
# Associations between gestation length, stillbirth, calving difficulty and calf size in Norwegian Red

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**64th EAAP, Nantes, France, August 26-30, 2013**

# Gestation length

- Not a trait we aim to change genetically
  - Too short as well as too long gestation length cause problems
- May contribute correlated information in genetic evaluation of calving traits
  - Calving difficulty, stillbirth
- EBV for gestation length may be used to predict expected calving date more accurately
  - Useful information for herd management purposes

# Objectives

- Infer heritability of and genetic correlations among gestation length (**GL)** , stillbirth (**SB**), calving difficulty (**CD**), and calf size (**CS**), in Norwegian Red
- Examine genetic change, range and distribution of EBV for GL in Norwegian Red AI sires

# Data

- First lactation Norwegian Red cows
- Age at calving 20-36 mo
- Year of calving > 2000
- Inseminated 265-305 days before calving
- Sire of cow and sire of calf Norwegian Red AI sire
  - Minimum 50 observations per sire

➢ 644,736 records

- 1387 sire of cow
- 1338 sire of calf

# Traits

- Gestation length

  No of days from last insemination to calving

  256 - 305 days

- Stillbirth

  0=alive  or 1=dead at birth or within 24 h

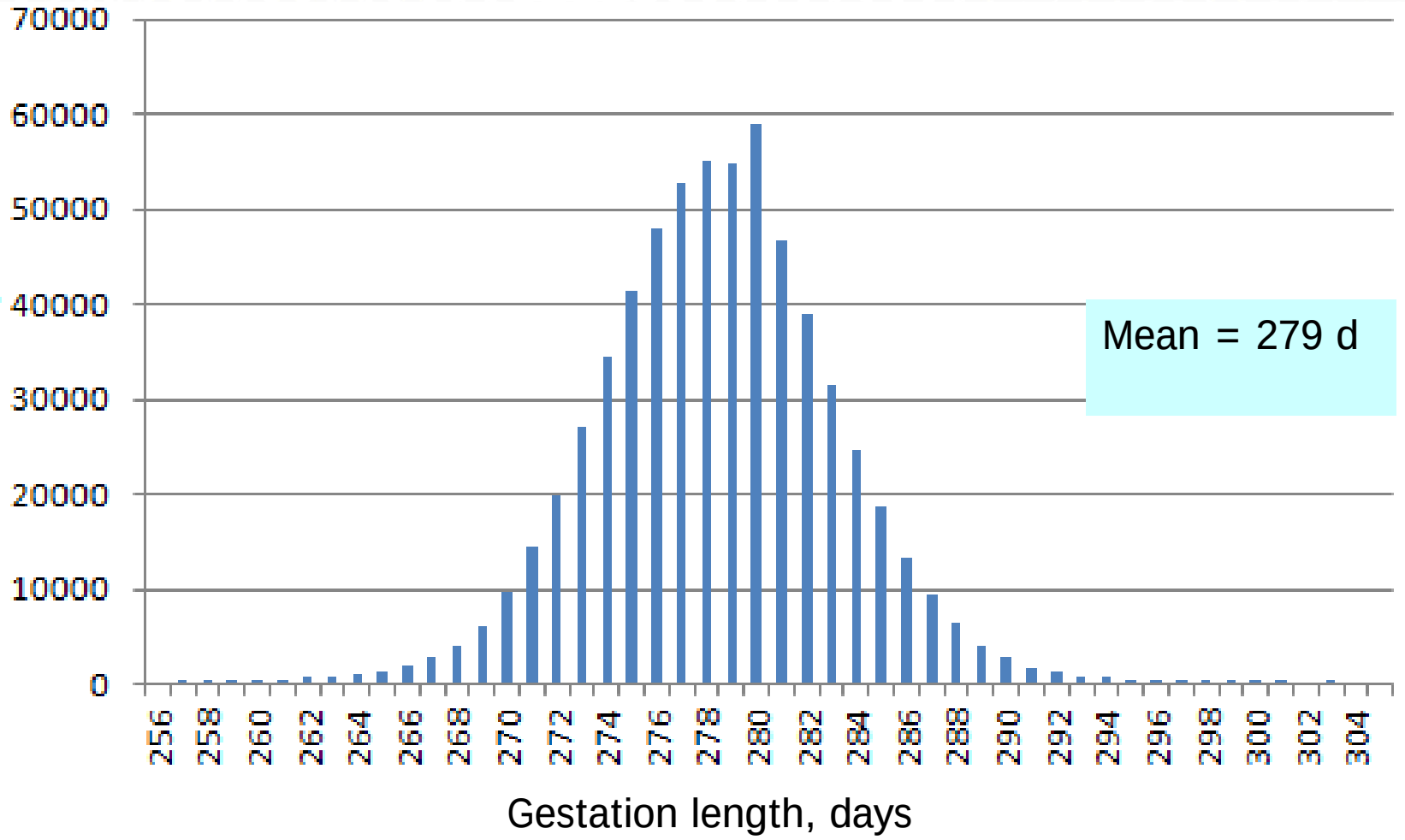
- Calving difficulty

  1 = easy calving, 2 = slight problems, 3 = difficult calving

- Calf size score

  1 = small, 2 = medium, 3 = large

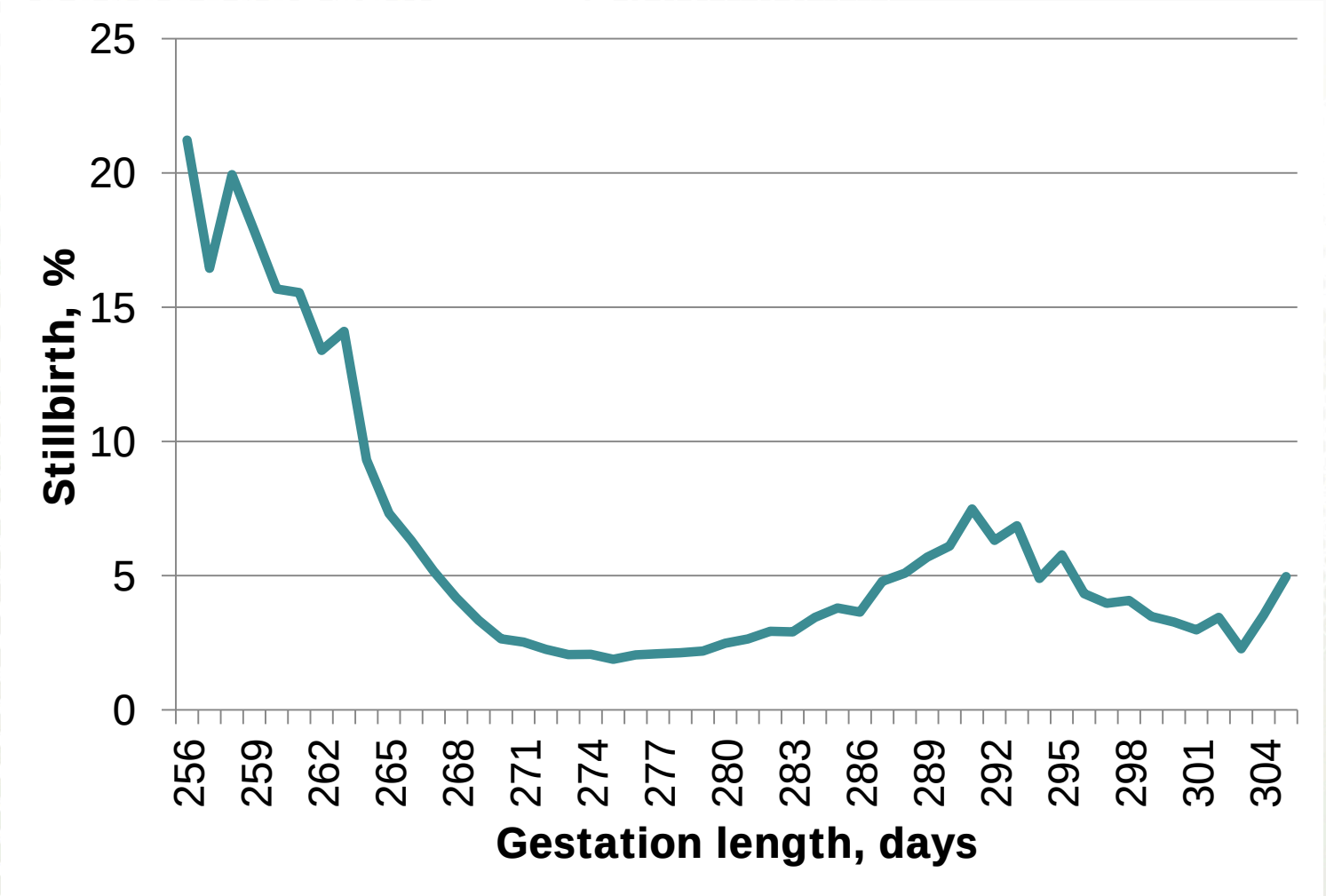
# Gestation length



# Frequency and mean gestation length for different categories of other calving traits

| | | Frequency % | Gestation length mean no, days |
|---|---|---|---|
| Stillbirth | No | 97 | 278.5 |
| | Yes | 3 | 278.8 |
| Calving difficulty | Easy calving | 88 | 278.3 |
| | Slight problems | 7 | 279.7 |
| | Difficult calving | 3 | 279.8 |
| | Unknown | 2 | 278.2 |
| Calf size | Small | 13 | 276.5 |
| | Medium | 74 | 278.5 |
| | Large | 10 | 280.5 |
| | Unknown | 3 | 278.6 |
| Overall mean | | | 278.5 |

# Frequency of stillbirth by gestation length



# Model

- Multivariate linear model with direct (sire of calf) and maternal (sire of cow) genetic effects

