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Validation of resilience indicators based on daily milk yield in dairy cows

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Resilience is the ability to be minimally affected by disturbances or to quickly recover. Resilience indicators for genetic selection in cows have been proposed, which are variance and autocorrelation of daily deviations from predicted milk yield. The aim was to validate how well these traits represent resilience, by estimating genetic correlations of the resilience indicators with traits describing production response to disturbances at herd level. A dataset with daily milk yield was used to identify disturbances affecting each entire herd, by selecting dates where the mean yield of all cows in the herd dropped. Production response of ~71,000 primiparous cows was then quantified by the depth of the drop and the total yield loss in kg and the length of the drop in days. Resilience indicators were available on ~79,000 cows. Genetic correlations were estimated using a sire-maternal grandsire model in ASReml. For variance, partial genetic correlations adjusted for yield level were calculated because of strong genetic correlations with yield level. Variance had strong partial genetic correlations with drop depth (0.82) and total yield loss (0.74), but not with drop length (-0.18). This suggests that variance contains information about strength of response to disturbances that cannot be explained by yield level. Autocorrelation had weak genetic correlations with drop depth (-0.13) and total yield loss (-0.01), but a strong genetic correlation with drop length (0.97). In conclusion, variance and autocorrelation cover different aspects of resilience and should be combined to breed for improved overall resilience.