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Fertility - Body Condition Scores

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Genetic correlations between fertility and body condition scores, using bivariate random regression models

Background - traits

- Fertility
  - influenced by negative energy balance
- Body condition score (BCS)
  - indicator of energy balance

Background - model

- Correlation BCS and fertility
  - depends on the stage of lactation
  - effect of BCS change
- Random regression model

Aim of the study

To estimate the genetic correlation between BCS, as a longitudinal trait, and fertility traits measured as single lactation scores

To determine the dynamics of these genetic correlations

Data editing

The dataset included only lactating heifers

- Known sire
- Age at first calving > 600d
- Sires with >4 daughters
- HY-classes with >2 cows

Final dataset

- BCS
  - Recorded since August 2001, till May 2004
  - 22,075 records
- Fertility
  - Included from January 2000 to May 2004 (more power of the model)
  - 40,736 records

Statistical model

- Fixed effects

  BCS
  - Herd-year and month of classification, classifier, age and pregnancy stage at classification (days)

  Fertility
  - Herd-year and month of calving, age at calving (days)

- Random effects
  - Additive sire – For BCS: modelled using a set of orthogonal polynomials across days in milk at classification (2^{nd} order!)
  - Residual

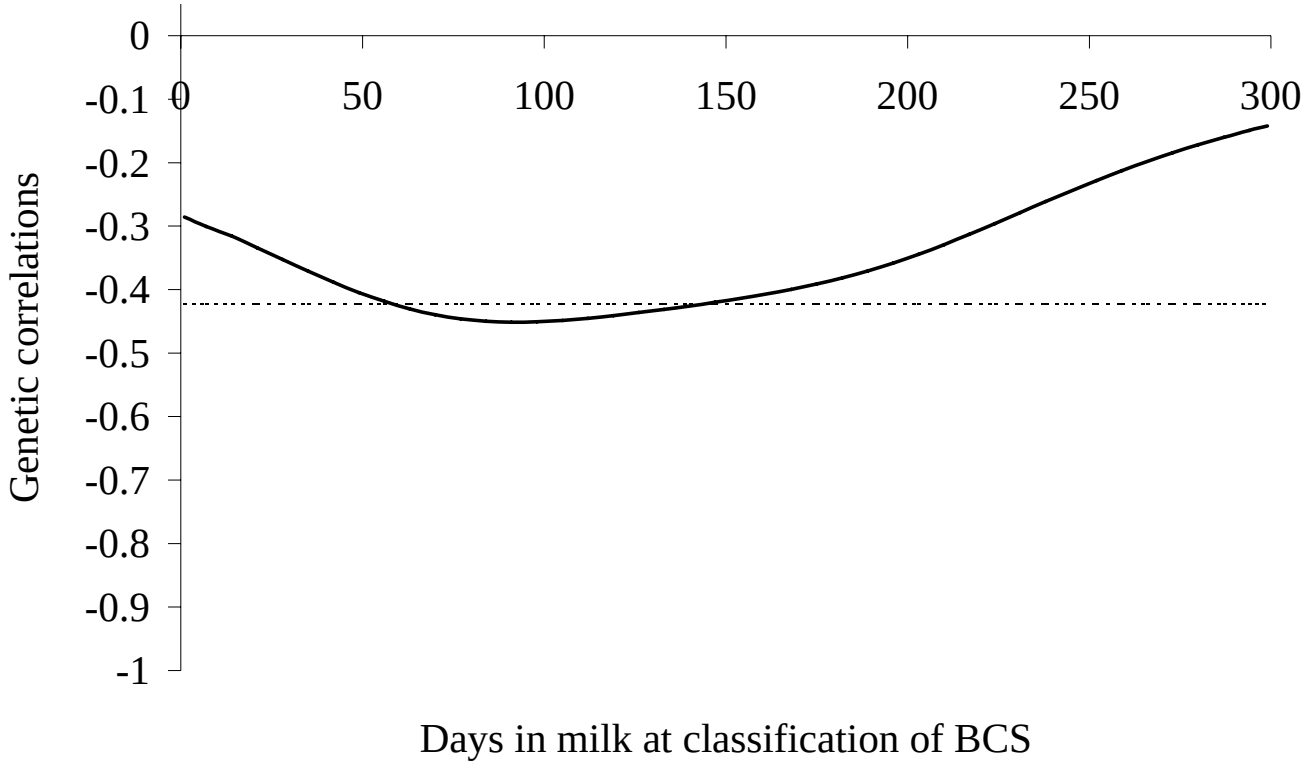
Fertility traits

- DFS : Days in milk at first insemination
- DFLI : Days between first and last insemination
- #INS : Number of inseminations
- CRFI : Conception rate at first insemination
- CI : Calving interval (days)

