Validation of Pedigree MatchMaker Using DNA profiling

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Recording of full pedigree, versus sire only, can significantly improve the accuracy of estimated breeding values and hence the selection of superior animals. Obtaining full pedigrees using visual matching or DNA profiling can be very laborious and costly to obtain and so are often not collected. Pedigree Matchmaker (PMaker) has been developed by the Sheep CRC to identify lambs' dams by recording the number of matches that lambs have with a ewe as they walk past an electronic panel reader. This technology has been validated using visual mothering soon after birth, where it is has achieved 89-95% accuracy (Richards *et al* 2006). Visual matching is not foolproof and so a trial was conducted on two North East Victorian merino flocks to validate the PMaker technology using DNA profiling.

Two Merino flocks used PMaker to identify dam parentage of lambs in mobs of approximately 200 ewes. Ewes and lambs tagged with electronic NLIS (sheep) tags were trained to walk past a panel reader and records were taken for 4-6 weeks pre-weaning. Flock 1 was part of an AgFund trial to test the practicality of the technology and encountered problems which impacted on the data quality. Therefore Flock 2 was set up and carefully monitored to ensure rigorous records. All ewes, lambs and where possible sires, were blood sampled for DNA and profiled to assess true dam parentage, which was used to validate the accuracy of dam/lamb matches made by PMaker. Since DNA profiling is not 100% accurate, particularly in closely related flocks, results identified as having low accuracy were further investigated and lambs that could not be guaranteed dam parentage were not included in the analysis (1% in Flock 2).

Table 1. Results from two flocks on the validation of PMaker using DNA profiling.

	No. ewes (lambs) in mob used for analysis	No. of records in PMaker	PMaker matches with reliability scores 1 and 2[a]	Correct lamb/dam in PMaker (%)	Incorrect dam/lamb in PMaker (%)	Lambs not matched to any dam in PMaker[b] (%)
Flock 1	190 (224)	14,776	90%	83.5	8.5	8.0
Flock 2	197 (207)	69,397	100%	88.4	5.8	5.8

[a] NSW DPI provide a reliability score as a guide to the strength of the match. Score 1 = Number of matches ≥10 and proportion matched = 100%. Score 2 = Number of matches > 3 and proportion matched over 50%.
[b] This includes lambs with a reliability score of 4 (in Flock 1 only) which are not identified in a PMaker report, given the association with any dam is very poor, and so the lamb is effectively not matched .

PMaker matched between 83 and 88% of lambs to their genetic dam. The lower result in Flock 1 is most likely due to poorer data, illustrated by less records and lower reliability scores. Otherwise the results are supported by a previous study (Barnett *et a*l, 1999) where incorrect pedigree information averaged 8% when recorded visually soon after or at birth and 12.4% if taken 2-6 weeks later (when PMaker records data). The number of lambs not matched correctly to their genetic dam, give an indication of the level of lamb swapping and mismothering that occurs very soon after birth. Lambs that are not matched to their correct genetic dam by PMaker but have a high reliability score, are most probably matched to the dam that reared them.

There is much scope for improving the accuracy of animal selection, through full pedigree recording in flocks that do not currently do so. PMaker offers a practical and efficient means for obtaining dam pedigree, but to achieve high accuracy it also requires training and support for producers using the technology. An additional advantage of PMaker is that it can provide data on the rearing type of lambs which could further improve breeding value adjustments, particularly in flocks with high numbers of multiples.

Barnett N.L., Purvis I.W., van Hest B and Franklin I.R. (1999) *Proc. Assoc. Advmt. Anim. Breed. Genet.***13**, 373.
Richards J.S. Atkins K.D., Mortimer M. and Semple S.J.(2006*) Proc. Aust. Soc. Anim. Prod.* **26**, Short Communication 31.

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