- Variance components estimated with DMU (Madsen&Jensen 2007)

# Heritability and genetic correlations

Table 1. Heritability (on the diagonal) and genetic correlations among direct (Dir) and maternal (Mat) gestation length (GL), stillbirth (SB), calving difficulty (CD) and calf size (CS)

| | | GL | | SB | | CD | | CS | |
|---|---|---|---|---|---|---|---|---|---|
| | | Dir | Mat | Dir | Mat | Dir | Mat | Dir | mat |
| GL | Dir | **0.37** | | | | | | | |
| | Mat | -0.10 | **0.06** | | | | | | |
| SB | Dir | 0.17 | 0.11 | **0.01** | | | | | |
| | Mat | 0.07 | 0.11 | -0.19 | **0.01** | | | | |
| CD | Dir | 0.26 | 0.06 | 0.87 | -0.07 | **0.05** | | | |
| | Mat | 0.05 | 0.26 | -0.15 | 0.72 | -0.15 | **0.03** | | |
| CS | Dir | 0.29 | 0.05 | 0.74 | -0.10 | 0.93 | -0.20 | **0.12** | |
| | Mat | 0.005 | 0.63 | 0.05 | 0.13 | -0.03 | 0.55 | -0.01 | **0.03** |

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# Genetic correlations

- All genetic correlation between direct and maternal traits were close to 0, within as well as between traits
- Strong genetic correlations between

