# Estimation of milkability breeding values and variance components for Italian Holstein: a Bayesian approach

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# Overview

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# Milkability: what and why

Ability to secrete milk in a regular, complete and fast way

Why is it important?

- Efficient use of time and labor
- Efficient use of machinery (for a faster investment pay-off)

Issues: Negative correlation with SCS and Teat length (Zwald et al, 2005; Sewalem et al, 2011). Partial association with mastitis susceptibility QTLs (Marete et al, 2018).

# Data editing

- Dataset: 7,862,371 observations (u = 2.67 Obs/Animal) – Mean frequency of slow cows: 0.029

- Cutoff time: 17 years back
- Days in milk at recording 5-305
- Herds with frequency of slow cows < 1% or > 30%: deleted
- Obs with production (Fat + Pro grams) < 1.5 IQR or > 1.5 IQR: deleted
- Herd-Year-Semester of recording groups with less than 20 obs: deleted

# Statistical model

ST repeatability threshold animal model

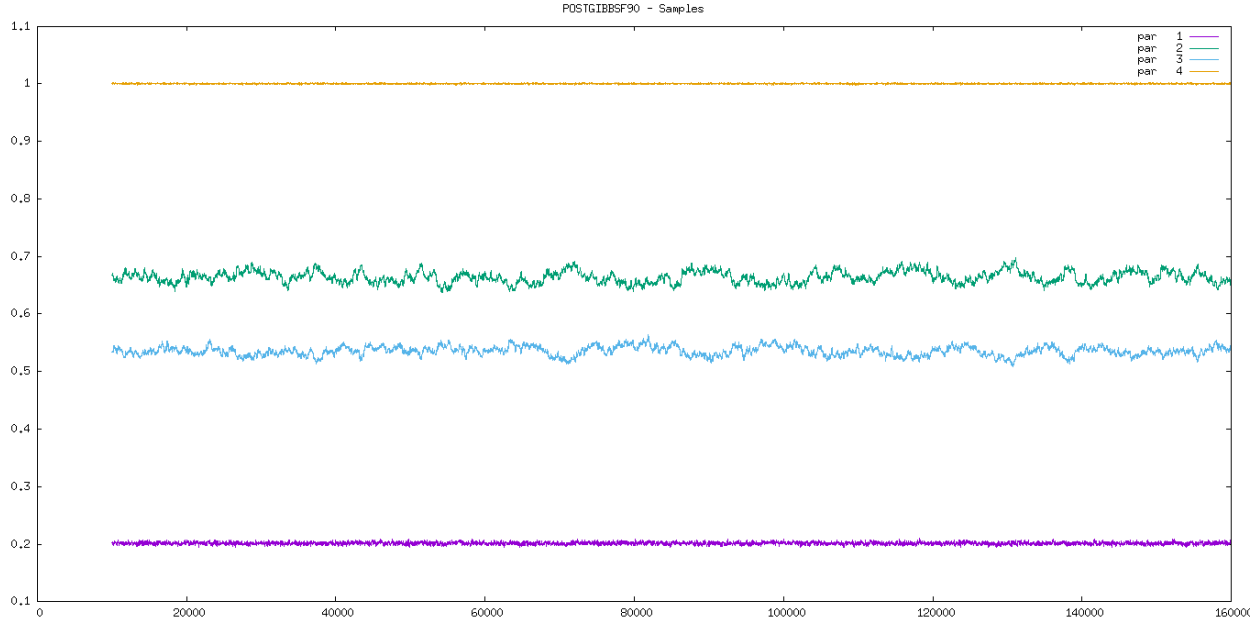
$$Y = P + DIM + CS + bPROD/\text{DIM} + hys + pe + a + \text{e}$$

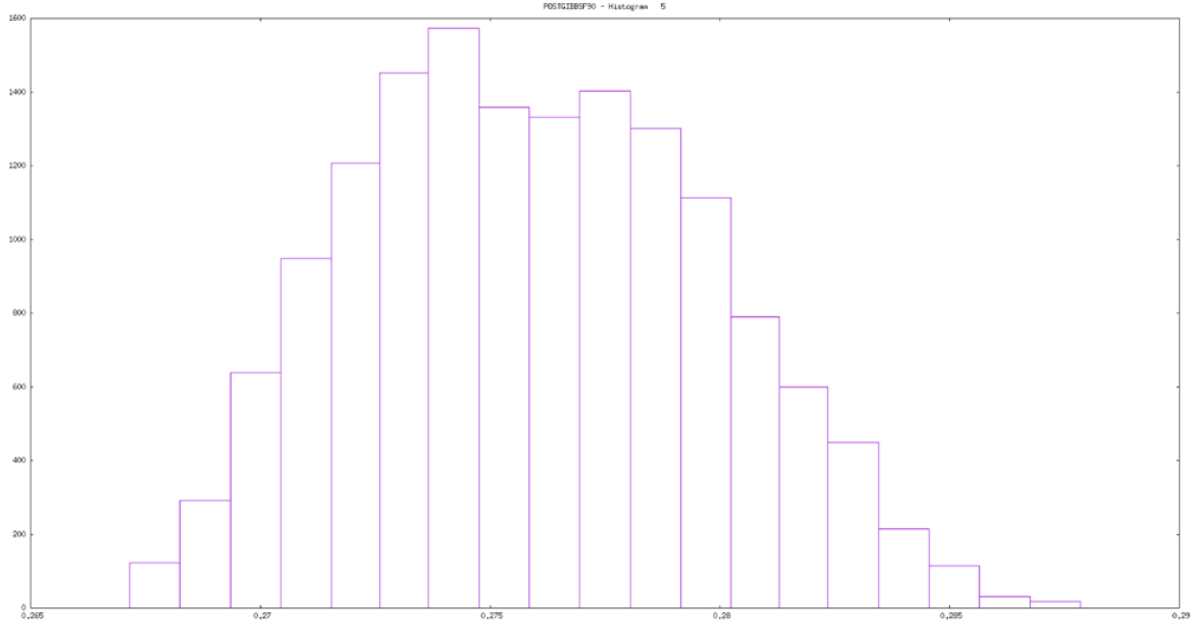
- Y: Slow/Not slow (1/0)
- P: Parity 1, 2, 3+ [FIXED]
- DIM: Days in milk class (7 classes: 5-15, 16-30, 31-60, 61-100, 101-150, 151-200, 201-305) [FIXED]
- CS: Calving season (hot/cold) [FIXED]
- bPROD/DIM: Production (fat+protein grams) within DIM class [cov-FIXED]
- hys: Herd-Year-Semester of recording [RANDOM]
- pe: Permanent environment [RANDOM]
- a: animal [RANDOM]
- e: residuals

