



THE UNIVERSITY  
of ADELAIDE

# SA Merino Sire Evaluation

2022 Drop - Carcase Outcomes

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**make  
history.**

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# 1. Introduction

The high price of lamb coupled with high consumer expectation has driven the urgency for the Australian lamb supply to ensure it is able to consistently supply high eating quality product. Good meat eating quality is driven by multiple traits which are influenced by genetic and environmental effects. Two key traits are intramuscular fat (IMF) and shear force after 5 days ageing (SF5).

Lean meat yield refers to the amount of lean in a carcass expressed as a percentage of hot standard carcass weight. Dual x-ray absorptiometry (DXA) is a precise and accurate method used to assess carcass composition, including lean, fat, and bone at chain speed in both the hot and cold carcass. DXA devices provide a lean meat yield estimate (DXA lean), with higher values indicating leaner carcasses (akin to lower fat score or GR). Lean meat yield has a high heritability in the range of 51% to 58%.

The percentage of intramuscular fat (IMF) is a major determinant of eating quality. IMF, visualised as marbling, is a measure of the chemical fat percentage in the lamb loin. An increase in IMF% has been shown to correlate with increased consumer perception of juiciness, tenderness, flavour, and overall liking with a minimum of 4% IMF preferred by consumers. The IMF range is typically between 2% and 7%. This trait is moderately to highly heritable and negatively correlated with SF5.

Shear force (SF5) reflects consumer perception of tenderness and is measured as the force required to cut through a sample of cooked loin after five days ageing to allow for tenderisation from proteolytic ageing. SF5 values less than 3kg or 29.42N are desirable and represent more tender meat. SF5 is a moderately to highly heritable trait with a typical range from 1.1kg to 7.7kg.

Higher, or more positive values for DXA lean% and IMF% are favourable, whereas lower, more negative values are preferred for SF5. A balanced approach to selection for lean meat yield and meat quality is needed to ensure these negatively correlated traits do not work against each other.

## 2. Project purpose and outcomes

This project contributes to the SA Sire Evaluation Site which has the outcome to provide an independent ram benchmarking service within SA for merino sires. Specifically, the purpose of this project was to enable collection of hard-to-measure meat eating quality phenotypes for IMF and SF5 from 2022 drop progeny of the 16 rams entered at the site. This will enable informed sire selection, increase breeding value accuracy of relatives, and augment the reference populations for these traits. This was achieved through completion of the following activities:

- 2022 Mentara Park drop wether lambs processed at JBS, Bordertown
- Individual animal IMF% and SF5 samples collected and analysed
- Collection of individual animal data for the progeny of 16 rams, including exit weight, HSCW, dressing %, GR tissue depth, pH decline, eye muscle measurements, IMF%, SF5, and DXA carcass composition estimates
- Fitting of a sire model to report on heritability, variance components, and sire predicted means across the sampled traits

# 3. Methodology

## 3.1. Animal management

The South Australian Merino Sire Evaluation Site at Mentara Park evaluated 16 rams, each joined to 57 ewes via artificial insemination in December, 2021. Ewes were pregnancy scanned and managed in groups of singles and multiples until just prior to lambing, when they were then separated in to single, twin, triplet, and quadruplet-bearing management groups. Lambing commenced mid-May, 2022. Conception rate was recorded at 64%, of which 65% of ewes scanned pregnant with multiples for a total of 825 lambs born across all sires. Lambs were weaned mid-August, 2022, shorn October, 2022, scanned for carcass traits in March, 2023, and shorn again in June, 2023. The wether lamb cohort was sold on 12 July, 2023 with seven progeny per sire selected for meat eating quality evaluation. For some sires, avoiding selection of lambs of multiple birth type was not possible. A summary of sire progeny is provided in Table 1.

**Table 1 Summary of number of progeny per sire by birth type.**

<b>Breeders Flock, Sire Number</b>	<b>Single</b>	<b>Twin</b>	<b>Triplet</b>	<b>Quad</b>	<b>Not recorded</b>	<b>Total</b>
<i>Baderloo Poll, 200106</i>	4	6	3	0	5	18
<i>Flairdale Poll, 190028</i>	3	6	2	0	3	14
<i>Forest Springs Poll, 200102</i>	5	7	4	0	9	25
<i>Kelvale Poll, 200114</i>	1	7	2	0	7	17
<i>Kiandra Poll, 200065</i>	6	9	0	0	10	25
<i>Lorelmo Poll, 170602</i>	2	5	1	0	2	10
<i>Malleetech Poll, 200119</i>	5	5	7	0	12	29
<i>Miramoota, 140012*</i>	9	8	0	0	13	30
<i>Mulloorie Poll, 160059*</i>	2	5	3	0	4	14
<i>OBrien Poll, 201166</i>	4	7	0	0	10	21
<i>Pepper Well Poll, 200145</i>	1	8	3	2	11	25
<i>Roemahkita Poll, 200058</i>	6	7	1	0	6	20
<i>The Yanko, 190310</i>	4	9	1	1	8	23
<i>Wallaloo Park Poll, 172223</i>	7	8	3	0	6	24
<i>Westwood Poll, 200215</i>	3	2	3	0	6	14
<i>Willandra Poll, 170018</i>	3	8	1	0	11	23

\* indicates link sires included to provide a genetic link across years and sites.

## 3.2. Abattoir assessment

The wether cohort were consigned together and transported from Mentara Park, Malinong to JBS, Bordertown on Tuesday 11<sup>th</sup> July 2023. Lambs were rested in lairage overnight then harvested on Wednesday 12<sup>th</sup> July 2023 and fabricated on Thursday 13<sup>th</sup> July 2022. All lambs consigned (n = 344) were subject to basic chiller assessment, and a subset (n = 102) representing approximately 7 lambs from each of the 16 sires entered were selected for further evaluation of eating quality traits. The basic chiller assessment on all 344 lambs included rib count, GR tissue depth, Hot Standard Carcass Weight (HSCW), palpated fat score, and DXA carcass composition estimates for lean, fat, and bone. In addition, birth type,

live weight, dressing%, ultimate pH, temperature, loin eye width, loin eye depth, loin fat depth, SF5, and IMF were also recorded for the eating quality subset.

Electronic identification was scanned at the point of slaughter and carcasses were manually tagged to enable tracking through harvest and fabrication, and subsequent linkage to Sheep Genetics identification. Carcasses were trimmed to AUS-MEAT specifications and then weighed to determine HSCW. All carcasses were then subjected to electrical stimulation before entering the chiller where they remained overnight at 0-4°C. Approximately two hours after chiller entry tissue depth (mm) was recorded using a GR knife inserted over the 12<sup>th</sup> rib 110mm from the midline.