Heritabilities

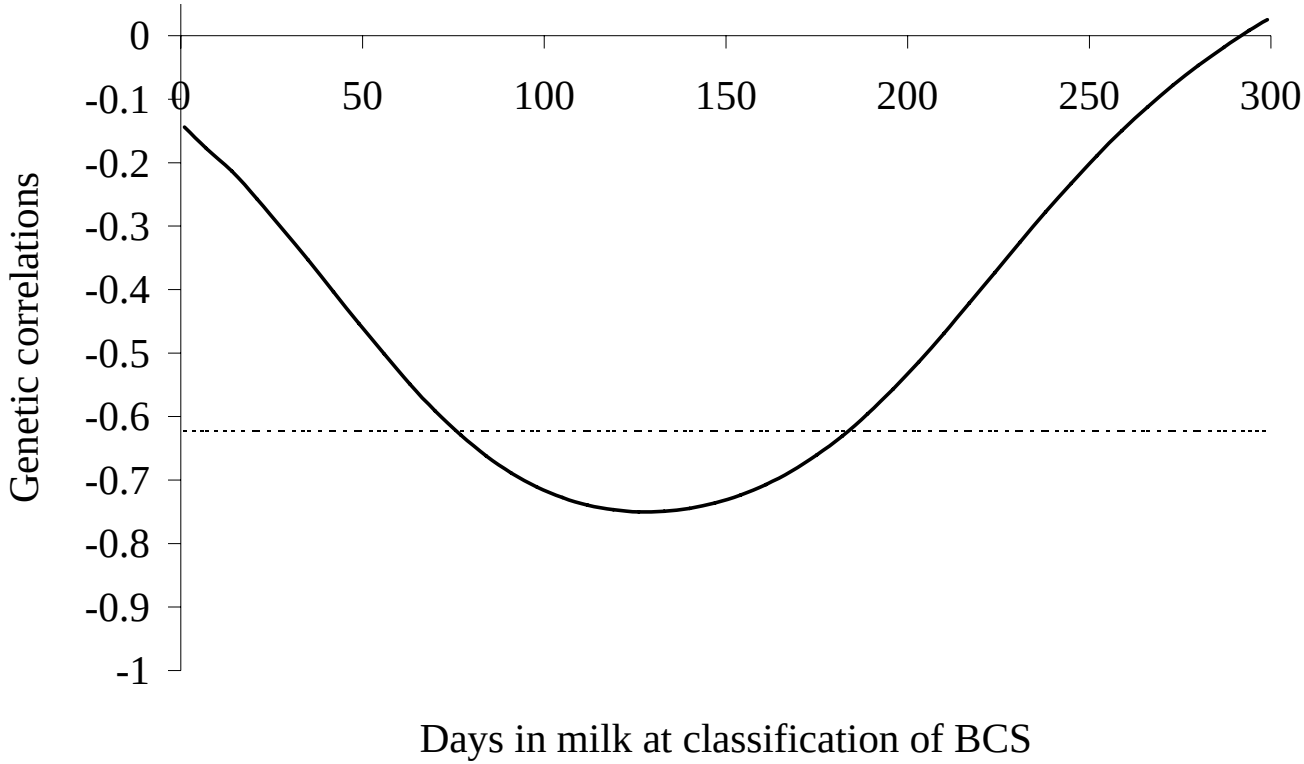
- DFS 0.08 (0.01)
- DFLI 0.08 (0.01)
- CI 0.04 (0.01)
- #INS 0.01 (0.01)
- CRFI 0.01 (0.01)
- BCS 0.17 (0.02)