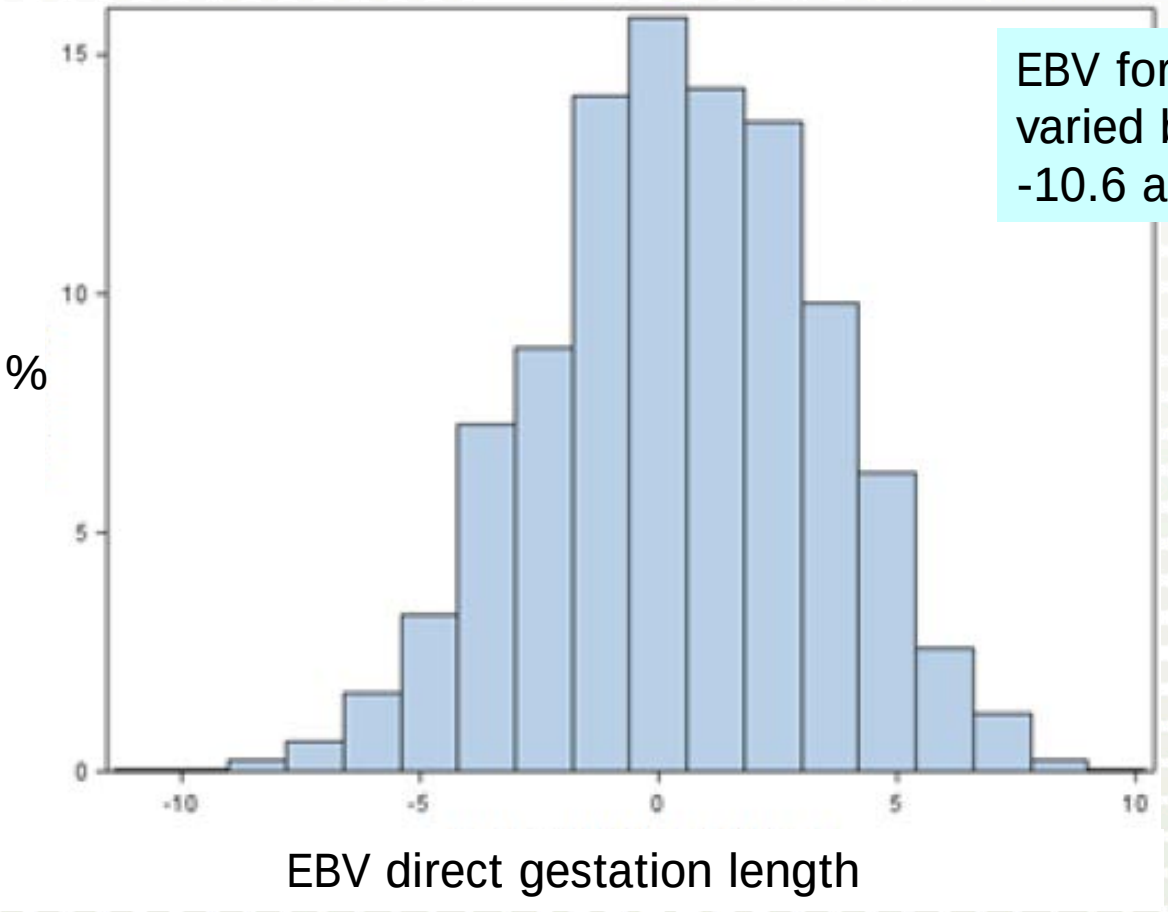
  dir CD and dir CS: 0.93

  dir CD and dir SB: 0.87

  dir SB and dir CS: 0.74

- Significant genetic