Carcass temperature and pH measurements were taken a total of four times and commenced immediately following harvest on entry to the chiller (approximately 30 minutes post slaughter). Subsequent readings were taken when muscle temperature was approximately 18°C and 12°C, followed by a final measurement in the laboratory. Measurements were taken in the caudal (tail) end of the *m. longissimus thoracis et lumborum* (loin) over the lumbar-sacral juncture on the left-hand side after sectioning the dorsal surface of the subcutaneous fat and muscle to expose the measurement site. Measurements were made with a pH meter (WP-80M, TPS Pty Ltd., Queensland) fitted with a stab type temperature probe (Stab Temperature Sensor, TPS Pty Ltd., Queensland) and polypropylene spear type gel electrode (1m pH Sensor Intermediate Junction, TPS Pty Ltd., Queensland). Calibration of the pH sensor with pH 4.01 and pH 7.00 buffers at chiller temperature and room temperature was completed prior to measurement in the chiller and laboratory, respectively. Loin temperature and pH measurements were taken simultaneously.

Carcasses were DXA scanned to assess lean, fat and bone composition then fabricated after approximately 24 hours of active chilling. The left-side loin sample was collected following preparation to AUS-MEAT specifications for short loin (H.A.M. item number 4881). Samples were vacuum sealed and refrigerated at approximately 4°C until further preparation. Samples were transported to the laboratory where a final temperature and pH measurement, along with measurement of eye muscle area were recorded prior to deboning. Measurements at the cranial end of the loin included loin eye width, loin eye depth, and fat depth over the loin 45mm from the midline using digital calipers (150mm digital vernier, Kincrome, Scoresby, Australia). This was followed by preparation of a denuded eye of short loin (H.A.M. item number 5150), which was separated into a cranial and caudal piece for intramuscular fat (IMF) and shear force (SF5) testing, respectively. A sample of approximately 45g was diced into 5mm cubes and placed in 50ml polypropylene tubes (Screw cap tube, Sarstedt, Nümbrecht, Germany), then frozen at -20°C until IMF analysis. Each SF5 sample was prepared with dimensions 60-70mm length, 40-50mm width, and 20-25mm depth to produce a weight of approximately 65g then individually vacuum sealed, aged at 4°C until day 5 post-slaughter, then frozen at -20°C until analysis (Sheep CRC, 2009).

### 3.3. Laboratory measured traits

Frozen IMF samples were appropriately packaged and transported to University of New England, Armidale for analysis. Samples were freeze dried and IMF% was determined using the procedure of near infrared reflectance spectroscopy (NIR). SF5 analysis was conducted following the Sheep CRC method (Sheep CRC, 2009). Briefly, frozen samples were weighed then cooked in a bag in batches using a water bath set at 71°C for 35 mins. Following cooking, samples were cooled in their bag under cold running water for 30 mins then removed from the bag, dried with paper towel, weighed, and stored in the refrigerator at 4°C until testing. Shear force was determined using a Lloyd LRX texture analyser fitted with a Warner-Bratzler blade attachment programmed with a crosshead speed of 100.00mm/min. Samples were cut into 10mm thick pieces that were then sliced parallel to the muscle fibres into pieces approximately 8.3mm by 12mm. Six replicates from each sample were loaded into the Lloyd cutting chamber for testing such that the cutting

line was perpendicular to the muscle fibres. Each of the six measurements were recorded (Newtons) and the mean, standard deviation, and coefficient of variation were calculated for each sample. The mean SF5 value was used for analysis unless the coefficient of variation was 24% or greater, in which case the median value was used.

### 3.4. Statistical analysis

Data were collated in Excel (Microsoft Corporation, 2018) then summarised, visualised, and analysed in R (R Core Team, 2021) using readxl (Wickham and Bryan, 2019), ggplot2 (Wickham, 2016), dplyr (Wickham *et al.*, 2021), tidyr (Wickham, 2021) and asreml (Butler, 2020). Asreml was used to fit linear mixed models to estimate heritability and generate sire predicted means for all traits. Basic chiller assessment traits included data from 344 lambs, and eating quality traits included data from the representative subset of 102 lambs (3.2). For all models, the trait being examined and birth type were fit as fixed effects, with sire included as a random term. The standard error is reported for each trait. In this trial only observations on sires were obtained, therefore due to the sire making up  $\frac{1}{4}$  of additive genetic variance the following equation was used to estimate heritability:

$$h^2 = \frac{(4 \times \textit{sire variance})}{(\textit{sire variance} \times \textit{residual variance})}$$

# 4. Results and discussion

## 4.1. Descriptive statistics

Descriptive statistics for the unadjusted exit weight (live weight), chiller assessment, eating quality, carcass composition, and eye muscle data are provided in Table 2. For each trait, the mean, minimum, maximum, standard deviation, and coefficient of variation (a measure of variability calculated by standard deviation/mean and multiplied by 100) are reported. As expected in a progeny test, there was large variation across the cohort. This is important and demonstrates differences in performance between individuals within the same lifetime management group. Lambs weighed between 43.5 kg and 91.5 kg at the time of slaughter and on average dressed at 47% yielding carcasses with HSCW from 20.0 kg to 47.0 kg. GR tissue depth was variable (CV of 41%) ranging from 1.00 mm (fat score 1) to 25.0 mm (fat score 5). Ultimate pH was the least variable trait and ranged from 5.41 to 6.22 with 96% of carcasses achieving pH 6.0 or below which is desirable for eating quality. Coefficient of variation indicated intramuscular fat and shear force were highly variable, ranging from 2.17% to 8.03%, and 30.30 N to 107.99 N, respectively, which are similar to values reported elsewhere (Mortimer *et al.*, 2014). An IMF above 4% is considered preferable by consumers and 57.8% of lambs exceeded this level. However, no lambs had a shear force below 29.42N (3kg), which is sought after to achieve tenderness. DXA lean averaged 53.2% with a range from 45.54% to 63.91%. Of the carcass composition estimates, fat was the most variable with CV of 14% and range 18.87% to 45.25%, which is consistent with the large variation also recorded for GR tissue depth and loin fat depth. An average 12.62% was recorded for DXA bone with standard deviation of 1.44. Eye muscle area ranged from 1277.97 mm<sup>2</sup> to 3506.65 mm<sup>2</sup> with more variation observed in loin eye depth than loin eye width. Loin fat depth ranged from 0.96 mm to 8.81 mm and had a high CV of 47%, following the large variation observed in other fatness traits.