Genetic correlations: BCS - DFS



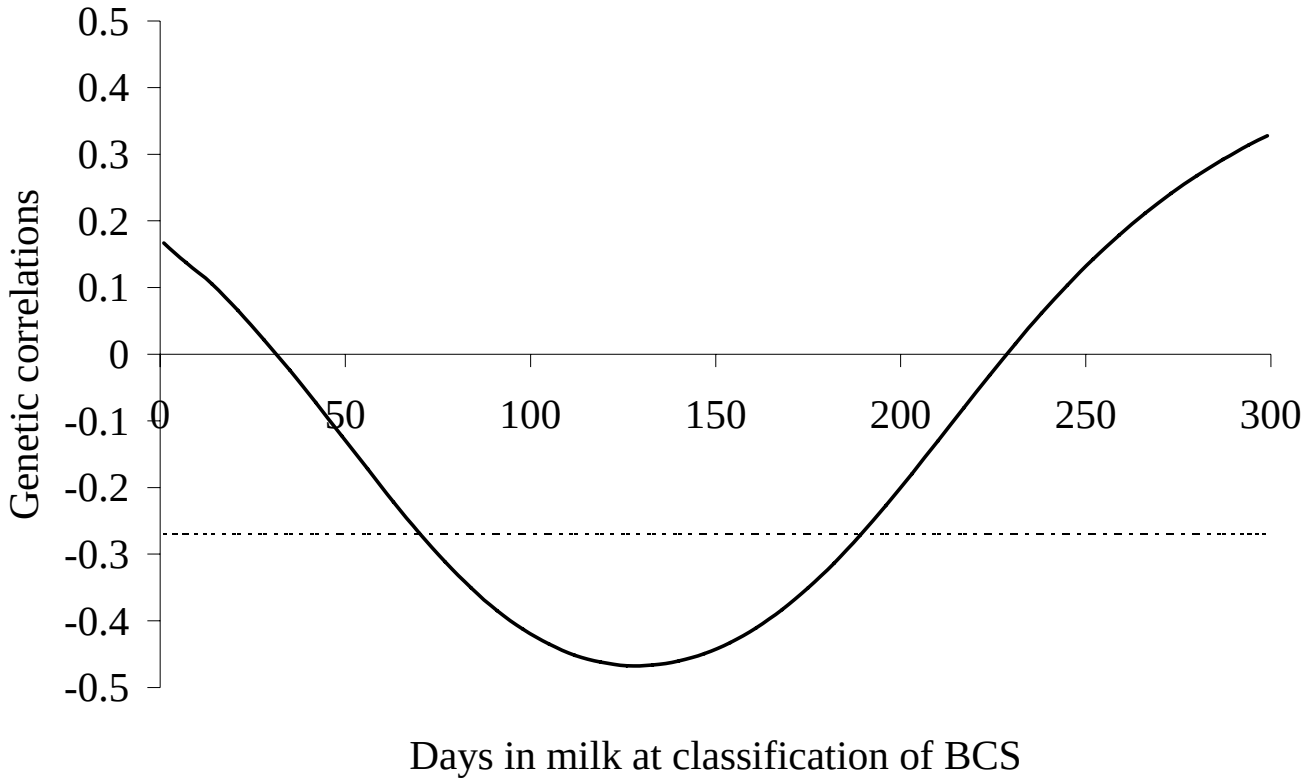
Cows with good body condition scores have their first insemination earlier in lactation

Genetic correlations: BCS - DFLI



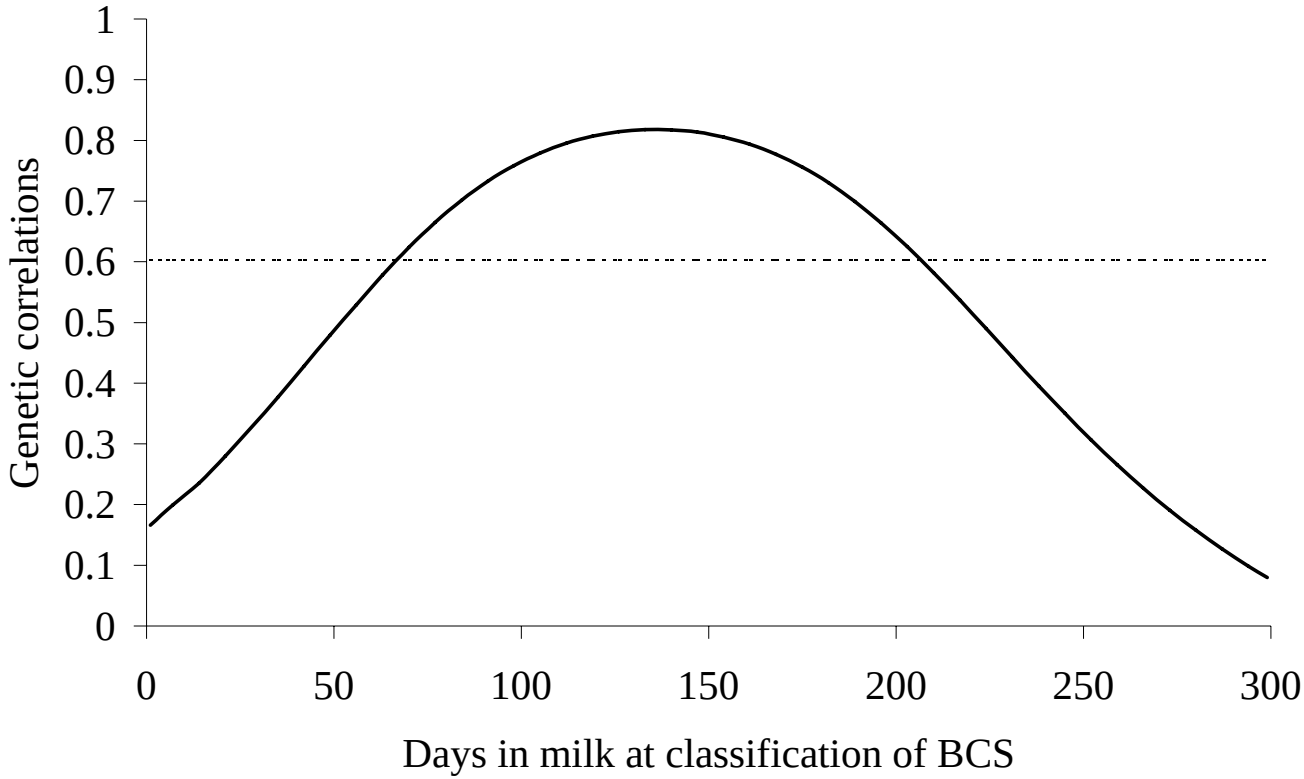
Cows with good body condition scores have less days between first and last insemination

