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

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Professional sheep classing based on visually assessed traits relevant to wool quality and conformation is included in selection decisions for most Merino ram breeding and commercial flocks. The Merino Lifetime Productivity (MLP) Project involves professional classing of approximately 5500 ewes from 134 sires for five years as well as the collection of wool, carcase and growth traits (Ramsay *et al.* 2019). Research has shown classer grades have a heritability between 0.12 and 0.2 and have favourable genetic and phenotypic correlations with liveweight, wool quality and structural traits (Fulloon *et al.* 2001; Mortimer *et al.* 2009). Mortimer *et al.* (2009) also showed a significant impact of birth and rear type on classing grade. Utilising data from the MLP ewes born in 2016 from 15 different sires at the Pingelly site, we hypothesised that birth and rear type would have an impact on both professional and AMSEA classing grade, but this effect would decrease with ewe age. We also expected that the classing grade would be influenced by liveweight, fleece weight and wool quality traits.

The ewes were classed prior to shearing at 8, 20 and 28 months of age by two classers into five professional classing grades (top, first, flock, sale or cull) and three Australian Merino Sire Evaluation Association (AMSEA) grades (top, flock or cull). They were classed according to the breeding objective that was defined as "producing sheep that are easy care, good conformation and constitution on a medium to large frame" and "wool had to be bright, white and stylish and free from colour and faults and wool cut had to balance wool production with body size". Data was analysed using the restricted maximum likelihood method. Birth and rearing type, liveweight and fleece traits were fitted as fixed effects. Dam source, dam year of birth, dam identification and sire were fitted as random terms.

The professional and AMSEA classer grades were influenced significantly by liveweight, clean fleece weight and fibre diameter on most occasions (Table 1). Sire influenced the professional classing grade at all ages but there was no sire effect on the AMSEA grade. Birth and rear type had no significant effect on the AMSEA grade, and the effect of birth and rear type on the professional grade disappeared when liveweight and wool traits were added to the model. At the first professional classing 69% of the culls were twins and only 31% were singles and conversely 70% of the tops were singles and only 30% were twins.

Table 1. Significance of liveweight (WT), clean fleece weight (CFW), staple strength (SS), fibre diameter (FD), yield (YLD) and sire for professional (PROF) and AMSEA (GRADE) classing grade at three ages.

Date (age)	Classing type	n	WT	CFW	SS	FD	YLD	Sire
15/03/2017 (8 months)	PROF	375	***	***	ns	**	ns	**
	GRADE		ns	***	*	ns	**	ns
05/03/2018 (20 months)	PROF	360	***	ns	ns	***	***	*
	GRADE		*	***	ns	***	ns	ns
26/11/2018 (28 months)	PROF	355	***	***	ns	***	ns	**
	GRADE		***	***	ns	***	ns	ns

***, $P < 0.001$; **, $P < 0.01$; *, $P < 0.05$; n.s., not significant

When classed according to the Pingelly MLP site breeding objective the classers were able to successfully combine visual and structural assessments with liveweight, clean fleece weight and fibre diameter assessment to give a classing grade. The professional classing grade was better able to discriminate between sires and birth and rear type than the AMSEA grade, possibly due to the professional class having more categories. The professional classing data shown here, together with the phenotypic and genetic correlations reported by Mortimer *et al.* (2009), indicate that continuing to class on visual traits without knowledge of birth and rear type will inadvertently select against ewes born as multiples and potentially compromise genetic gain.

References
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