

Use of linear data for characterization and selection of sport horses with highest genetic potential for performance

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Routine linear profiling and genetic evaluation for linear traits is giving access to detailed information on the individual horse and its genetics regarding conformation, gaits and jumping. Previous studies have indicated the suitability of genetic linear profiles for selecting horses for performance in riding sport, with generally minor role of conformation and particular value of distinct aspects of gaits for dressage and several linear jumping traits for show jumping. The aim of this study was to quantify the possible impact of strong focus on top sport performance on development towards extremes and risk of overemphasis of certain traits. Analyses were performed for the mare population of the Oldenburg studbooks OL and OS and based on phenotypic data and estimated breeding values (EBVs) for 46 linear traits included in the routine genetic evaluation and on genetic proofs for sport traits, using rank-based (R) and summarizing (highest level achieved, L) trait definitions for reflecting dressage (D) and show jumping (J) competition performance. Mares were categorized depending on whether or not they belonged to the 10% (25%) with the highest sport EBVs, followed by statistical analyses of these categories vs. linear trait phenotypes and EBVs using SAS software. Only mares with sport EBV reliability $\geq 30\%$ were considered (N=2,873 for DL to N=5,187 for JR), and inclusion criterion of own phenotypic data and/or at least two progeny with phenotypic data for the linear traits reduced the studied mare sample to N=1,084 (JL) to 2,737 (DR). Analyses of variance revealed that ranking among the mares with highest sport EBV significantly increased the probability of extreme linear trait EBV with discipline-specific pattern (all gait and few conformation aspects for D, jumping aspects for J). On phenotypic level, more extreme values were rarely found in the mares and their progeny, and none of the category differences reaching significance indicated strong shifts towards extreme trait expressions which may harm long-term functional integrity, but use of linear data for monitoring is recommended.