

Genetic variability of mid-infrared predicted cheese yield in Holstein first-parity cows in Walloon Region of Belgium

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Cheese yield is an important technological and economical parameter in cheese manufacturing at the farm level. Up to date, empirical or theoretical formulae allow estimating the theoretical cheese yield from fat, and casein or protein contents of milk. Since few years, several studies have demonstrated the usefulness of the mid-infrared (MIR) spectrometry for the prediction of milk technological properties.

Aims

- ❖ To estimate the genetic parameters for the MIR predicted fresh and dry individual laboratory cheese yields (ILCYf and ILCYd)

MIR prediction equations

- ❖ Statistical parameters

	ILCYf ^a	ILCYd ^b
Final dataset used to obtain the equations		
N	337	344
Mean (SD)	26.5 (7.1)	61.1 (7.4)
Min - Max	10.7 - 51.0	41.0 - 83.0
Cross-validation		
SEcv	3.6	3.2
R ² cv	0.74	0.81
RPD	1.96	2.30
RER	11.1	13.2

^a expressed as g of coagulum/100 g of milk

^b expressed as g of dry matter coagulum/100 g dry matter of milk

Data

- ❖ Walloon spectral database (FUTUROSPECTRE)
- ❖ Data selection rules
 - 1st parity Holstein cows with known parents
 - Test-day (TD) recorded after 1st January 2009
 - TD recorded from the 5th to the 365th day in milk (DIM)
 - Standardized Mahalanobis distance: upper threshold of 3
 - Prediction encompassed in the range of reference values
 - At least 6 predicted values per cow
 - At least 3 predicted values per herd * test-day
- ➔ 15,338 cows selected in 254 herds

Variance components

- ❖ Estimation using REML and AI-REML
 - Single-trait random regression animal test-day model
 - Modified normalized 2nd order Legendre polynomials
 - Heterogeneity of the residual variances over DIM

Conclusions

- ❖ Moderate daily heritabilities of ILCYf and ILCYd
- ❖ Potential of selection for ILCYf and ILCYd

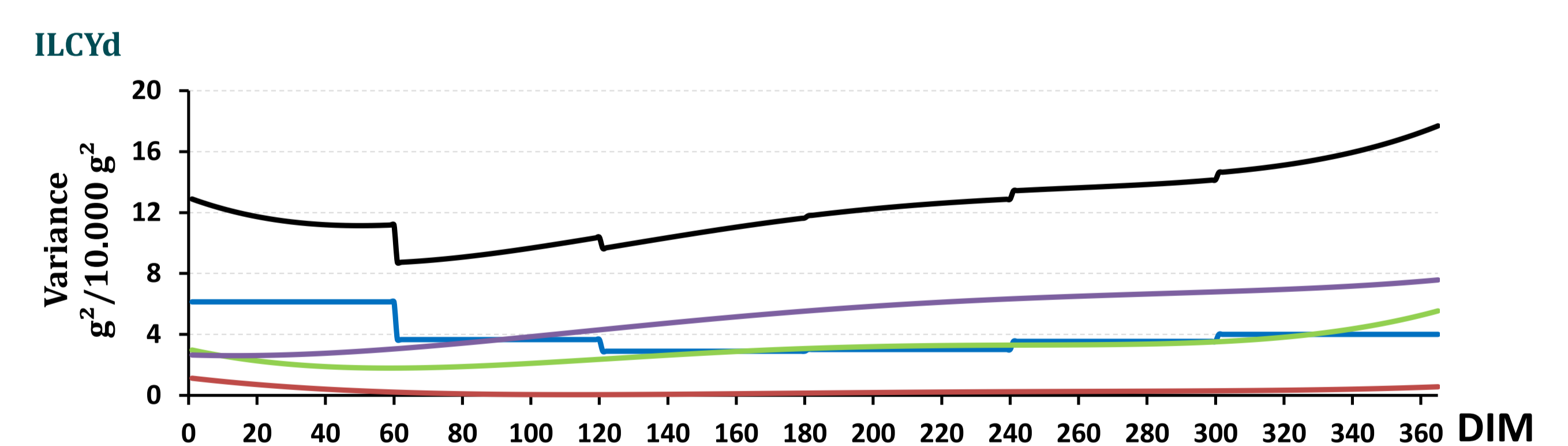
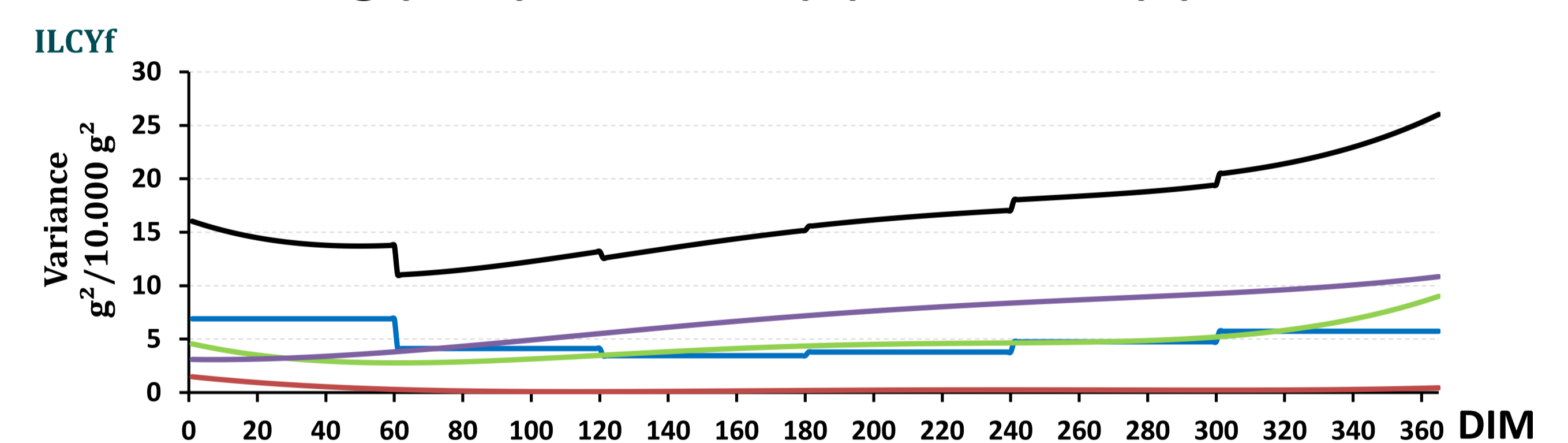
Results

- ❖ Descriptive statistics of selected data

	ILCYf	ILCYd
No. predicted records	109,249	109,536
Mean (SD)	27.7 (4.9)	63.3 (4.3)
Min - Max	11.5 - 50.9	43.3 - 82.4

- ❖ Estimated variance components throughout first lactation for ILCYf and for ILCYd

- Genetic (G), Permanent environment (PE), Herd * Year of Calving (HYC), Residual (R) and Total (T) variances



- ❖ Estimated daily heritabilities throughout first lactation for ILCYf and for ILCYd

