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Changes over time in genetic parameters for growth in bulls and assessment of suitability of test methods

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Objectives of the study were to examine alternative measures of growth potential of bulls in testing stations, determine whether genetic parameter estimates of such traits changed over time, and examine whether existing methods for performance testing were appropriate. Records from 1980 to 2010 of 44 425 Fleckvieh bulls in Czech progeny testing stations were analyzed. The following traits were examined: weight at the beginning of the test (150th day of age), weight at the end of the test (530th day of age), gain from birth to the beginning of the test, and gain during the test. Fixed effects in five multi-trait animal models were station-year-season groups, linear and quadratic regressions on age, and regression on heterozygosity (proportion of an individual's loci with alleles from different ancestor breeds). Random effects included additive genetic, permanent environment, and residual variances. Separate analyses were conducted in four consecutive time periods (1980–1987, 1988–1992, 1993–1997, and 1998–2010). Across these time intervals, estimates of additive genetic variance decreased for all of the traits, while estimates of residual variances increased. In consequence, heritability estimates for all of the traits decreased over time. This decrease was most apparent for gain during the test, for which heritability declined by more than 50% over the course of the study. Results demonstrate that over three decades, the system of testing came into conflict with genetic improvement of the breed, possibly because the measured traits changed genetically over the course of selection. Regular analysis of the recorded data, re-estimation of genetic parameters in relation to time, and appropriate modification of existing methods of rearing/fattening in station tests are required. When such inspections are neglected, data from the testing stations may not accurately reflect genetic merit of individual animals.

Keywords:

gain; genetic analysis; progeny test; Fleckvieh; genetic variation during time

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