

Genetic parameters for calving traits in Norwegian Beef-on-Dairy crosses

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The use of beef semen in Norwegian dairy herds is increasing, highlighting the need for genetic evaluations of calving traits for beef sires based on their performance in Beef-on-Dairy (BoD) systems. The objective of this study was to estimate variance components, heritabilities, and genetic correlations for key calving traits in crosses between Norwegian Red (NRF) dams and beef sires.

The genetic analysis was based on data from the Norwegian Dairy Herd Recording System recorded between 2016 and 2024. Herds were required to have at least five BoD calves with Charolais, Aberdeen Angus or Limousin sire born per year. The final data included 44,265 crossbred BoD and 205,486 purebred NRF calves born in the same herds and years. Four calving traits were analyzed: Stillbirth was a binary trait coded as 0 for calves alive at birth and 1 for calves dead at birth or within 24 hours. Calving ease was recorded on a three-point scale, where 1 indicated no assistance needed, 2 for moderate difficulty, and 3 for severe difficulty. Calf size was scored 1 for small, 2 for medium, and 3 for large calves. Gestation length was defined as the number of days between successful insemination or mating, and calving. The pedigree used comprised 601,869 animals. Variance components were estimated using the DMU software package, applying a multi-trait animal model. The statistical model included fixed effects of birth month, twinning, herd-year, calf sex, sire breed, and a regression on age of dam within each calf sex-sire breed combination. Heritability ranged from low to high, with estimates \pm SE of 0.66 ± 0.006 for gestation length, 0.33 ± 0.007 for calf size, 0.16 ± 0.008 for calving ease, and 0.05 ± 0.003 for stillbirth. Calf size showed positive genetic correlations with gestation length (0.32 ± 0.01) and calving ease (0.27 ± 0.02) and negative genetic correlation with stillbirths (-0.08 ± 0.03). A strong genetic correlation was observed between calving ease and stillbirth (0.94 ± 0.009). Gestation length had weak genetic correlations with calving ease (0.04 ± 0.02) and stillbirths (0.09 ± 0.03).

This study provides essential genetic parameters for establishing a national genetic evaluation system for calving traits in Norwegian beef-on-dairy production and supports the development of breeding values aimed at improving calving performance, animal welfare, and production efficiency.