

Estimation of Genetic Parameters for Test Day Milk Yields of Moroccan Holstein Cows Using Random Regression Test Day Model

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1. Objective

The first step toward the possible application of a test day model in Morocco is to estimate the genetic parameters of milk yields under Moroccan conditions. Thus, the aim of this study was to estimate the (co)variance components of test day milk yields of the first 3 lactations using random regression test day model.

2. Material and Methods

Data

Data were obtained from Holstein cows calving between 1998 and 2008 in 224 herds from 17 geographic regions. Data were restricted to the first 3 lactations, test day records between 5 and 365 days, milk yields from 1.5 and 85 kg. Also, only cows with more than 5 test day records and herds with more than 4 cows by year of calving were kept. Table 1 presents the characteristics of edited data.

Statistical analyses

The model used was a multiple-lactation random regression test day model. The matrix notation of the model is: $y = Xb + Q_3(Za + Wh) + Q_4Zp + e$ where y = vector of test day milk yields; b = vector of fixed effects: herd x test day and age season of calving x classes of 25 DIM; a = vector of random regression coefficients for additive genetic (AG) effect; p = vector of random regression coefficients for permanent environmental (PE) effect; h = vector of random regressions for herd x year of calving common environmental (HY) effect; e = vector of residual effects; Q_3 et Q_4 matrices of 3 and 4 modified Legendre Polynomials as used by Gengler et al. (1999); and X , Z and W = incidences matrices. Variances components were estimated by EM-REML method using REMLF90 package of Misztal et al. (2002).

Table 1 : Data structure for the analysis

	1 st lactation	2 nd lactation	3 rd lactation
Test day records	73 739	52 035	33 661
Mean milk yields (kg)	18.4	19.8	20.9
Number of cows with records	7 978	5 592	3 753
Number of herds	212	208	188
Average number of test day records by cows	9	9	9

3. Results and Discussion

The daily AG, PE, HY and R variances for milk yields across parity are given in figure 1. The trends of PE and HY variances were similar to trends reported by Santellano-Estrada et al. (2008). The magnitude of the values of AG et PE were very close to those obtained in countries with the same climate and same dairy system, like Tunisia (Hammami et al., 2008). In general, the values of heritabilities of test day milk yields for the first three lactations (figure 2) were higher in middle of lactation than the edges of lactation. The values obtained in this study were smaller than those reported by Druet et al. (2003).

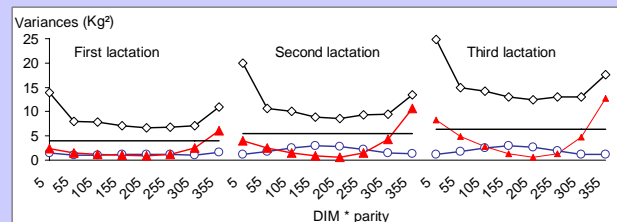


Figure 1 : AG (circle), PE (square), HY (triangle) and R (trait) of milk for the three first lactations of Moroccan Holstein cows

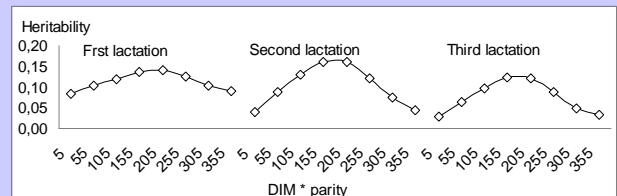


Figure 2 : Heritability estimates of test day milk yields of the first three lactation of Moroccan Holstein cows.

4. Conclusion

The genetic parameters estimated in this study were the first results of analyzing Moroccan data using random regression test day model. Although this study was limited to milk yields, it initiates and illustrates the usefulness of test day model for genetic evaluation of Moroccan dairy cattle, where records are costly to be obtained for farmers.