**Application**

The ability to breed sheep that naturally shed their fleece is advantageous when the value of the fleece is less than the cost of shearing; wool shedding can enhance animal welfare and reduce labour costs.

**Introduction**

Breeders with wool shedding breeds are routinely scoring the ability of their sheep to shed their fleece. A 1-9 scale is used, with breeders asked to assess their flock when 50% of individuals are in the process of shedding their fleece; the point when the variation in shedding scores is greatest. Ideally breeding ewes are scored every year. Developing a breeding value for this trait will allow farmers to implement selection strategies to improve wool shedding attributes in their flock. The objective of this study was to estimate genetic parameters for this trait and thus develop a breeding programme for wool shedding.

**Material and methods**

The dataset included a pedigree of 10,608 individuals and 19,200 records collected from 7,512 sheep that had been scored between 2006 and 2022. Among them, 6,804 of the sheep measured (with 18,452 records) were Exlana; a wool shedding composite developed in the UK using Wiltshire Horn, Easycare, Kathadin and Dorper genetics. A further 699 of the sheep (with 727 records) were purebred Wiltshire Horns. The majority of shedding scores came from six flocks (7,243 measured sheep).

The analysis used records for females over 300 days of age that had measurements taken between April and September. If multiple records were provided within the year, only the first record was used. This approach optimised the variation in the dataset as scores tended to become less variable over time.

Scores had a non-normal distribution (see Table 1), which may have been expected as there had been phenotypic selection for the most desirable value (9=sheep that shed completely). However, it may also indicate the need for breeders to score their sheep earlier in the season to obtain greater variation in scores, with 46% of scores supplied being a 9.

Table 1. Breakdown of shedding scores

|  |  |
| --- | --- |
| Shedding Score | Count of scores |
| 1 | 1127 |
| 2 | 168 |
| 3 | 966 |
| 4 | 489 |
| 5 | 1643 |
| 6 | 1035 |
| 7 | 2357 |
| 8 | 2540 |
| 9 | 8875 |
|   |   |
| Total | 19200 |

For the analyses a repeatability model was implemented. This model includes 3 independent random effects (additive genetic, permanent environmental and residual) and the following fixed effects: litter size reared, age of the animal, flock-year-management contemporary groups.

Heterosis and recombination were incorporated as covariates to take into account differences in breed composition. Note that litter size reared was included because this influences the onset of shedding, with those ewes rearing single lambs and in better body condition tending to shed earlier. Variance components of the model were determined using Restricted Maximum Likelihood (REML) estimation in ASReml (Gilmour et al., 2009).

**Results**

The variance component analysis indicated a moderate-to-high heritability for wool shedding with a genetic variance of 2.15 and a heritability of 0.44 (Table 2), supporting earlier findings by Pollott (2011) and the potential to use genetic selection to improve wool shedding in sheep.

Table 2. Variance components of wool shedding

|  |  |  |
| --- | --- | --- |
| Variance components | Variance | Heritability |
| Additive genetic effect | 2.151 | 0.435 |
| Permanent environmental effect | 0.363 |  |
| Residual effect | 2.434 |  |

Breeding Values were generated for 10,609 animals that either had phenotypes or progeny with phenotypes. The average pedigree reliability was 0.58 (range 0.00 - 0.98).

To assess the impact of wool shedding estimated breeding values (EBVs) at farm level the scores for ewes with a known sire (n=18,436) were split into those whose sire had an EBV in either the top or bottom 25% of the population. Within this sub-set of records, 46.2% achieved the top score of 9 (full wool shedding). For daughters of top 25% and bottom 25% sires this figure was 56.7% and 32.5% respectively.

**Conclusions**

The high heritability observed supports earlier studies by Pollot (2011) and shows that breeder-derived scores for wool shedding can be used to generate informative breeding values.

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**References**

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