

**Evaluation of genetic trends for milk yield and somatic cell counts in the Holstein breed in terms of changes in the lactation curve**

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# Introduction



- One of the advantages of the TDM is that PTAs can be computed for any days in milk (DIM)
- However selection still based 305-d PTAs
- Therefore different weights are being applied on PTAs at different DIM which depends:
  - Variance of the PTAs at DIM
  - And covariance with 305-d PTA
- This could result in changes in the genetic lactation curves of animals over time

# Objectives



- Study examines genetic trends in terms changes in PTAs at different DIM
  - Milk yields in Holstein/Friesian breed
  - and somatic cell counts
- SCC is included £PLI is using a genetic correlation of about 6% with milk yield on 305-d basis
- Examine the efficiency such selection given the relationship between both traits at different DIM.

# Model for milk yield



- Multi-lactation random regression model was fitted.
- Fixed part:
  - fixed curves nested within year-period-season-age, days open, days pregnant/DIM, herd (DIM); heterosis & recombination
- Random part:
  - Herd-test day, random regressions for animal and permanent environmental effects

# Model for SCC



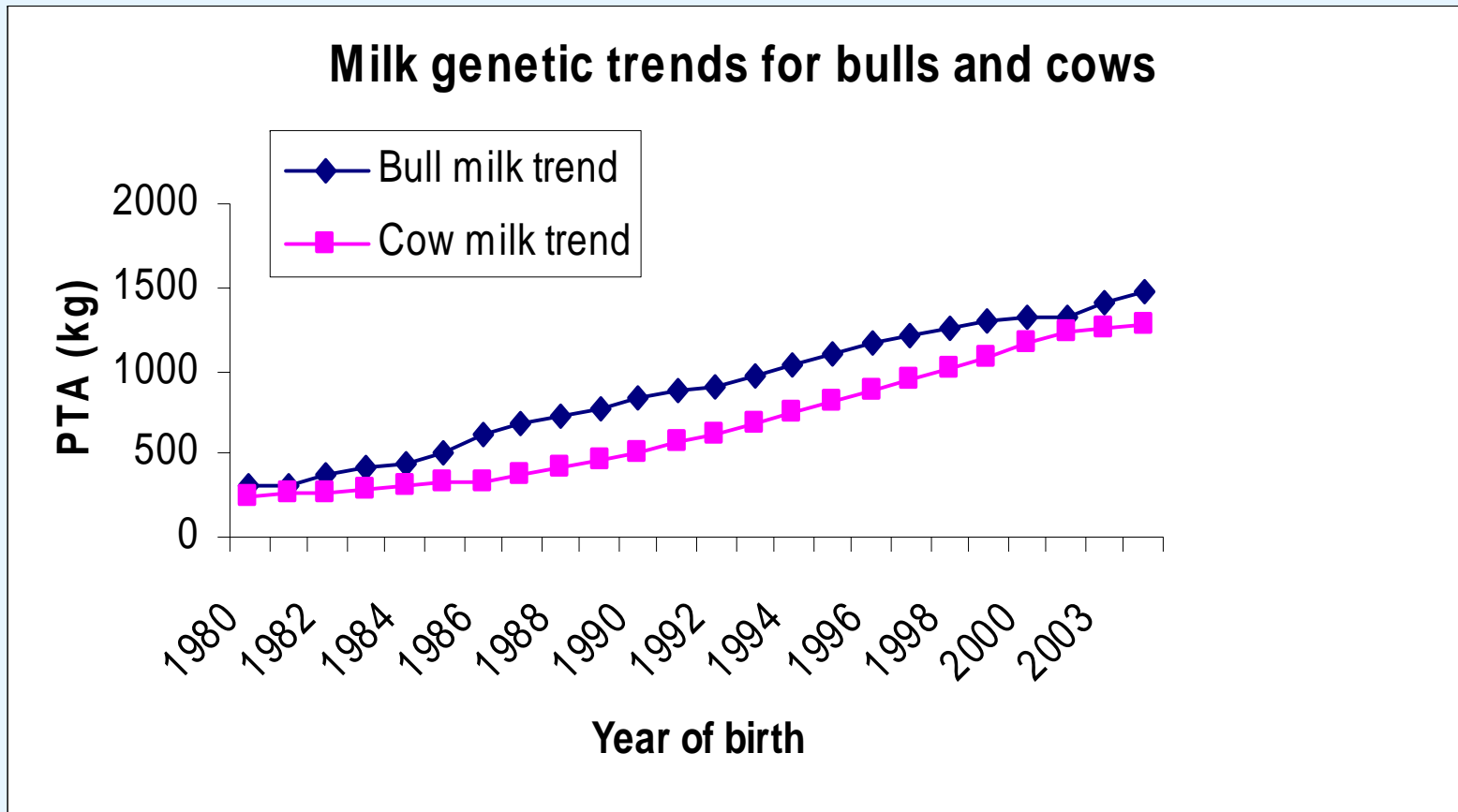
- Single trait RRM for first lactation records
- Random regression for
  - animal and permanent environment effects

