

Genetic parameters and non-genetic influences related to birth weight in farmed white-tailed deer

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Abstract

Studying and understanding the sources of variation in early life traits in farmed deer are fundamental for management and/or breeding purposes. Data from a captive white-tailed deer population were analysed to identify non-genetic and genetic factors affecting the birth weight (BW) of fawns. The year, type of birth and sex were included in a fixed linear model to examine their significance. All of the examined non-genetic factors had a highly significant effect on BW ($P < 0.001$). The examined years showed variation attributed to food availability affecting the gestational conditions of does. Male fawns were 193 g heavier than female fawns at birth ($P < 0.001$), and singleton births were associated with a higher BW (2.97 ± 0.043 kg) compared with twin (-0.261 g) and triplet (-0.642 g) fawning ($P < 0.001$). The best-fitting animal model was selected by comparing reduced and complete models. Based on the selected animal model, which included direct genetic and common maternal effects, genetic components and parameters were estimated. The direct heritability was found to be 0.28 ± 0.126 , and a small but important contribution of common maternal environmental effects was identified ($c^2 = 0.15 \pm 0.062$). The results support the importance of certain environmental factors affecting BW and indicate the relevance of direct genetic and maternal environmental influences to sustained genetic changes in BW and positively correlated traits in farmed white-tailed deer populations.