**Table 2 Summary statistics for unadjusted weight, carcass, eating quality, composition, and eye muscle measurements including mean, minimum, maximum, standard deviation (SD), and coefficient of variation (CV).**

	Mean	Minimum	Maximum	SD	CV (%)
<i>Exit weight (kg)</i>	63.84	43.50	91.50	6.63	10
<i>HSCW (kg)</i>	29.29	20.00	47.00	3.72	13
<i>Dressing %</i>	46.95	37.10	53.40	3.09	7
<i>GR (mm)</i>	12.01	1.00	25.00	4.94	41
<i>pH<sub>u</sub></i>	5.64	5.41	6.22	0.15	3
<i>IMF (%)</i>	4.25	2.17	8.03	1.12	26
<i>SF5 (N)</i>	53.08	30.30	107.99	16.20	31
<i>DEXA lean (%)</i>	53.26	45.54	63.91	3.34	6
<i>DEXA fat (%)</i>	34.16	18.87	45.25	4.80	14
<i>DEXA bone (%)</i>	12.62	9.29	17.22	1.44	11
<i>Loin eye depth (mm)</i>	33.02	21.19	47.69	4.28	13
<i>Loin eye width (mm)</i>	64.74	54.65	74.93	4.77	7
<i>Loin fat depth (mm)</i>	3.15	0.96	8.81	1.47	47
<i>EMA (mm<sup>2</sup>)</i>	2140.50	1277.97	3506.65	339.94	16

Graphs of predicted mean  $\pm$  standard error by sire for carcass traits including live weight, HSCW, dressing%, and GR fat depth are presented in Figure 1. Liveweight was the least variable of these traits across the sire cohort. The greatest variation was observed in GR tissue depth, which is consistent with other fatness traits where large variations in predicted means were reported.

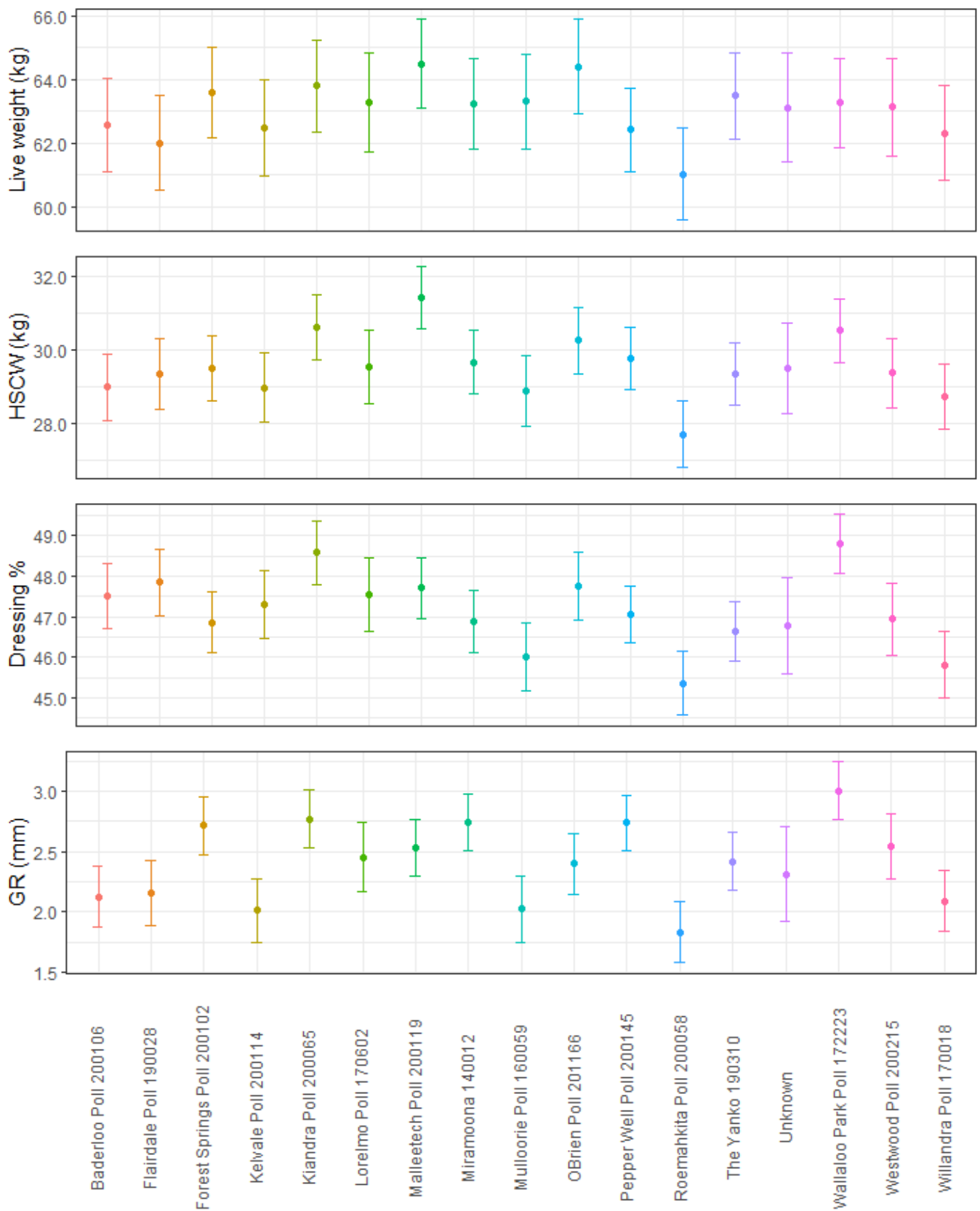


Figure 1 Summary of predicted means ( $\pm$  standard error) for carcass traits including live weight, Hot Standard Carcass Weight (HSCW), dressing %, and GR tissue depth (GR), separated by sire.

Figure 2 summarises the predicted mean  $\pm$  standard error by sire for loin eye traits, including loin eye depth, loin eye width, and loin fat depth. Eye muscle area is calculated by multiplying the width and depth of the loin eye, and results indicate that most of the variation in eye muscle area is due to the variation in loin eye depth, with loin eye width being a more uniform trait. Loin fat depth further demonstrated the large variation in carcass fatness across the sire cohort. Hide pull effects and varying degrees of trimming at different locations likely contributed to the slight reranking observed among sires when comparing GR tissue depth and loin fat depth predicted means.