# Summary of data

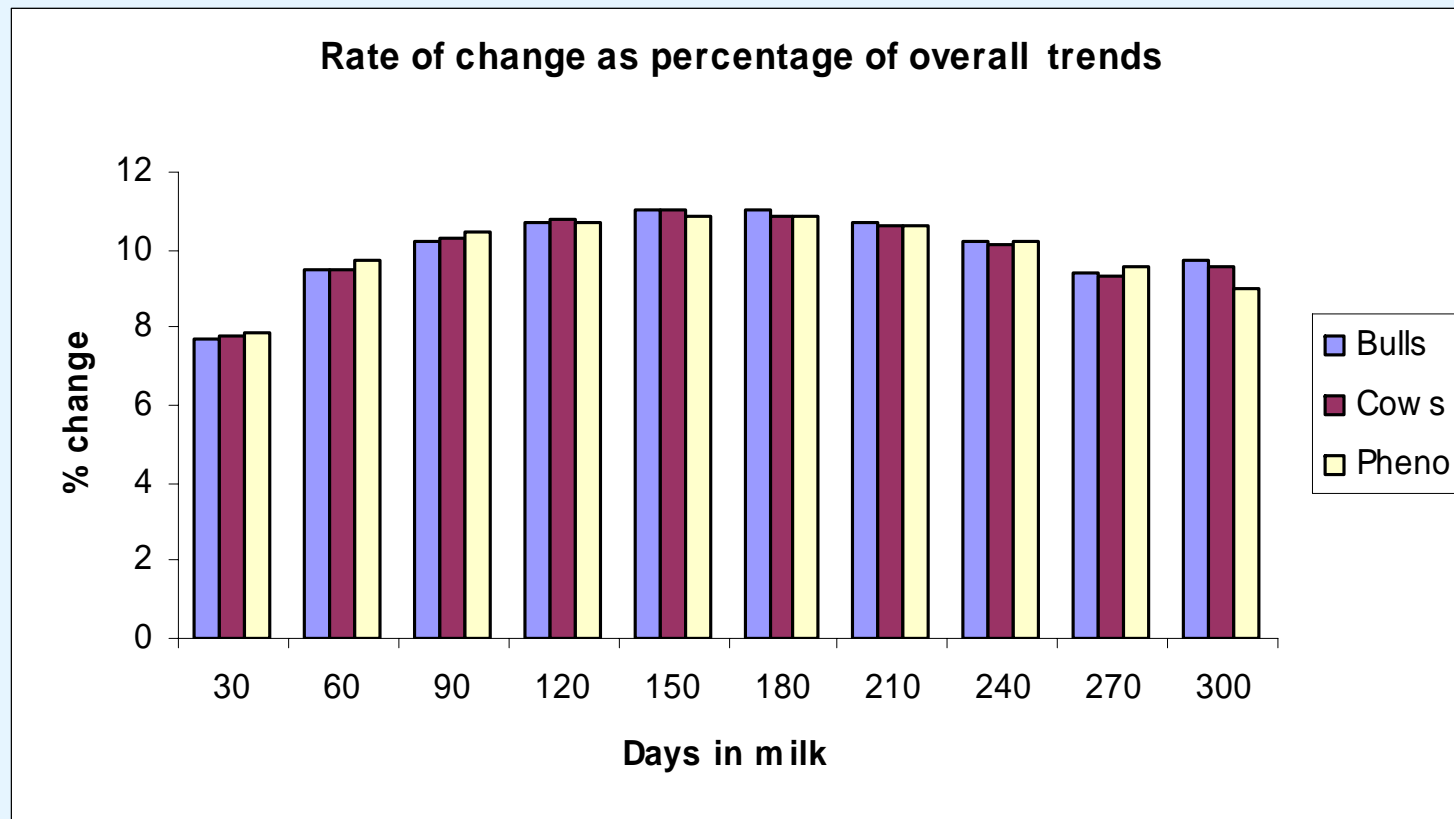


- Milk yield
  - 6,450,558 cows born from 1974 – 2006, with 58 million TD records
- Somatic cell count
  - 3,294,634 born 1986 – 2006, with 28 million TD records