correlations between GL and other calving traits

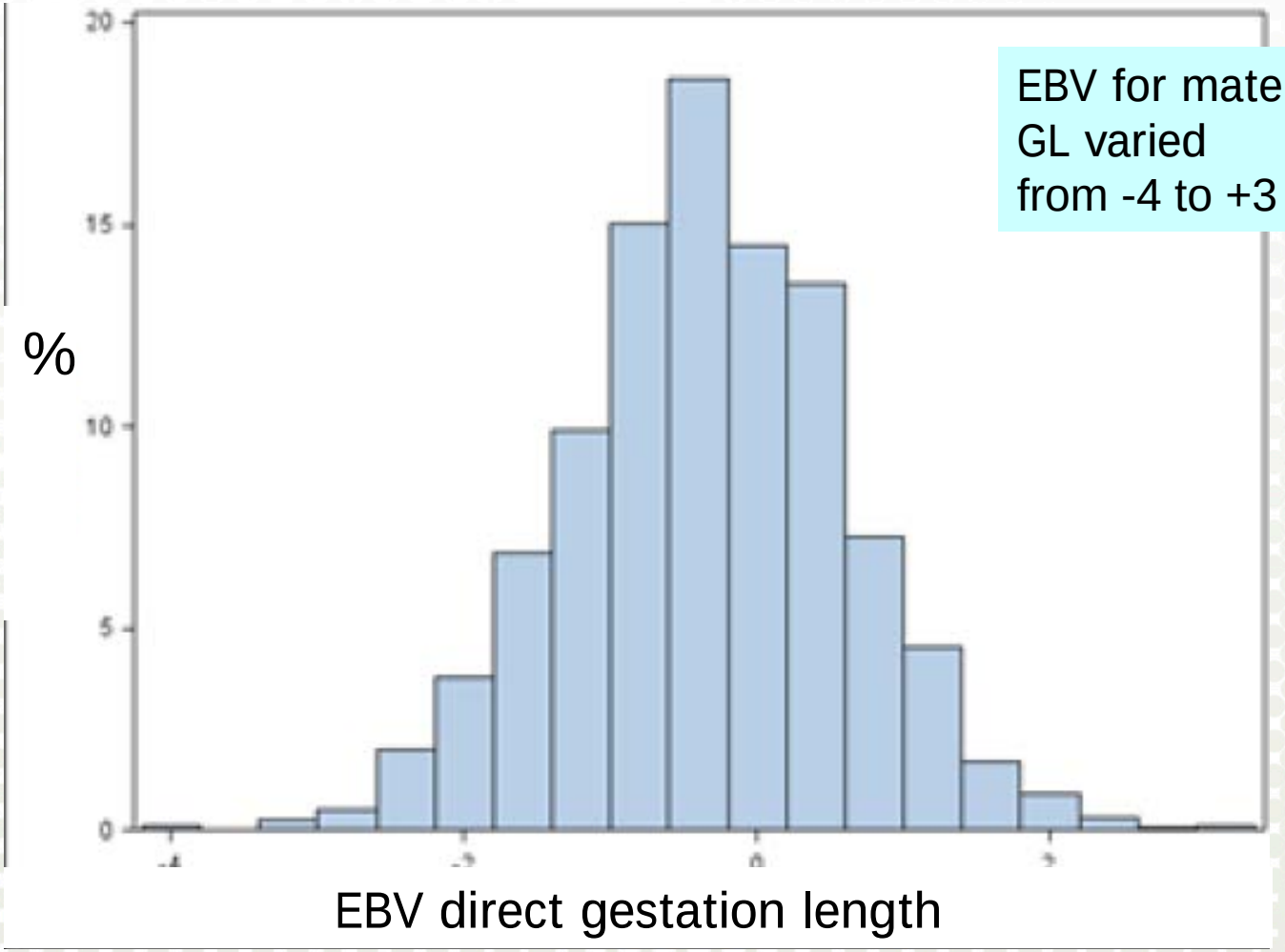
# Sire EBV for direct gestation length
## (sire of calf)