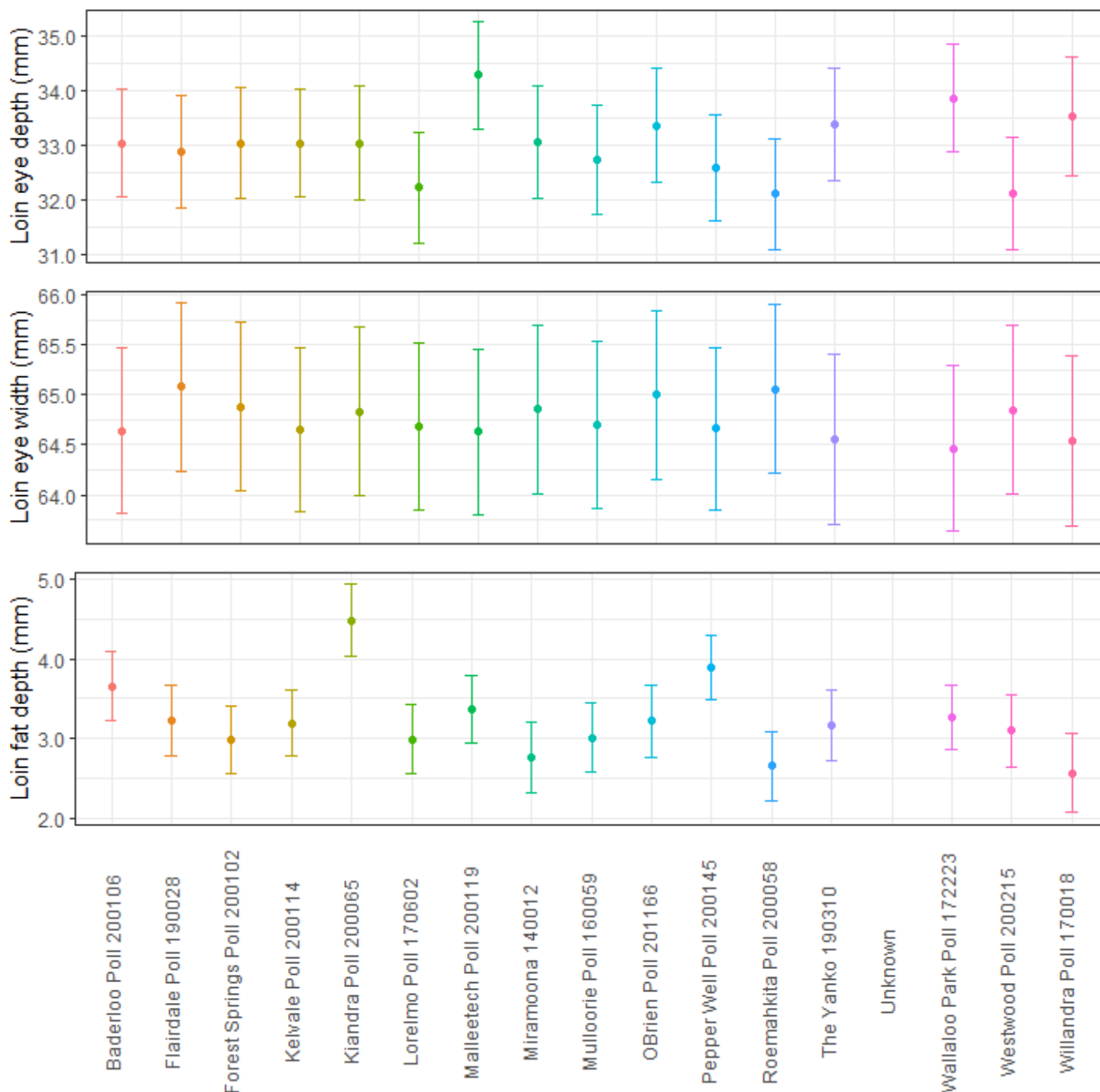
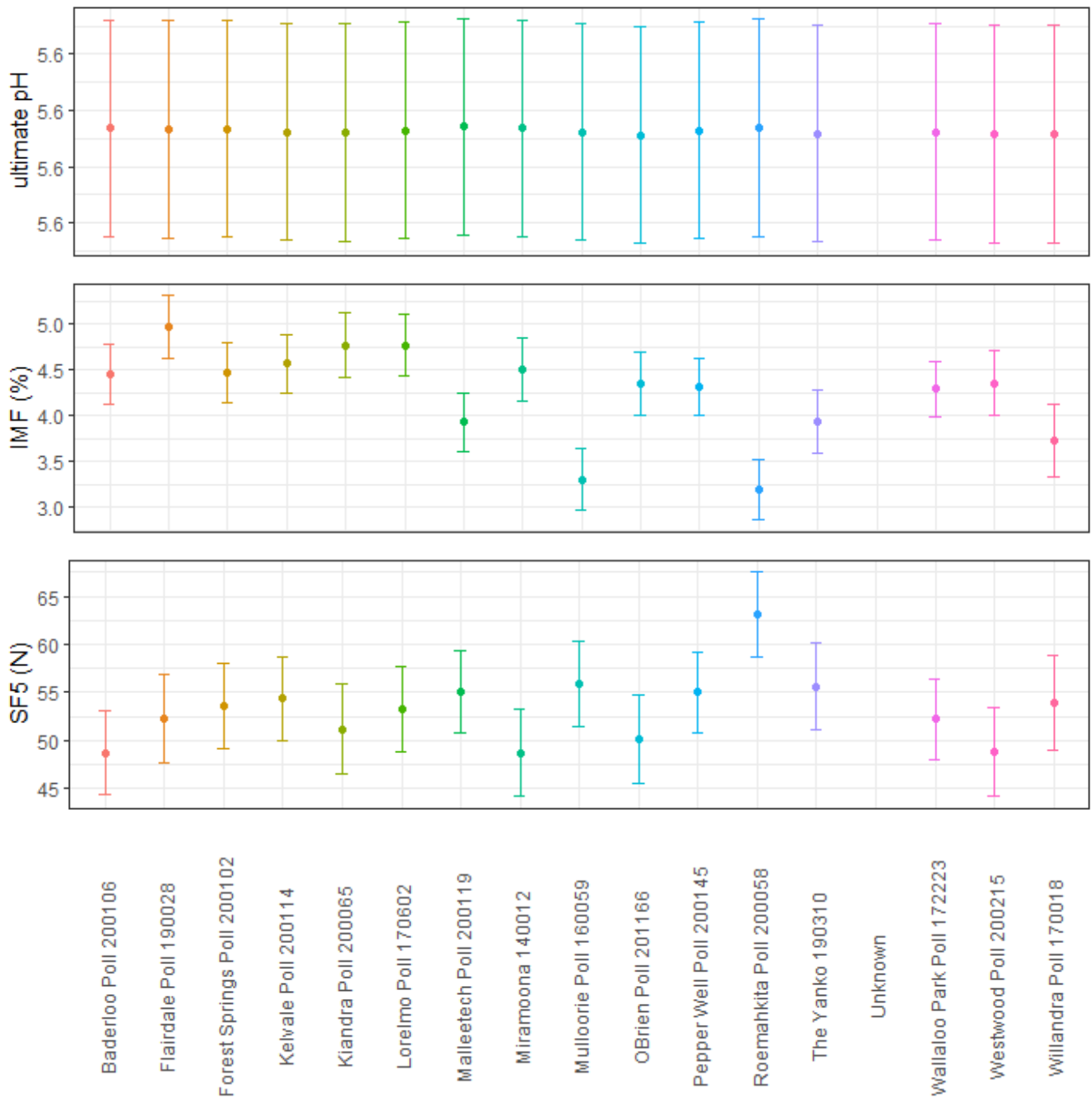


