Alternative consideration of social genetic effects models in Duroc pigs

Ragab M.[1,2], Piles M.[1], Sánchez J.P.[1]

[1]Institut de Recerca i Tecnologia Agroalimentàries. Torre Marimón, Caldes de Montbui, 08140, Barcelona, Spain.

[2] Poultry prod. Depart. Kafr El Sheikh University, 33516, Kafr El Sheikh, Egypt.

Important statistical difficulties there are associated to social interaction models, basically derived from the collinearity between direct and social interaction effects. We present an alternative implementation of these models to alleviate these problems. Bi-weekly average daily gain records (ADG) were recorded on 663 animals between 105 and 182 d of age. The animals were reared in pens with between 10 and 14 mates. Three types of models were fitted: i) repeatability animal model (RAM), ii) repeatability animal model with traditional social interaction effect (RSM) and iii) repeatability animal model with a social interaction effect function of the degree of competition between each pair of mates (RS_1M). All the proposed models included the fixed effects of batch, pen size and age, and the interaction between batch and age, and also the random effect of pen. In RS_1M pair specific competitions were defined as standardized Euclidean distance between each pair of animals based on two alternative feeding behavior traits: feeding rate (FR) and time between two consecutive feeding (FT). Estimated total heritability was 0.34(0.09) and 0.42(0.17) using RAM and RSM, respectively, under RS_1M at the average distance (0) the estimated total heritability was 0.38(0.09) regardless the behavior trait considered for defining distance. Estimated social interaction heritability for RSM was 0.004(0.003), this parameter under RS_1M reached 0.06(0.09) when FT was used to define the distance between competitors and the parameter was evaluated at the 3rd quartile of the distance distribution. Using feeding behavior traits to account for variability in the intensity of competition between animals generated parameter estimates with lower errors than the traditional social interaction model, which would be expected to yield higher accuracies in the predictions derived from such models.