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Genetic evaluation for stillbirth in French beef cattle breeds

R. Lefebvre^{1*}, H. Leclerc², F. Phocas¹, V. Ducrocq¹, D. Boichard¹, S. Mattalia²

¹ GABI, INRA, AgroParisTech, Université Paris-Saclay, 78350 Jouy-en-Josas, France

² Institut de l'Élevage, Genetic Department, 78352 Jouy-en-Josas, France

* Presenting author

Until now in France, breeding objective in beef breeds included birth weight and calving ease but not stillbirth. A new evaluation under development is based on progeny mortality within two days after birth. Mortality rate ranges from 1.7 to 5.7 % in the nine evaluated breeds. For such a binary trait with low incidence, a threshold model (TM) would be especially recommended, as used in the stillbirth routine evaluation in dairy breeds. However, a TM implies random contemporary group (CG) effects in the statistical modeling of environmental effects. Because of the predominant natural services, French beef herds are not as well genetically connected as dairy herds, preventing any accurate estimation of difference in genetic levels between herds. Therefore considering CG as fixed effect in a linear model would reduce the bias in the genetic evaluation. The TM and linear models, each of them with a fixed or random contemporary group, were compared in three breeds (Charolaise, Limousine and Parthenaise), very contrasted with regards to population sizes and stillbirth rates. Models included direct and maternal genetic effects. The comparison led to conclude that TM with random CG was the most predictive and appropriate model. Accordingly, this model was applied for genetic parameters and breeding values estimations in all breeds and in routine conditions. Heritability estimates on the observed scale ranged from 0.5 to 2.9 % for the direct effect and from 0.6 to 1.2% for the maternal effect, with higher values for breeds with higher stillbirth rates. Genetic correlations of the direct effect with birth weight and calving ease ranged from 0.22 to 0.73. Two breeding value standard deviations were equivalent to 5.7-9.7 % of stillbirth, depending on the breed. These results are in favor of a new routine genetic evaluation for stillbirth in French beef cattle.

Keywords: genetic evaluation, stillbirth, beef