Figure 2 Summary of predicted means ( $\pm$  standard error) for loin eye traits including loin eye depth, loin eye width, and loin fat depth, separated by sire.

Eating quality traits are presented in Figure 3 as the predicted mean  $\pm$  standard error by sire. Ultimate pH was consistent across the cohort. Intramuscular fat and shear force varied between sires, and those with high IMF tended to have lower shear force values. This relationship is explored further in Figure 6.



**Figure 3** Summary of predicted means ( $\pm$  standard error) for eating quality traits including ultimate pH, intramuscular fat (IMF), and shear force after 5 days ageing (SF5), separated by sire.

Figure 4 presents the predicted mean  $\pm$  standard error by sire for DXA traits. Sires with high DXA lean had a corresponding low DXA fat, and vice versa. Predicted means for DXA lean, fat, and bone were within the expected range for these traits.

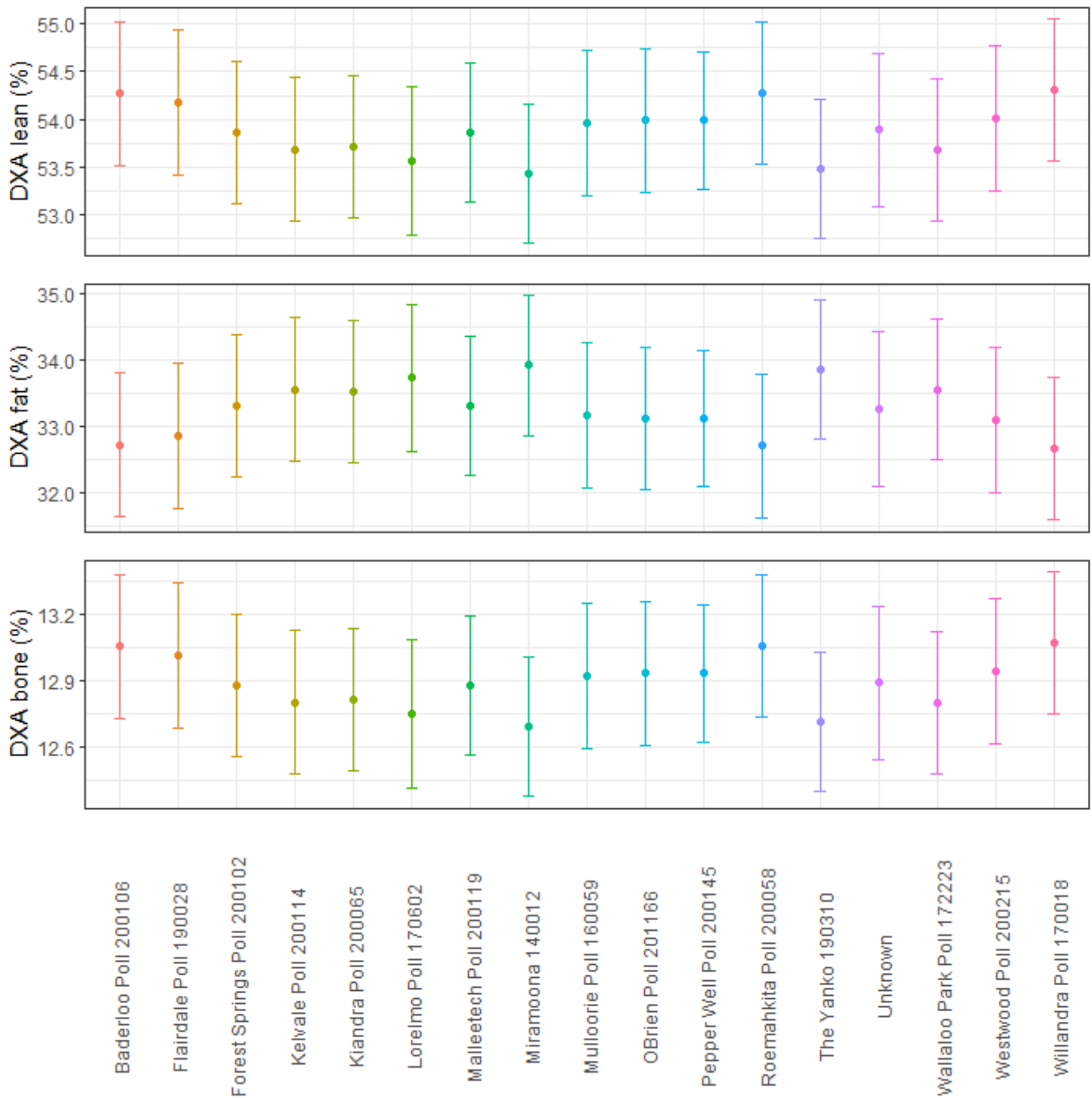
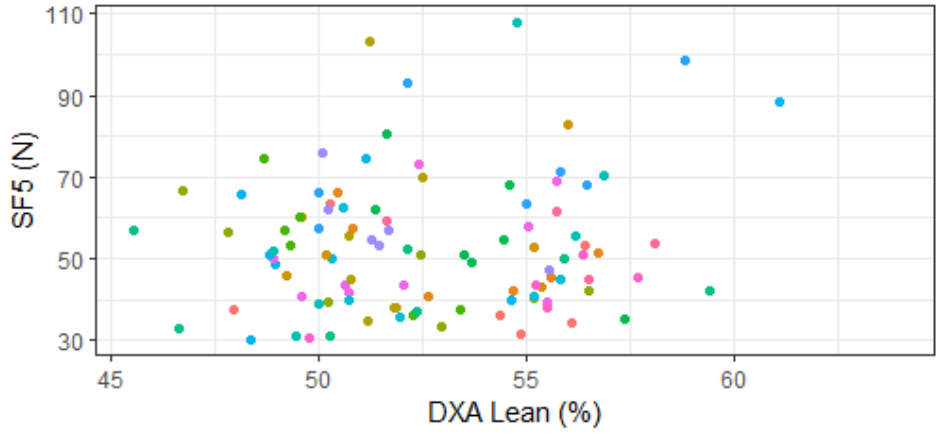
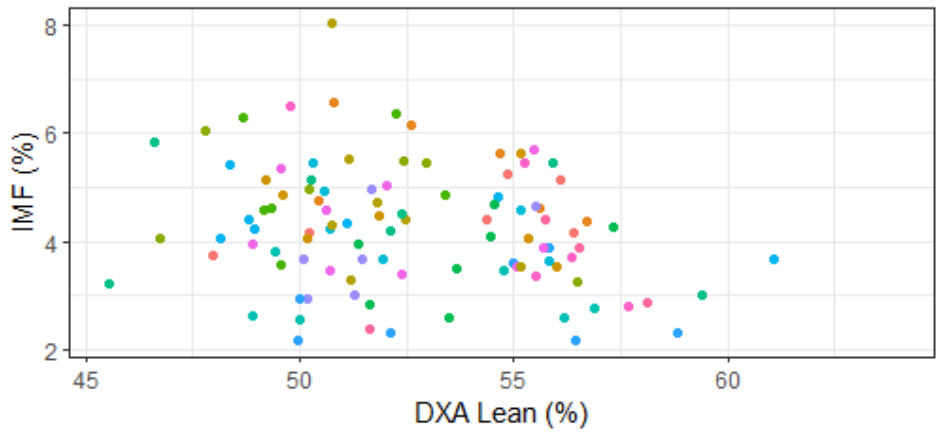
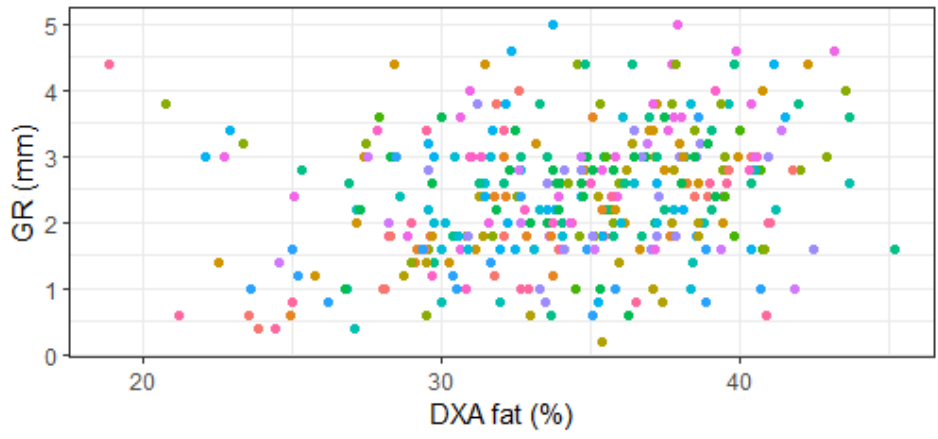
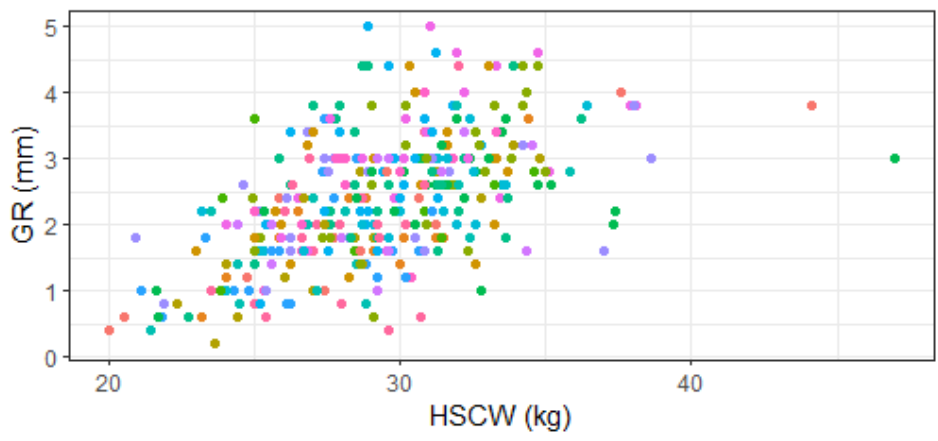


Figure 4 Summary of predicted means ( $\pm$  standard error) for carcass composition traits including DXA lean, DXA fat, and DXA bone, separated by sire.