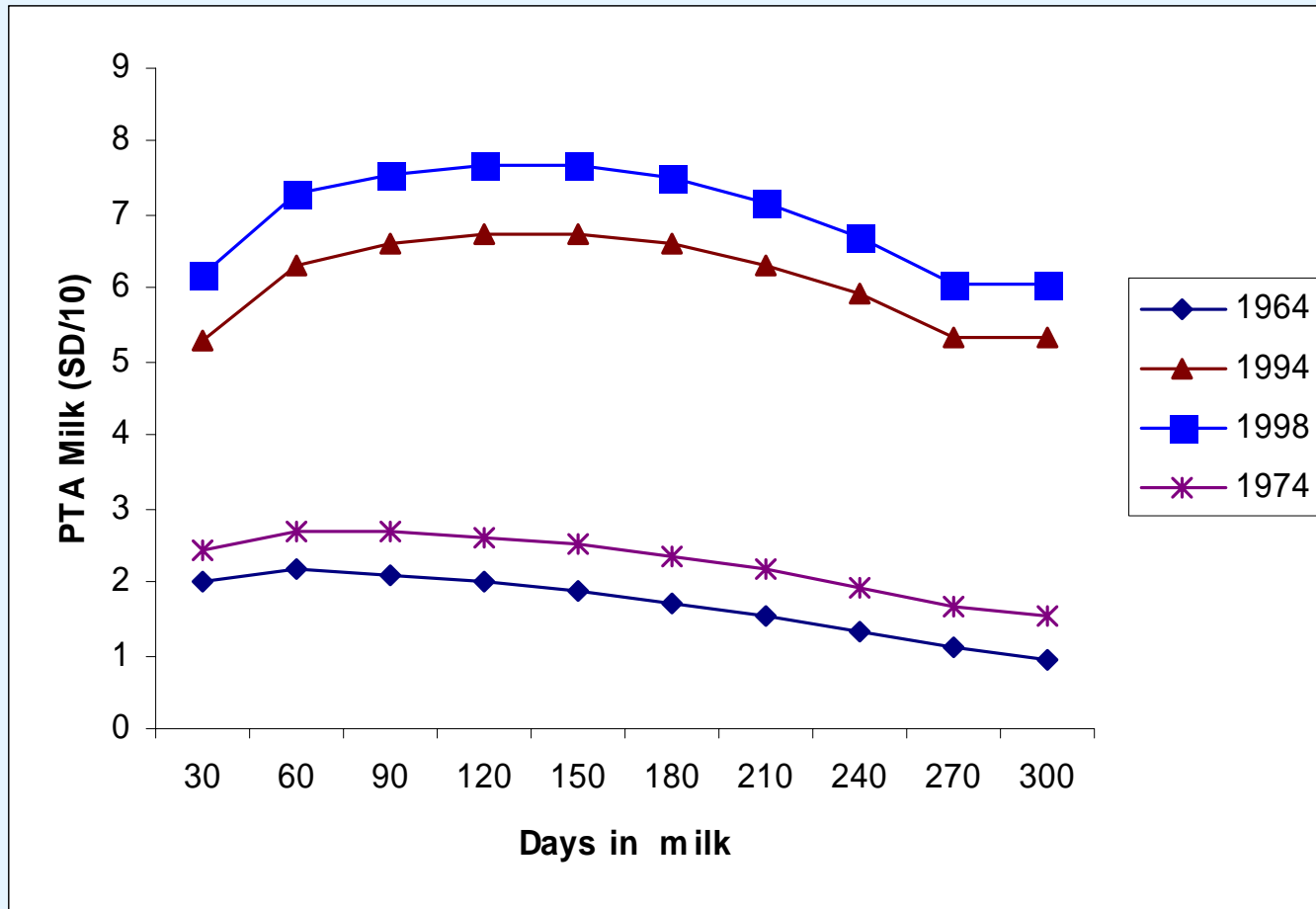
# Bull and cow genetic trends for Milk



