

Genetics of linear traits for specifying and enhancing breeding programs for sport horses

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With the wider implementation of linear profiling of conformation and performance in sport horses, refined phenotypic information have become routinely available for the studbooks. Genetic proofs for linear traits can valuably support targeted selection decisions and can retrospectively be used for monitoring realized breeding strategies. For this study, results from the prototype genetic evaluation for linear traits of the Oldenburg studbooks were available and allowed characterizing distinct groups of sires defined by discipline (dressage, show jumping) and popularity (numbers of progeny). Breeding values (BV) were estimated in multiple trait linear repeatability animal models using linear data collected from foals, mares and stallions in 2012-2016. Depth of the 12,931 linear profiles varied depending on the assessment conditions, with maxima in performance tested mares and stallions presented for approval with testing under saddle. Total numbers of traits in genetic analyses were 46 for conformation, 22 for gaits, 13 for jumping, and 5 for special remarks and behavior. Of the 1,812 sires with on average 7 linearly described progeny, 931 sires were represented with foals and 1,268 sires with mares and/or stallions. Analyses of BV distributions of the stallions revealed clear indications of more extensive use of stallions with genetic potential for certain conformational characteristics like long legs and arched neck shape. Patterns of BV for performance related linear traits showed differences between disciplines, with obvious selection effects in for example freedom of shoulders and hind limb activity in trot and in free jumping characteristics. The results of this study indicated that different breeding goal related aspects of conformation and performance varied considerably in their genetic progress and impact on the breeding use of stallions. With the availability of genetic and future genomic proofs for linear traits, more targeted breeding progress can be achieved in the breeding programs for sport horses.