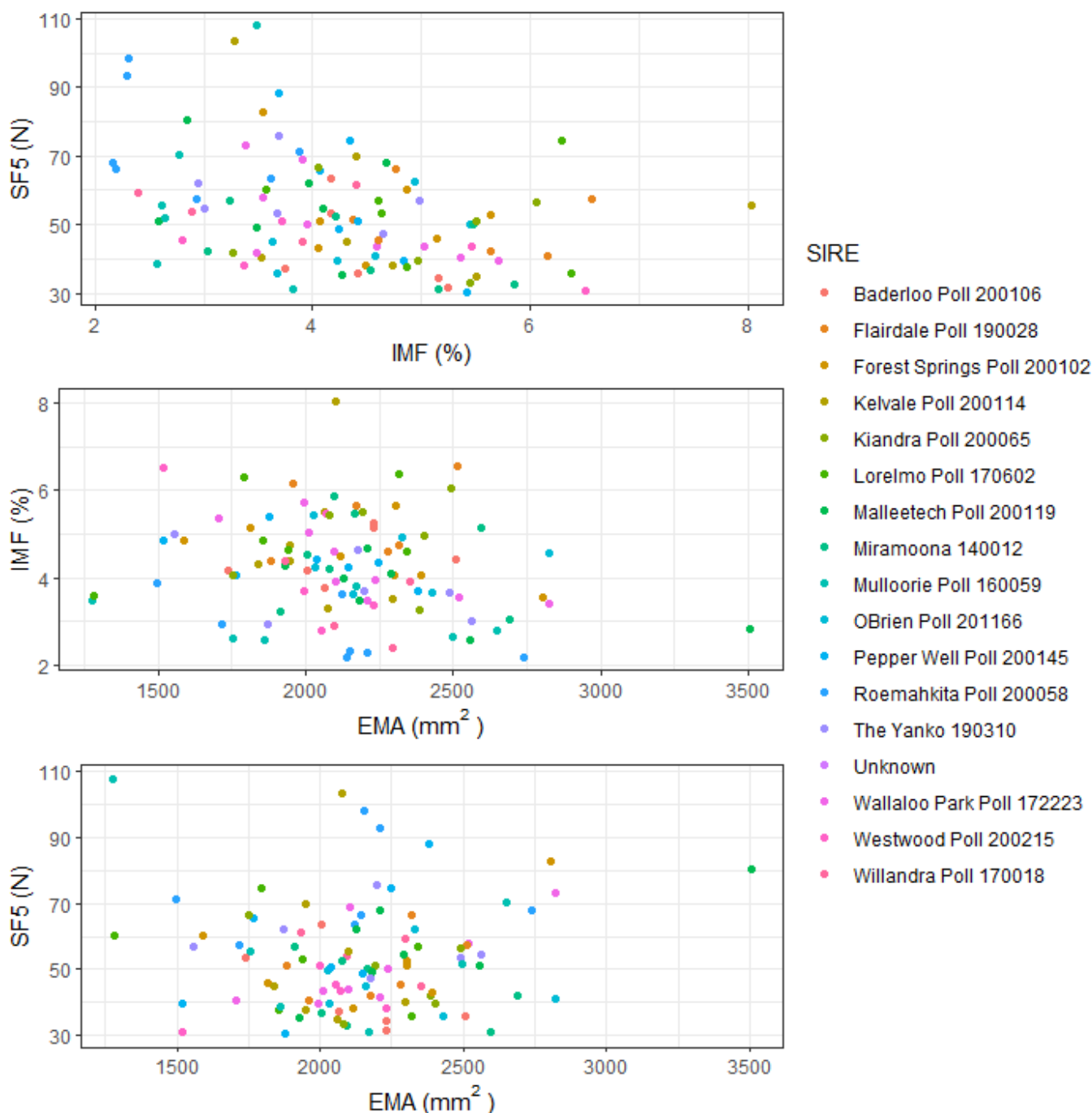
Figure 5 shows the relationship between traits, including HSCW, GR, DXA fat, DXA lean, IMF, and SF5 with all traits following trends as expected and reported in other literature. There was a positive relationship between HSCW and GR, with GR tissue depth increasing as carcass weight increased. There was also a trend for GR tissue depth to increase as DXA fat increased. This was not a strong relationship and highlights the ability of DXA to capture whole carcass fatness over measures using a single location. As DXA lean increased, indicating less carcass fat, IMF decreased. The opposite was true for shear force where the lowest shear force values, indicating more tender meat, were recorded for lambs with more fat indicated by the lowest DXA lean values.



- SIRE**
- Baderloo Poll 200106
  - Flairdale Poll 190028
  - Forest Springs Poll 200102
  - Kelvale Poll 200114
  - Kiandra Poll 200065
  - Lorelmo Poll 170602
  - Malleetech Poll 200119
  - Miramoona 140012
  - Mulloorie Poll 160059
  - OBrien Poll 201166
  - Pepper Well Poll 200145
  - Roemahkita Poll 200058
  - The Yanko 190310
  - Unknown
  - Wallaloo Park Poll 172223
  - Westwood Poll 200215
  - Willandra Poll 170018

Figure 5 The relationship between recorded traits including Hot Standard Carcase Weight (HSCW), GR tissue depth (GR), DXA fat, DXA lean, intramuscular fat (IMF), and shear force after 5 days ageing (SF5).

The relationship between eating quality and eye muscle traits are presented in Figure 6. There was a negative relationship between IMF and SF5 as expected, such that as IMF increased, SF5 decreased, both of which are values desirable for eating quality. This relationship was stronger at higher levels of IMF, with those below 4% IMF having more variable SF5 values. There was a weak negative relationship between IMF and EMA, with higher levels of IMF recorded in lambs with smaller EMA. The opposite was true for SF5, where higher values less desirable for eating quality tended to increase with EMA, continuing the inverse relationship observed between IMF and SF5.



**Figure 6** The relationship between recorded traits including intramuscular fat (IMF), shear force after 5 days ageing (SF5), and eye muscle area (EMA).

## 4.2. Heritability estimates

Table 3 presents the heritability estimate for each trait examined in this report. Estimated heritability from a sire model was high for GR, IMF, SF5 and loin fat depth, which was likely a result of the small number of sires sampled. Previous studies have reported heritability of GR tissue depth, lean meat yield, IMF% and SF5 at 32%, 35-58%, 48% and 27%, respectively (Jacob and Calnan, 2018; Mortimer *et al.*, 2014; Safari and Fogarty, 2003). Moderate heritability was recorded for live weight (20%), HSCW (36%), and loin eye depth (27%), while DXA lean, fat, and bone had unexpectedly low heritability of 9%, 9%, and 10%, respectively. Calibration data for the DXA unit was not available and may have contributed to the low heritability of these traits in this study compared to those reported elsewhere. Loin eye width and ultimate pH had very low heritability with only 7% and 1%, respectively, of the variation in this trait accounted for by genetics. The variation in heritability from expected values for many of the traits reported herein is likely a function of the small size of the data set with only 16 sires sampled (Jacob and Calnan, 2018; Massender *et al.*, 2019; Mortimer *et al.*, 2014; Safari and Fogarty, 2003).

