier fleece weights.

The bloodline deviation in profit/DSE with liveweight is presented in Figure 7 which shows a weak relationship. There is no clear trend in profit/DSE with change in liveweight.

GrassGro™ was also used to estimate the financial performance for each of the 77 bloodlines using soil and pasture parameters for two other sites, Woolbrook and Narrandera (both in NSW). This was undertaken to explore the impact of location on the relative financial performance of the bloodlines. For the 2016 analysis, the correlations between profit per head ($/hd) and profit per DSE ($/DSE) among the 3 sites ranged from 98% to 99% with many of the bloodlines retaining their ranking across the three sites. Therefore, despite large differences in the environment between these three sites, the relative financial performance of the bloodlines was similar.

For the 2016 analysis, the standard deviation of each of the two measures of profit was calculated. These are presented in Table 2. The standard deviation provides an indication of the amount of variation around the average profit (both per head and per DSE) for each of the 77 bloodlines over the 53 years of GrassGro™ simulations. A large standard deviation indicates greater variation in profit compared with a smaller standard deviation.

The financial performance of the 77 bloodlines at each of the three sites, Bookham, Narrandera and Woolbrook, together with the standard deviation of profit ($/hd and $/DSE), for the median price as well as low (30 percentile) and high (70 percentile) market scenarios can be found on the Merino Bloodline Performance website:

www.merinobloodlines.com.au

Figure 4 Bloodline deviations for profit calculated as $/head ($/hd) and fibre diameter (FD) for the 77 bloodlines

