***animal* journal**

**Genotype by environment interaction between heat stress during gestation and postpartum for milk production of Holstein cattle**

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Supplementary Table S1. Comparison of the informative criteria for models 3, 4, and 5 used to estimate (co)variance components for milk yield in the first lactation of Holstein cows.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Models |  | Informative criteria\* | | |
| Number of parameters | logL | AIC | BIC |
| Model 3 | 13 | -170.51 | 317 | 187 |
| Model 4 | 14 | -134.75 | 247 | 128 |
| Model 5 | 25 | 0 | 0 | 0 |

logL = maximum likelihood, AIC = Akaike’s information criterion, BIC = Schwarz’ bayesian information criterion.

\*As deviation from the best model.



Supplementary Figure S1. Estimated breeding value (EBV) for daily milk yield of the best 250 Holstein cows in cold (left) and hot (right) environments during the last 60 days of gestation (THI\_g) according to days in milk (DIM) (top) and a selected group (within the best 250) of 50 cows identified as stable or tolerant (bottom).



Supplementary Figure S2. Estimated breeding value (EBV) for daily milk yield of the best 250 Holstein cows in cold (left) and hot (right) environments during the last 60 days of gestation (THI\_g) according to the postpartum environment condition (THI\_m) (top) and a selected group (within the best 250) of 50 cows identified as stable or tolerant (bottom).

**Supplementary Material S1**

The genetic variance for test day milk yield (TD) for each X point along the trajectory of days in milk (DIM) or temperature-humidity index (THI\_m) in cows in the cold environment during last 60 days of gestation was estimated by , while for the cows in the hot environment was , and the covariance between the cold and hot environment was .

With the new variances and covariances for TD along with the trajectory of DIM or THI\_m scale, the heritability and genetic correlations were estimated following classic formulas (Falconer and Mackay, 1996). The genetic correlations (rg) of the same trait between the cows in the cold and hot environment during the last 60 days of gestation for each level of the X scale were:

On the other hand, the heritability (h2) for TD of the cows in cold environment and the point X of the scale of DIM or THI\_m was:

and for the hot environment and point X of the trajectory of DIM or THI\_m was:

where means the total phenotypic variance for each point of the scale of DIM or THI\_m.

The estimated breeding value ​​(EBV) for TD of each animal at any point X of the cold and hot gestation environmental conditions of the cows along the trajectories of DIM or THI\_m was estimated by:

for the cold environment,

   for the hot environment,

where and represent the solution corresponding to the ith animal and is made up of the corresponding elements of a Legendre polynomial. For DIM, the estimates of EBV for cumulative milk yields up to 120,150 and 305 days of lactation were estimated by adding the coefficients of the Legendre polynomial () between the first five days of lactation until X point mentioned above. For THI\_m, it is estimated in the same way, but only for each point of the environmental scale.

**References**

Falconer DS and Mackay TFC 1996. Introduction to Quantitative Genetics, 4th ed Longman. Harlow, Essex, UK.