**Application**

Ewe prolificacy and other maternal traits of interest drive key determinants of farm productivity and profitability on sheep farms. Higher genetic merit sheep and their progeny outperform lower genetic merit ewes, therefore selecting high genetic merit animals will increase productivity.

**Introduction**

Genetics leads to improved animal performance across various species, including sheep. However, to sustain long-term genetic gain, selection indexes are required to aid producers in selecting animals to become the next generation's parents. The Irish €uro-star indexes are the national sheep breeding objectives that enable farmers to select animals based on their genetic potential. Similar breeding objectives exist for sheep in both Ireland and New Zealand, with both placing significant emphasis on maternal traits (Santos, et al., 2015); results from previous studies (Featherstone, et al., 2021) have shown that elite Irish or New Zealand maternal genetics could aid in improving Irish flock performance including ewe reproductive performance. This breeding study incorporates cross-breeding Irish and New Zealand genetics to obtain hybrid vigour. The objective of the present study was to compare the maternal performance of ewes and subsequent progeny performance based on their genetic merit and country of origin (Ireland or New Zealand).

**Materials and Methods**

This study took place from September 2021 until September 2024. Four genetic groups divergent in maternal genetics, including elite genetic merit Irish ewes (here on referred to as Elite Irish), low genetic merit Irish ewes (Low Irish), elite genetic merit New Zealand ewes (NZ) and a cross between elite genetic merit New Zealand and elite genetic merit Irish (NZxElite Irish) were used over the trial period. Animals were selected based on either the Sheep Ireland €uro-star Replacement index (Irish animals) or the New Zealand Maternal Worth (New Zealand animals). Twenty-five Suffolk and twenty-five Texel ewes were present in each group each year. Ewes were mated via laparoscopic artificial insemination (AI) using fresh semen in early October. Fourteen days post AI, rams were introduced for 42 days. Across all four years, the mean lambing date was 10th March and averaged 8 weeks in length. Ewe live weight and body condition score (BCS) were recorded at key time points, including pre-mating and 24 hr post lambing. Ewe’s barren status and pregnancy scan size were recorded on each ewe. Lambs were weighed and tagged within 24 hours of birth. Lambing difficulty score and lamb vigour score were recorded on a four-point scale reflecting the scales currently used in the national genetic evaluations (www.sheep.ie). For lambing difficulty, one was unassisted, two had little assistance, three manual delivery okay, and four manual delivery difficult. For lamb’s viability, one is unobserved, two the lamb sucked without assistance, three the lamb needed assistance, and four that the stomach tube was given. Data was analysed using a linear mixed model in PROC MIXED (SAS Inst. Inc., Cary, NC, USA) with breed (Texel or Suffolk), genetic group (NZ, NZx Elite Irish, Elite Irish or Low Irish), ewe parity, and year were included as fixed effects.

**Results**

Barren rate differed by genetic group (P < 0.05) and ranged from 2.6% (NZ) to 11.5% (Low Irish). Low Irish ewes had the lowest scan rate (P<0.05; Table 1), while all other genetic groups did not differ from each other. Ewe's live weight and BCS measured at both pre-mating and post-lambing differed by genetic group (Table 1). Pre-mating the Low Irish ewes had the lowest live weight (P<0.05). Lamb vigour score differed by genetic group where (P<0.01); lambs born to NZ ewes were the most vigorous, while lambs born to Low Irish ewes had the greatest lamb vigour scores, indicating they were the least vigorous (P < 0.01). Lambing difficulty differed by ewe genetic group (P<0.001; Table 1), with the Low Irish ewes having the highest lambing difficulty, which resulted in them having the highest percentage of ewes being assisted at lambing, 52% (P < 0.001; data not shown).

**Table 1. The effect of dam genetic merit on performance across the four genetic groups**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | NZ1 | NZ\*Elite Irish2 | Elite Irish3 | Low Irish4 | SEM | *P value* |
| Pregnancy scan rate | 1.69a  | 1.64a | 1.62a | 1.40b | 0.067 | <0.05 |
| Pre-mating live weight (kg) | 83.14a | 83.97a  | 82.41a | 79.60b | 0.711 | <0.001 |
| Pre-mating body condition score | 3.57a  | 3.54ab | 3.48b | 3.39c | 0.027 | <0.001 |
| Post- lambing live weight (kg) | 82.17b  | 85.28a | 82.49b | 81.26b | 0.899 | <0.01 |
| Post- lambing body condition score | 3.04b | 3.17a  | 2.94c | 2.90c | 0.049 | <0.001 |
| Lamb vigour score | 2.31bc | 2.33c | 2.46ab | 2.53a | 0.095 | <0.01 |
| Lambing difficulty score | 1.87c | 2.23b | 2.43a | 2.58a | 0.158 | <0.001 |

1 NZ = New Zealand, 2NZ\*Elite Irish = New Zealand X elite genetic merit Irish ewes, 3Elite Irish= Elite genetic merit Irish ewes and 4Low Irish= Low genetic merit Irish ewes

ab Within rows mean with differing superscripts differ significantly

**Conclusions**

Results show that dam genetic merit influenced reproduction traits. New Zealand and Elite Irish ewes produced more lambs and achieved a greater pregnancy scan rate than ewes of low genetic merit. The crossbreeding of New Zealand and Elite Irish animals resulted in a lower proportion of ewes being assisted at lambing and greater lamb vigour at birth than the Irish groups.

# **References**

Featherstone, N., McHugh, N., Boland, T. M. & McGovern, F. M., 2021. The impact of maternal genetic merit and country of origin on ewe reproductive performance, lambing performance, and ewe survival. Translational Animal Science, July.5(3).

Santos, B. F. et al., 2015. Comparison of breeding objectives across countries with application to sheep indexes in New Zealand and Ireland. Animal Breeding and Genetics, March, 132(2), pp. 144- 154.