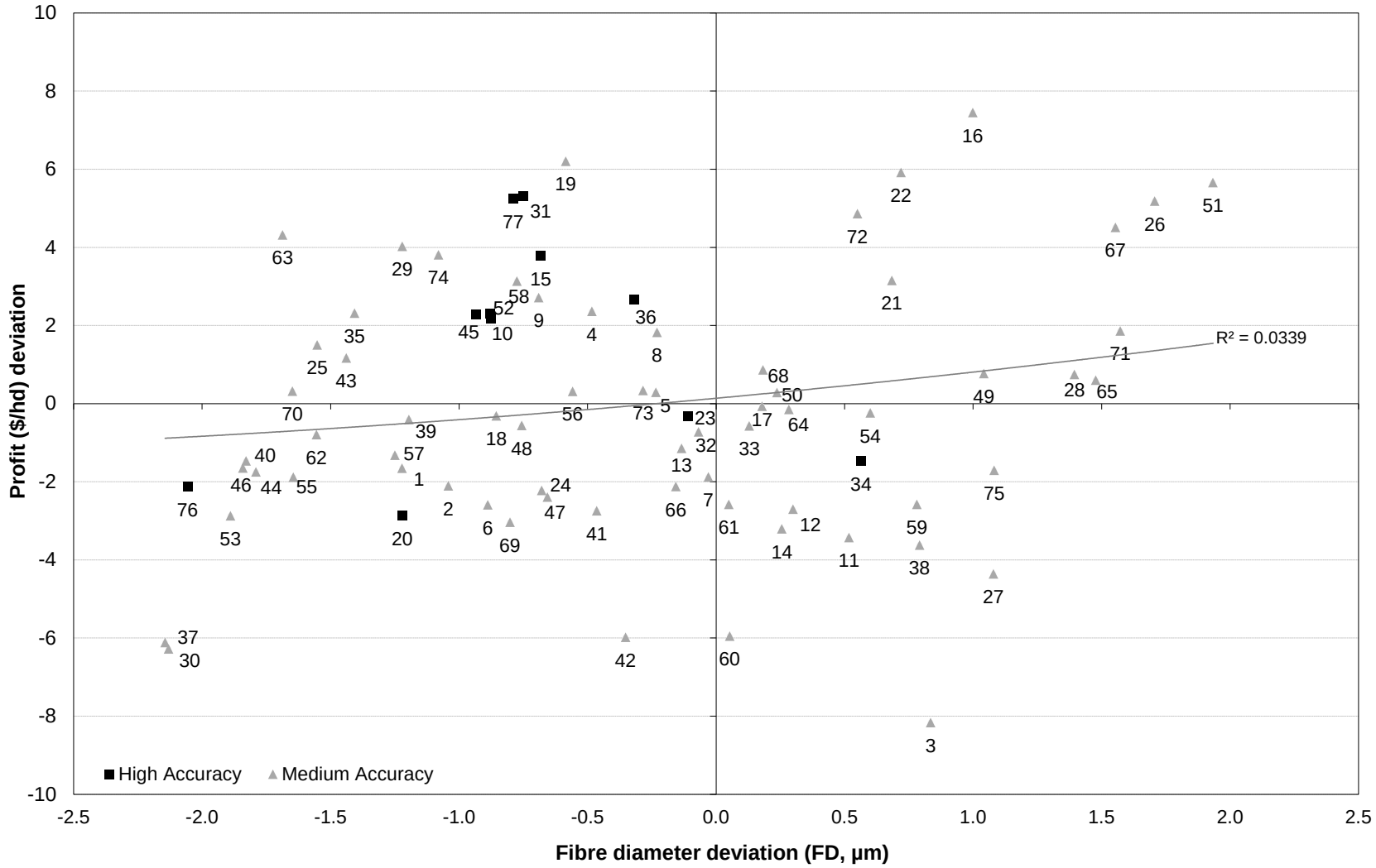


Figure 5 Bloodline deviations for profit calculated as $/ dry sheep equivalent (DSE) and fibre diameter (FD) for the 77 bloodlines

