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SESSION A. Room: Theatre Cerise 10.40-12.20 hrs

Assessing Genotype by Environment interactions in Dutch dairy farms, between organic and conventional systems and across dietary concentrate levels

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Differences in practices between dairy farms, such as between organic and conventional systems, or differences in feeding practices, may result in large variability between farm environments. Genotype by environment interactions (G×E) arise when genotypes respond differently across environments, potentially leading to genotype re-ranking. This study assessed G×E: (1) between organic (OF) and conventional (CF) dairy farm environments and (2) across a range of environments defined by concentrate levels (proportion of total diet dry matter). Data from 974 Dutch dairy farms (2016 to 2021) was available, resulting in 102,141 first lactation Holstein Friesian cows, including 6,126 records on OF and 96,015 on CF. Dietary concentrate levels were available for 101,751 cows, 95% of the data ranging from 17% to 38% of concentrate. Five milk production traits were analysed using multivariate and reaction norm models. Heritability of milk yield was 0.36 (±0.036) in OF and 0.44 (±0.011) in CF, and increased from 0.27 (±0.015) to 0.53 (±0.011) across concentrate levels. Similarly, heritabilities and genetic variances of fat- and protein yield were higher in CF than OF and increased with increasing concentrate levels, while smaller variations were observed in parameters of fat- and protein content. High genetic correlations were found between environments for the five traits, ranging from 0.94 (±0.034) to 0.99 (±0.027) between OF and CF and from 0.96 (±0.023) to 1.00 (±0.001) between concentrate levels. These results indicate a scaling effect but provide little evidence of genotype re-ranking across environments, supporting current breeding strategies for milk production traits, consistent across environments.