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A preliminary investigation into GxE in first lactation South African Holstein cows

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Genotype  $\times$  environment interaction (G $\times$ E) in dairy cattle is a contentious issue that is usually ignored in genetic evaluations. It can, however, play a significant role in the accuracy of breeding values in different environments, if it exists, with a negative impact on genetic response when it is ignored. The purpose of the study was to investigate a possible genotype by environment interaction in first calf South African Holstein cows for both production and reproduction traits. Data from 100,975 cows on a total mix ration (TMR) and 22,083 pasture based cows were used. They were the progeny of 4,391 sires and 84,935 dams produced over a period of 11 generations. Traits analysed were milk production (corrected to a 305-day equivalent) and age at first calving (AFC). Both were recorded over a period of 30 years from 1980-2010. Production or AFC in each environment (TMR vs. pasture) was treated as a separate trait. Bivariate analyses, using an animal model in ASREML, were used to obtain genetic correlations between the traits measured in each environment. The genetic correlation for milk production measured in the two different environments was 0.90 (0.027) and that of age at first calving 0.28 (0.12). The heritability estimates for milk production were 0.23 (0.008) under the TMR system and 0.32 (0.015) for the pasture based system, while the estimates for AFC were 0.063 (0.005) and 0.055 (0.009), respectively. The rather large scale effect in the heritability (0.23  $\rightarrow$  0.32) as well as the correlation of less than one for milk production between the two environments indicates that a GxE might exist. However, the low genetic correlation between the two environments for AFC is much more real and indicates that GxE should be taken into account when sire selection are done