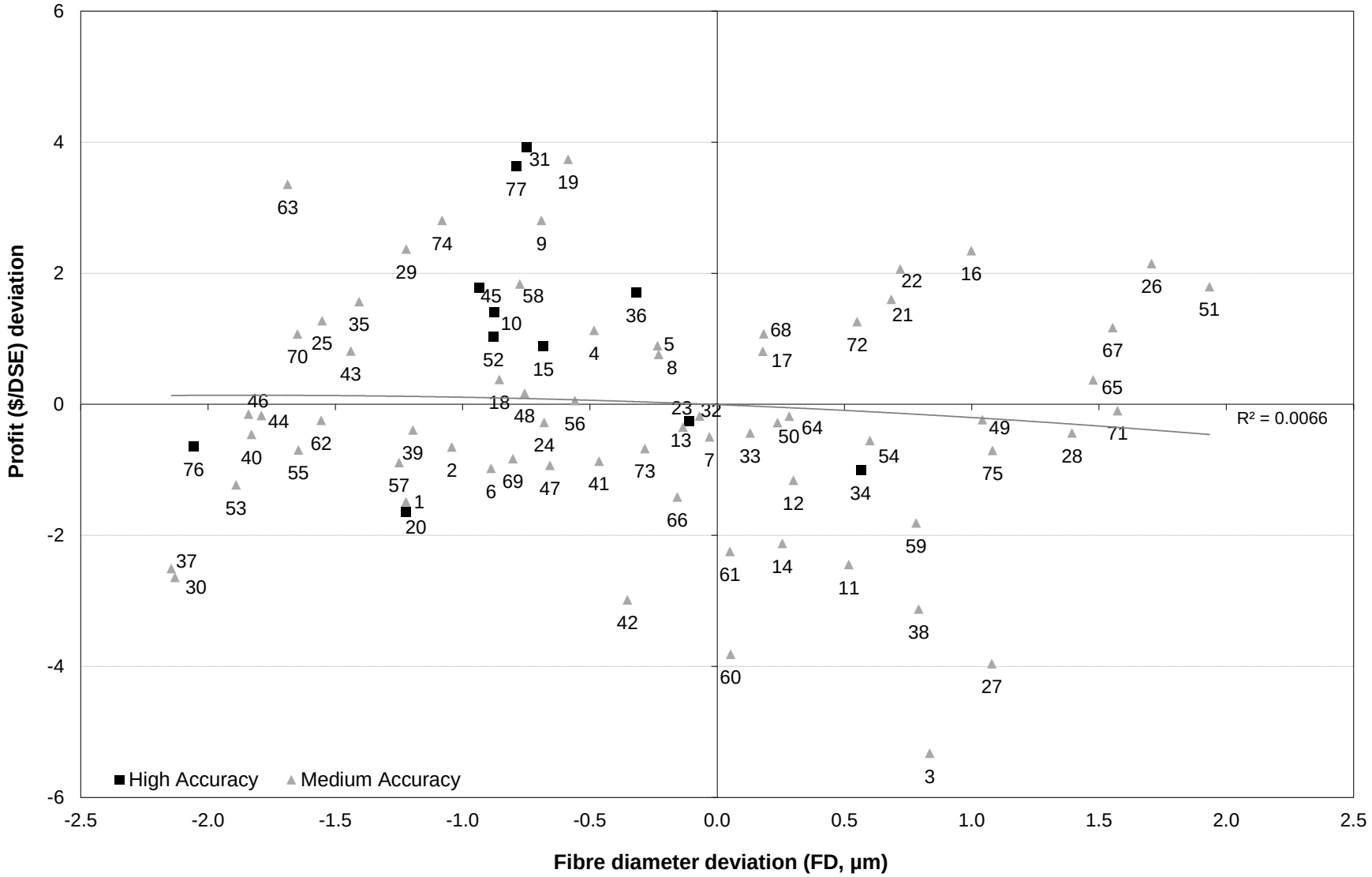


Figure 6 Bloodline deviations for profit calculated as $/ dry sheep equivalent (DSE) and clean fleece weight (CFW, %) for the 77 bloodlines