EBV for direct GL varied between -10.6 and +9.6 days

Sires with > 50 rec

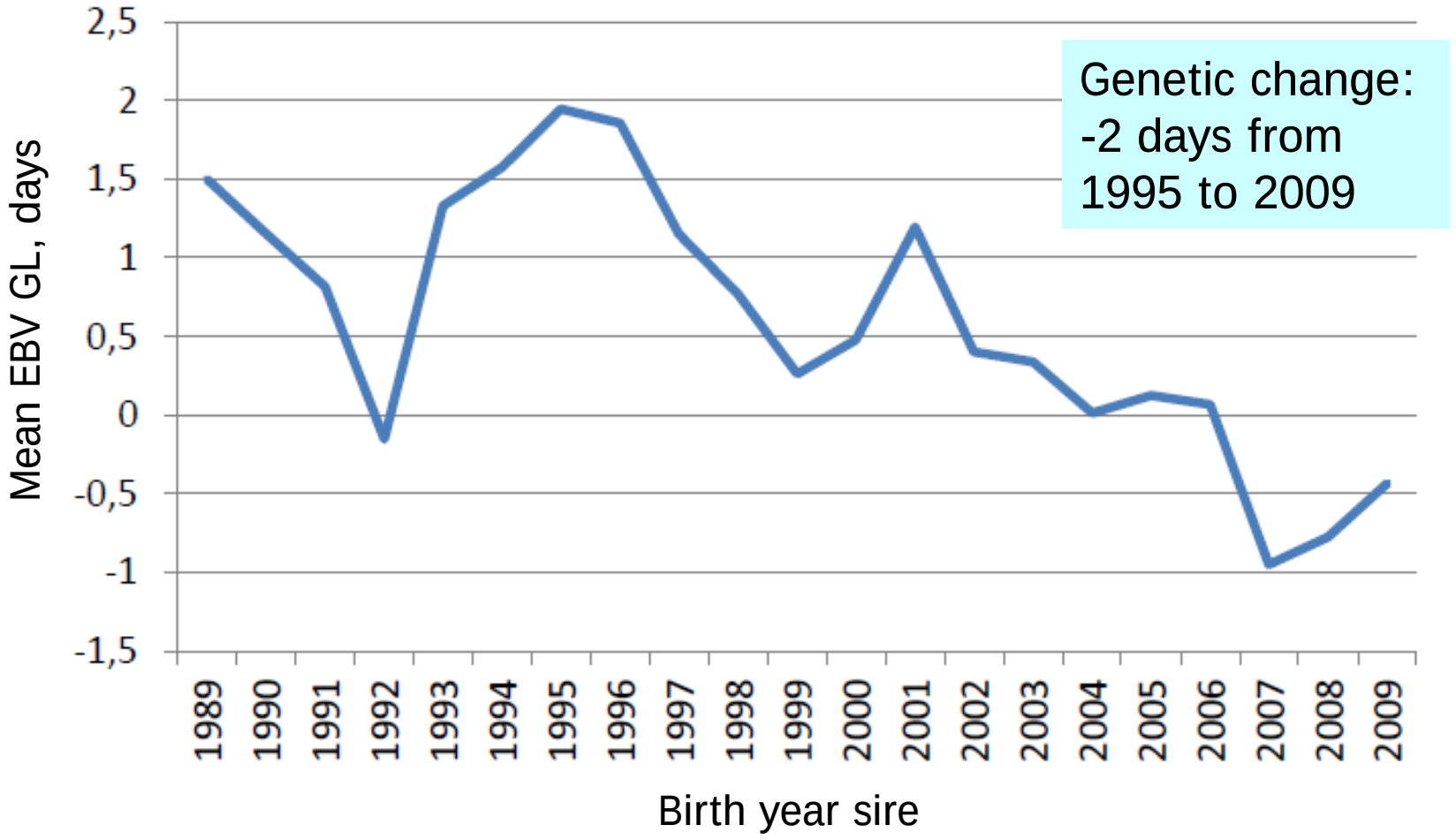
# Sire EBV for maternal gestation length
## (sire of cow)




