PEDIGREE ASSIGNMENT BY ELECTRONIC MATCHING OF LAMBS AND DAMS

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Determining pedigree in sheep flocks is an expensive and time consuming process. It is often achieved through tagging and recording during lambing or occasionally DNA matching at a later date. The result is that there is a relatively low proportion of animals in Merino breeding flocks that have full pedigrees. This has important implications for deriving the full benefits from genetic evaluation and the estimation of genetic trends in studs. A method is proposed that could lead to a substantial increase in the number of animals with full pedigrees. This new method could be most useful in situations where full pedigrees are currently not possible rather than as a replacement method for mothering up or DNA fingerprinting.

The new method is designed to calculate a pedigree to a reasonably high level of accuracy through a fairly inexpensive and low labour input methodology. Using a walk-over-weighing system, the order of movement of ewes and lambs can be used to make a prediction as to which lamb belongs to which ewe. The walk-over weighing system captures the tag number of the ewes and lambs as they pass through a radio-frequency identification (RFID) panel or portal reader on the way to food, water or between paddocks. All animals have a RFID tag and the reader simply captures the identity of each animal as it passes in a (time-) ordered list. A list of the identities of all ewes and lambs is supplied so that each animal on the walk-through list has a code for either ewe (E) or lamb (L). These walk-through records are then examined to determine which lamb and ewe combinations appear in the data. The result is a matrix of frequency counts for each ewe/lamb combination. Data optimisation procedures are used to trim random associations while maximising the informative data.

An initial trial to establish proof of concept that ewes and lambs could be associated by their proximity on sequential reading of RFID tags at a single point was established at Centre Plus stud, Tullamore N.S.W. in August 2005. A group of 64 lambs and 52 ewes, which had been mothered up at birth by the usual practice, was recorded over a period of about 4 weeks after they had been drifted from their lambing paddock when the lambs were 5-10 days old. A total of 17,313 IDs were recorded and the data were 'scored' for the association of each ewe with a lamb either 1 or 2 in front or behind it. The best results were obtained with a ewe and 1 following lamb.

From the observed data, the following results were obtained:

- 54/64 animals were allocated to their correct dam with 100% certainty
- 1/64 animal was allocated to an incorrect dam with certainty. The “correct” ewe for this lamb had no records at all so that the apparently incorrect allocation may have been a case of lamb fostering.
- Of the remaining 9 lambs, 6 were allocated to their correct dam with at least 50% certainty, but at least 1 other dam was the potential parent. The other 3 lambs were allocated to an incorrect dam but the correct dam was still rated as a potential parent but with low accuracy.
- The average accuracy of correct dam assignment across all lambs peaked at 89%, with 81% of lambs having a 100% correct assignment.

Advantages of the method:

- High accuracy with low labour input
- Modest cost – tags can be re-used and/or they become the permanent identification of the animals for their lifetime
- Timing non-critical for pedigree identification
- Simple algorithm for matching
- Simultaneously generates a lamb survival record for ewes that can be used for selection on reproduction rate
- Possible to combine the technique with other measures such as lamb growth rate, mothering ability and correlation of these characteristics with subsequent performance.

The technique will be validated by working with a number of studs currently using DNA testing or mothering up so that there is further confirmation of the accuracy of the technique. We will test length of time and age period for recording association between dam and progeny, and impact of group size on accuracy.

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