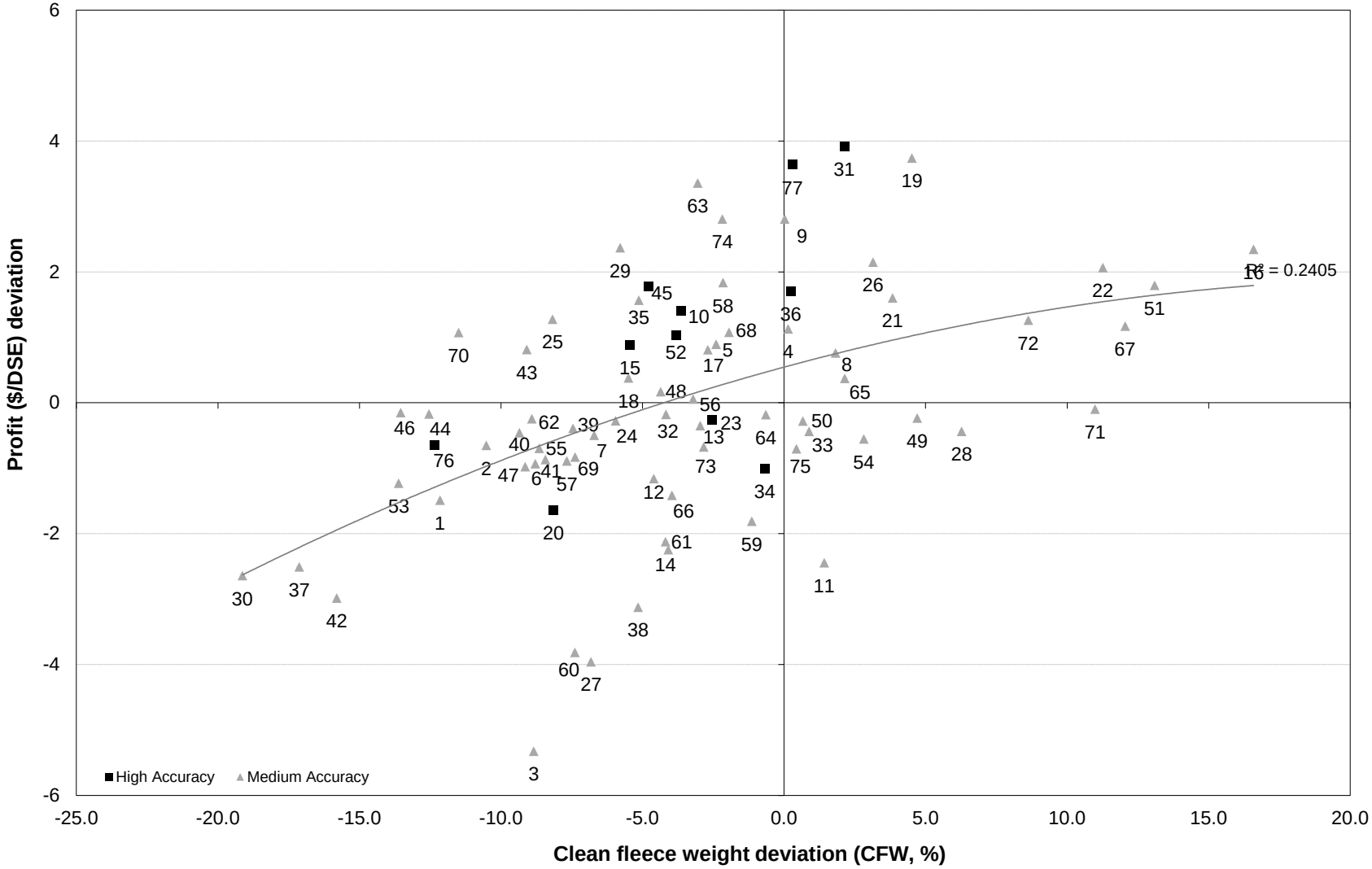
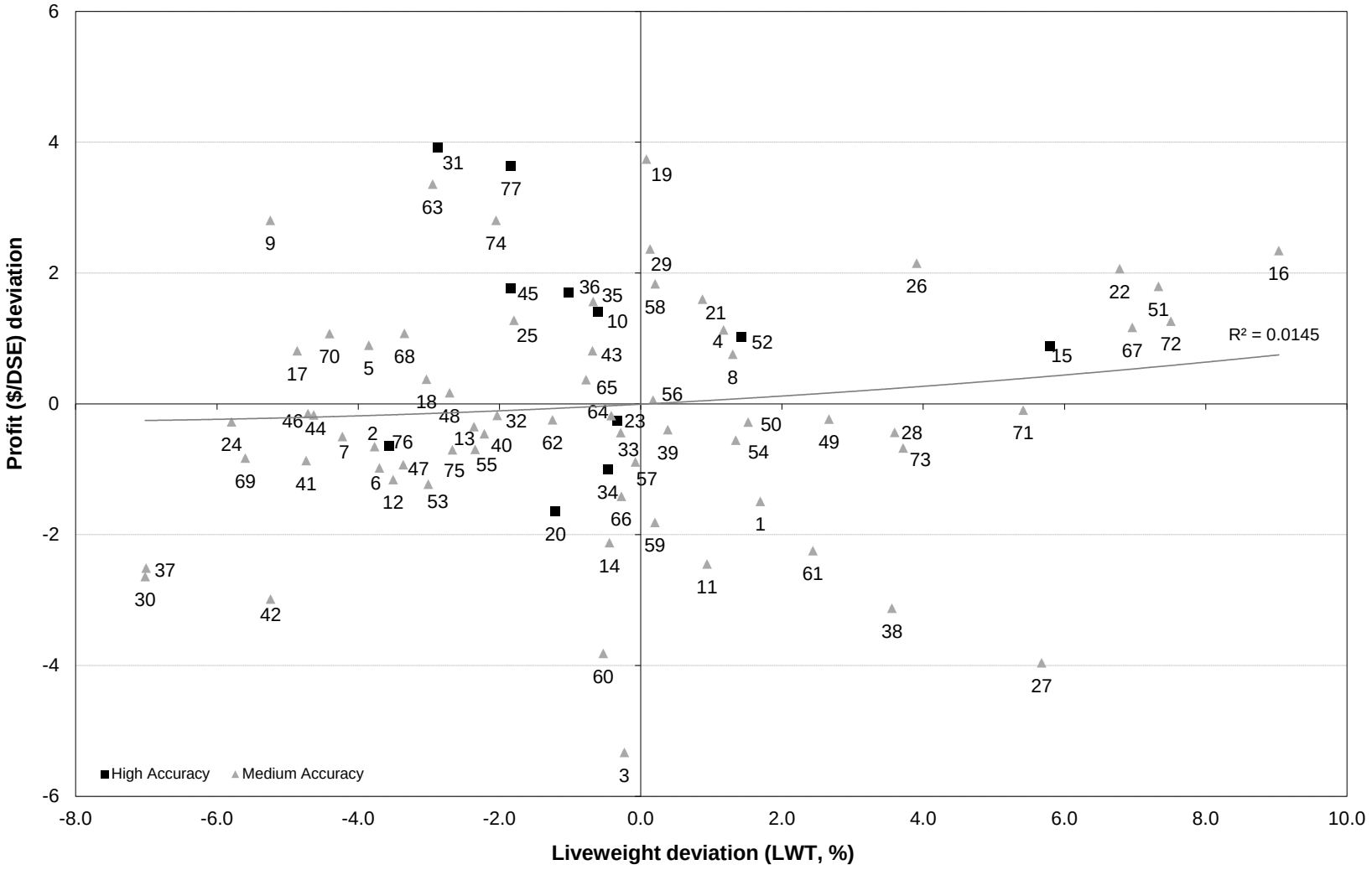