EBV for maternal GL varied from -4 to +3 days

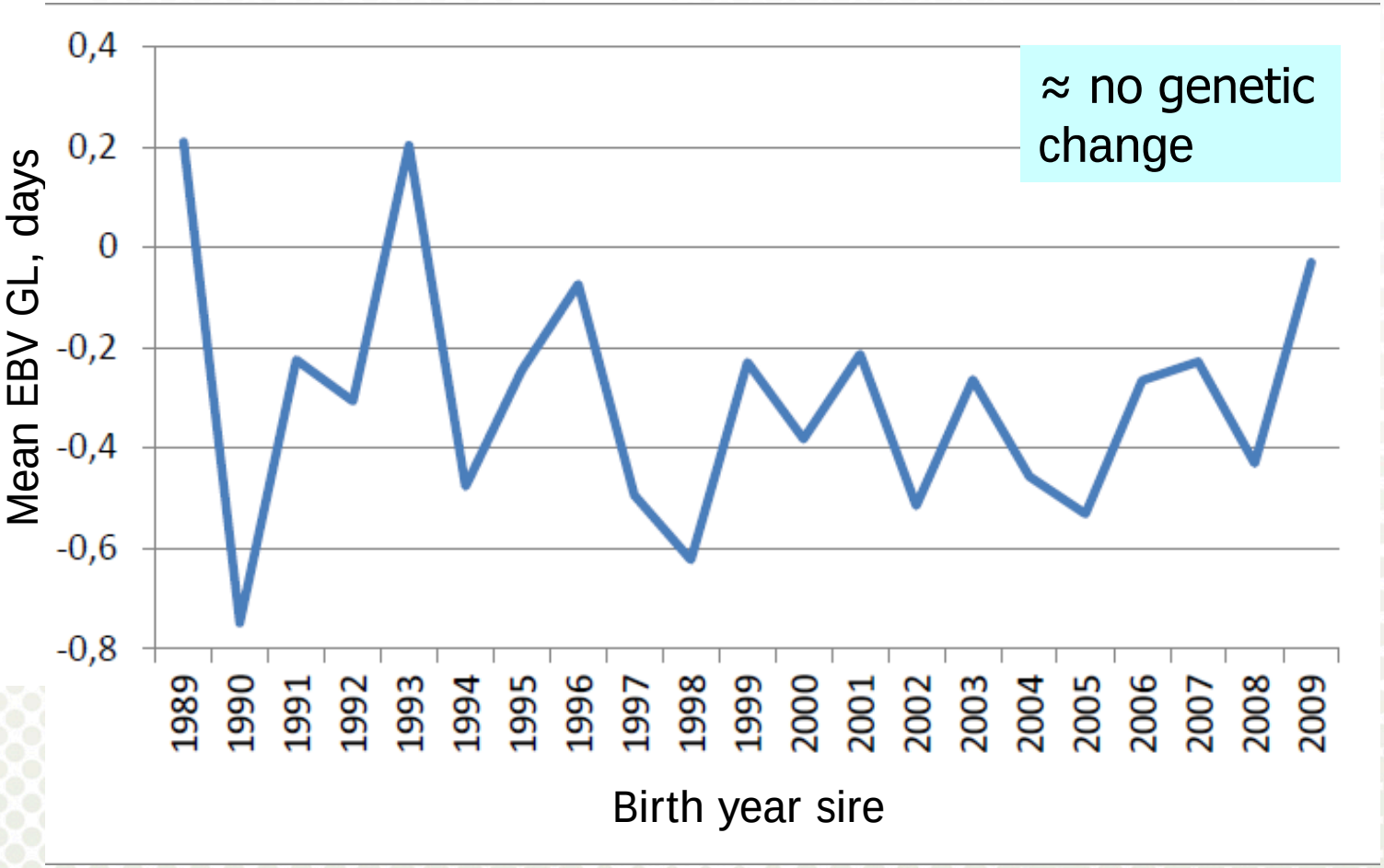
Sires with > 50 rec

# Genetic change direct gestation length




Sires with > 50 rec

# Genetic change maternal gestation length




Sires with > 50 rec

# Gestation length

- Not a trait we aim to change genetically
  - Too short as well as too long GL cause problems
- Contribute correlated information in genetic evaluation of other calving traits
  - Heritability 0.37 for direct GS and 0.06 for maternal GS
  - Genetic correlations:

    Direct GS to direct SB (0.17), CD (0.26), CS (0.29)

    Maternal GS to maternal SB (0.11) CD (0.26) CS (0.63)
- EBV for gestation length may be used to predict expected calving date more accurately
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