# Genetic parameters estimation

Bayesian approach: Gibbs sampling [THRGIBBS1F90 + POSTGIBBSF90] on the entire dataset

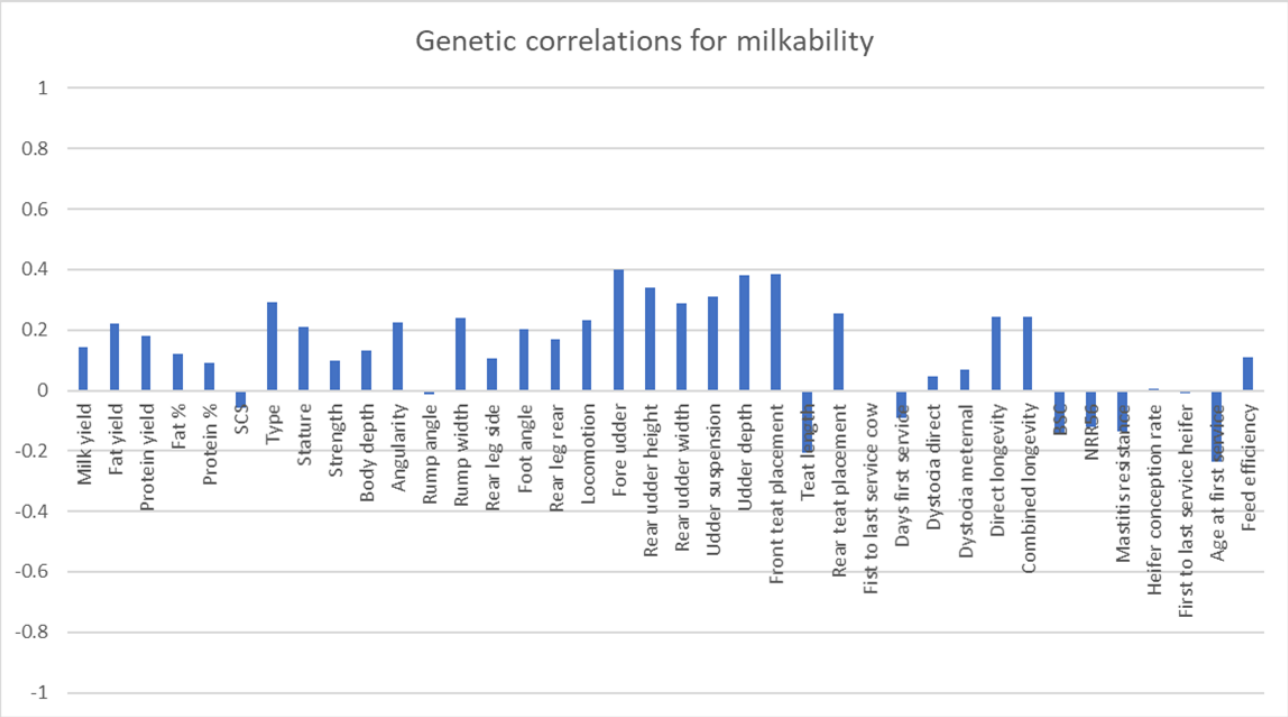
Total rounds: 160,000; Burn-in: 10,000; Thinning rate: 10



# Results

- Heritability: 0.275 (+0.215), PSD: 0.004
- Repeatability: 0.50
- Reliability: +0.14 [EBVs: MiX99, Reliability: ApaX99]




Genetic correlations: method based on correlations between EBVs and their reliabilities.

# Conclusions

- Enhanced accuracy of EBVs
- More reliable tool for decision making at farm level
- Trait to be handled carefully: both extremes, low and high EBVs, have issues

# Thanks for your attention!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