Figure 7 Bloodline deviations for profit calculated as $/ dry sheep equivalent (DSE) and liveweight (LWT, %) for the 77 bloodlines



Trials included in this analysis

Bloodline data used in this analysis were sourced from wether and ewe comparisons that had been run for a minimum of two years (50% of comparisons), and a maximum of three years (Table 4).

Table 4 The 26 wether comparisons and 1 ewe productivity^ trial included in this analysis

Trial name	State	Trial years
Wagga (CWWT)	NSW	2004-2006
Yass IV	NSW	2005-2006
ANFD Schute Bell 2005	NSW	2004-2007
Bathurst 2005	NSW	2005-2007
M2M - Elmore	VIC	2004-2006
Midlands Ag Assoc.	TAS	2006-2007
Avondale Ewe Trial^	WA	2004-2006
Alectown	NSW	2007-2008
Armour	NSW	2005-2008
Glen Innes 05	NSW	2005-2007
ANFD Wether Trial 2007 - 2010	NSW	2007-2010
Bookham 2008 - 2011	NSW	2007-2011
Paling Yards, Taralga	NSW	2008-2010
Merrimba	NSW	2009-2010
Peter Westblade Memorial Merino Challenge	NSW	2010-2012
Bathurst 2009 - 2011	NSW	2009-2011
Bookham 2011 - 2013	NSW	2011-2013
Glen Innes 2009 - 2011	NSW	2009-2011
Parkes 2010 – 2012	NSW	2010-2012
Peter Westblade Memorial Merino Challenge 2	NSW	2013-2014
Monaro 2012 - 2014	NSW	2012-2014
Bathurst 2013 - 2015	NSW	2013-2015
Glen Innes 2013 - 2015	NSW	2013-2015
ANFD 2012 - 2015	NSW	2013-2015
Peter Westblade Memorial Merino Challenge 3	NSW	2015-2016
Bookham Ag 2015 - 2018	NSW	2015-2016