Genetic correlations: BCS - #INS



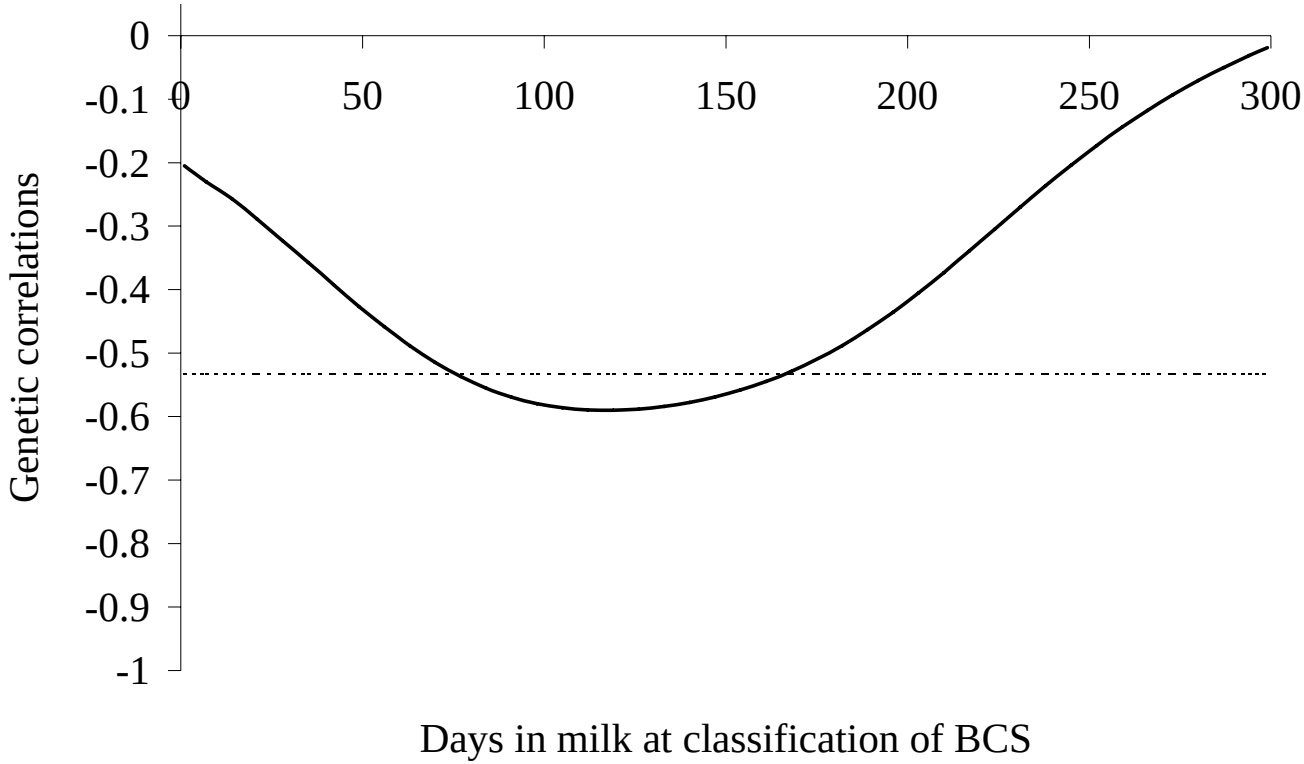
Cows with good body condition scores need fewer inseminations to get pregnant

Genetic correlations: BCS - CRFI



Cows with good body condition scores conceive better to their first inseminations

Genetic correlations: BCS - CI



Cows with good body condition scores have a shorter calving intervals

Conclusions

- Genetic correlations are all nicely distributed around the correlation estimated with the lactation model, but are not on a constant level
- Maximum genetic gain in fertility from indirect selection on BCS should be based on measurements taken in midlactation

Acknowledgements

- Financial support of:
  - ASR (Arbeitsgemeinschaft Schweizerischer Rinderzüchter)
- Data provided by:
  - Holstein Association of Switzerland