## 4.3. Birth type effects

Birth type only had a significant effect on the traits live weight ( $p = 0.0001$ ), HSCW ( $p = 0.000001$ ), and loin eye depth ( $p = 0.04$ ). As birth type increased, live weight, HSCW, and loin eye depth decreased. The highest predicted mean for live weight was  $66.64 \pm 0.86$  kg in singles, followed by  $62.96 \pm 0.70$  kg,  $61.34 \pm 1.13$  kg, and  $61.28 \pm 3.69$  kg, for twins, triplets, and quadruplets, respectively. Hot standard carcass weight unsurprisingly followed the same trend with predicted mean of  $31.20 \pm 0.20$  kg for singles, and  $29.51 \pm 0.42$  kg,  $29.13 \pm 0.64$  kg, and  $28.76 \pm 2.03$  kg, for twins, triplets, and quadruplets, respectively. Singles had the greatest loin eye depth at  $33.64 \pm 0.59$  mm, followed by twins at  $31.41 \pm 0.79$  mm. Triplets had a predicted loin eye depth of  $34.01 \pm 1.34$  mm. Rearing type data were not available for these lambs and it is likely that some lambs born a triplet were reared a twin or single, increasing the predicted mean of loin eye depth for this group. There may also have been instances of mismothering or an error in birth type records as it is unexpected that triplets would have a greater loin eye depth.

## 4.4. Sire predicted means

Variance components and sire predicted means are presented in Table 3. Sire predicted means for dressing % were high and ranged from 45.82% to 48.80% and those for GR ranged from 9.15 mm (fat score 2) to 15.05 (fat score 4), placing the cohort in an ideal range for processing. The DXA carcass composition traits of lean, fat, and bone had sire predicted means within the range observed in industry. The predicted mean for IMF exceeded to 4% benchmark associated with good eating quality for 11 of the sires, with a peak of 4.98%. Predicted means for shear force after 5 days ageing were greater than the maximum 29.42 N (3kg) sought after to achieve good tenderness across the sire cohort. The predicted mean for ultimate pH was 5.62 across the cohort, with low heritability and high residual variation indicating non-genetic factors had the largest impact on this trait. Sire predicted means for loin eye depth ranged from 32.10 mm to 34.29 mm, while loin eye width ranged from 64.54 mm to 65.05 mm with comparatively limited variation within and between sires. Loin eye fat depth continued the trend for large variation in fatness traits across sires, with predicted means from 2.56 mm to 4.49 mm.

**Table 3 Variance components and sire predicted means for carcass traits. Heritability of traits with a \* were high and could not be accurately calculated due to low sire numbers.**

	Live weight (kg)	HSCW (kg)	Dressing %	GR (mm)	DEXA Lean (%)	DEXA Fat (%)	DEXA Bone (%)	IMF (%)	Loin eye width (mm)	Loin eye depth (mm)	Loin fat depth (mm)	pH <sub>u</sub>	SF5 (N)
<b>Variance components</b>													
<i>Heritability</i>	20%	36%	54%	58%	9%	9%	10%	*	7%	27%	72%	1%	44%
<i>Sire variance</i>	2.01	1.15	1.31	0.14	0.25	0.51	0.05	0.36	0.38	1.18	0.40	0.00003	29.87
<i>Residual variance</i>	38.66	11.63	8.32	0.83	10.87	22.42	2.03	0.89	22.80	16.30	1.82	0.02	239.23
<i>Birth type</i>	0.0001	0.000001	0.64	0.76	0.22	0.22	0.22	0.26	0.81	0.04	0.56	0.27	0.96
<b>Sire predicted means</b>													
<i>Baderloo Poll 200106</i>	62.56	28.99	47.50	10.65	54.27	32.72	13.06	4.46	64.64	33.04	3.66	5.62	48.72
<i>Flairdale Poll 190028</i>	62.00	29.36	47.84	10.75	54.18	32.85	13.02	4.98	65.08	32.87	3.22	5.62	52.30
<i>Forest Springs Poll 200102</i>	63.60	29.51	46.86	13.60	53.86	33.31	12.88	4.47	64.88	33.04	2.98	5.62	53.52
<i>Kelvale Poll 200114</i>	62.47	28.98	47.30	10.05	53.69	33.56	12.80	4.57	64.65	33.04	3.19	5.62	54.35
<i>Kiandra Poll 200065</i>	63.80	30.63	48.58	13.85	53.71	33.52	12.82	4.77	64.83	33.04	4.49	5.62	51.21
<i>Lorelmo Poll 170602</i>	63.28	29.54	47.54	12.25	53.57	33.73	12.75	4.77	64.69	32.22	2.99	5.62	53.29
<i>Malleetech Poll 200119</i>	64.49	31.42	47.70	12.65	53.86	33.30	12.88	3.93	64.63	34.29	3.37	5.62	55.07
<i>Miramoonna 140012</i>	63.23	29.67	46.88	13.75	53.43	33.92	12.70	4.51	64.86	33.05	2.76	5.62	48.69
<i>Mulloorie Poll 160059</i>	63.31	28.88	46.02	10.10	53.95	33.17	12.92	3.30	64.70	32.74	3.00	5.62	55.92
<i>OBrien Poll 201166</i>	64.41	30.26	47.77	12.00	53.99	33.12	12.94	4.36	65.00	33.37	3.21	5.62	50.16
<i>Pepper Well Poll 200145</i>	62.42	29.77	47.06	13.70	53.99	33.12	12.93	4.32	64.66	32.59	3.89	5.62	55.00
<i>Roemahkita Poll 200058</i>	61.01	27.71	45.36	9.15	54.28	32.71	13.06	3.20	65.05	32.10	2.66	5.62	63.09
<i>The Yanko 190310</i>	63.48	29.35	46.63	12.10	53.48	33.85	12.72	3.94	64.55	33.38	3.17	5.62	55.63
<i>Unknown</i>	63.11	29.49	46.77	11.55	53.89	33.26	12.89	-	-	-	-	-	-
<i>Wallaloo Park Poll 172223</i>	63.26	30.52	48.80	15.05	53.68	33.56	12.80	4.30	64.46	33.87	3.26	5.62	52.26
<i>Westwood Poll 200215</i>	63.13	29.37	46.95	12.75	54.01	33.09	12.94	4.36	64.85	32.11	3.10	5.62	48.89
<i>Willandra Poll 170018</i>	62.32	28.74	45.82	10.45	54.31	32.66	13.07	3.73	64.54	33.54	2.56	5.62	53.94

## 5. Conclusion

The data collected in this project will inform Australian Sheep Breeding Values for key carcase and eating quality traits. Carcase yield performance was high with consideration for GR tissue depth and DXA lean%. Importantly, average performance for IMF% was favourable and above the threshold for acceptable eating quality, although SF5 performance was not as strong with average values exceeding the upper limits for desirable tenderness. Balanced selection for carcase yield and meat quality traits can be achieved by incorporation of lean meat yield, IMF%, and SF5 breeding values into decisions when selecting sires to simultaneously improve lean meat yield and eating quality. This highlights the importance of informed genetic selection coupled with management of growth path to maximise cohort performance relative to consumer expectations.

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