Limitations

The information generated by the Merino Bloodline Performance analysis provides an objective comparative evaluation of the genetic variation between Merino bloodlines. It is a useful tool to aid decision making by wool producers in choosing alternative bloodline sources that match the breeding objectives of their commercial flocks. However the limitations of the information need to be recognised:

- The financial performance reported in this Primefact is based on a wether enterprise shorn 3 times and sold as mutton.
- Merino Bloodline Performance information is historic as the database for this report was restricted to comparisons that commenced within the past 10 years. Therefore, the relative performance of each bloodline represents the breeding policies of that stud and their commercial clients 5 to 15 years ago. Recent changes in breeding objectives

or practices at the stud and commercial level will not be reflected in this information.

- Differences in the number of teams representing each bloodline and the accuracy of each bloodline's performance information are listed in Table 2. Making decisions on alternative bloodlines of MODERATE accuracy will involve a slightly higher risk than those of HIGH accuracy.
- All teams included in this analysis were selected according to the guidelines set out in *Designing and conducting Merino wether comparisons and on-farm genetic evaluations.* This limits the ability of wether and ewe trial entrants to specifically select sheep for the trials and assists stud breeders and each of the wether and ewe trials contributing data to this analysis to define a team representing a flock as being of a particular bloodline.
- This analysis is unable to account for whether the teams have come from the bloodline's ram breeding flock or from their commercial clients. A high proportion of teams from higher merit flocks may occur when the stud's own commercial flock provides the majority of the teams which make up the bloodline result. We recommend that producers ask their stud whether the teams representing that bloodline were from the studs own flock or their commercial clients.
- The relative financial performance of the bloodlines do not account for any variation between bloodlines in reproductive performance.

When using the information presented in this Primefact to evaluate one or more bloodlines it is important to contact the stud representing each bloodline directly and seek information that describes their bloodline's genetic improvement policy and direction.

Primefact 74, *Choosing a Bloodline Source,* provides a comprehensive description of how to use bloodline performance information to evaluate one or more bloodlines (http://www.dpi.nsw.gov.au/agriculture/merino-bloodline-performance/choose-a-bloodline-source).

Further information

Not all traits measured or assessed by some of the wether and ewe trials contributing data to this project are included in this Primefact. These include meat traits, face cover, fertility, wrinkle development and fleece rot. Producers should make contact with the coordinator of each trial to access this information. Some of these traits are evaluated at Merino sire evaluation sites. Reports from these sites can be accessed from the Australian Merino Sire Evaluation Association's (AMSEA) Merino Superior Sires website or via the Sheep Genetics MERINOSELECT website.

Merino Bloodline Performance information complements the Australian Sheep Breeding Values (ASBVs) provided by MERINOSELECT that predict the genetic merit of individual sheep and stud averages.

Other useful resources

To make the best use of this information, producers should consider the details on the inside cover of the Merino Bloodline Performance folder and the information contained in the folder which includes:

- Primefact 1472. Merino bloodlines: a comparison based on wether trial results 2006 – 2016
- Primefact 74. Choosing a bloodline source
- Bloodline contacts
- Application to be added to the mailing list
- Feedback form to suggest changes for future publications

The Merino Bloodline Performance website (www.merinobloodlines.com.au) has been updated with the results of this analysis along with all the information contained in the bloodline package.

Other associated information sources include:

- *Designing and conducting Merino wether comparisons and on-farm genetic evaluations.* http://www.dpi.nsw.gov.au/agriculture/merino-bloodline-performance/running-wether-trials
- Ewe productivity trials, including information on reproduction differences. http://www.agric.wa.gov.au/PC_91878.html?s=1001
- Merino Superior Sires website. http://www.merinosuperiorsires.com.au/
- Sheep Genetics MERINOSELECT website. http://www.sheepgenetics.org.au/Breeding-services/MERINOSELECT-Home

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www.dpi.nsw.gov.au/primefacts

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