Genetic covariance components of conformation, movement and athleticism traits in Irish Sport Horses

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Conformation, movement, and athleticism traits have been routinely captured on Irish Sport Horses (ISH) via linear profiling at studbook inspections of mares and stallions since 2010. The scoring system used in the ISH studbook is derived from the linear descriptive system that was first introduced by the Dutch Warmblood studbook in 1989 and has since been widely used as inspiration for other warmblood studbooks. Genetic parameters of linear descriptive traits have been extensively researched in continental warmbloods but, no such research has been conducted in the ISH population. Therefore, the objective of the present study was to estimate the genetic parameters of the linear scored conformation, movement, and athleticism (jumping) traits in the ISH and to determine their suitability for inclusion in a national genetic evaluation for sport horses. A total of 37 linear scored traits on 2,129 ISH were included in the analysis. Data were analysed using an animal linear mixed model that included the fixed effects of sex of the horse, age at scoring, the year of scoring, and the chairperson of the inspection panel that scored the horse. The heritability estimates for the conformation traits ranged from 0.03 (standard error (SE)=0.04) for length of croup to 0.23 (SE=0.06) for head-neck connection and shape of feet. The lowest heritability estimate within the movement traits was for walk correctness (0.09; SE=0.04) while heritability estimates for the rest of the traits within this group ranged from 0.23 (SE=0.06) for canter balance to 0.40 (SE=0.07) for trot length of stride. Scope (0.31; SE=0.07) had the highest heritability of the athleticism traits while attitude (0.02; SE=0.04) had the lowest heritability of these traits. Overall, the genetic correlations among the traits were in the same direction as the phenotypic correlations among the same traits but were generally stronger in magnitude. In general, the strongest genetic correlations were found among the movement traits and the athleticism traits. Results of the present study may be used for future genetic evaluations in the ISH population.