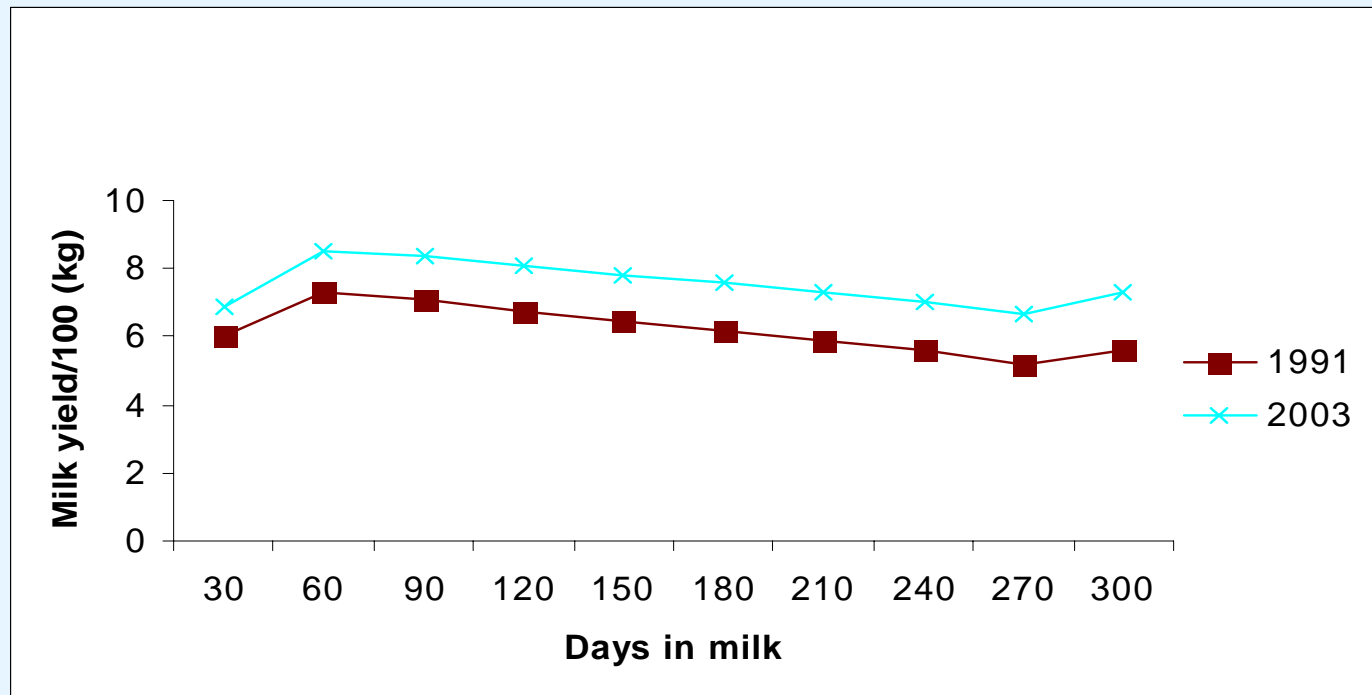
# Rate of change as a percentage of overall trends



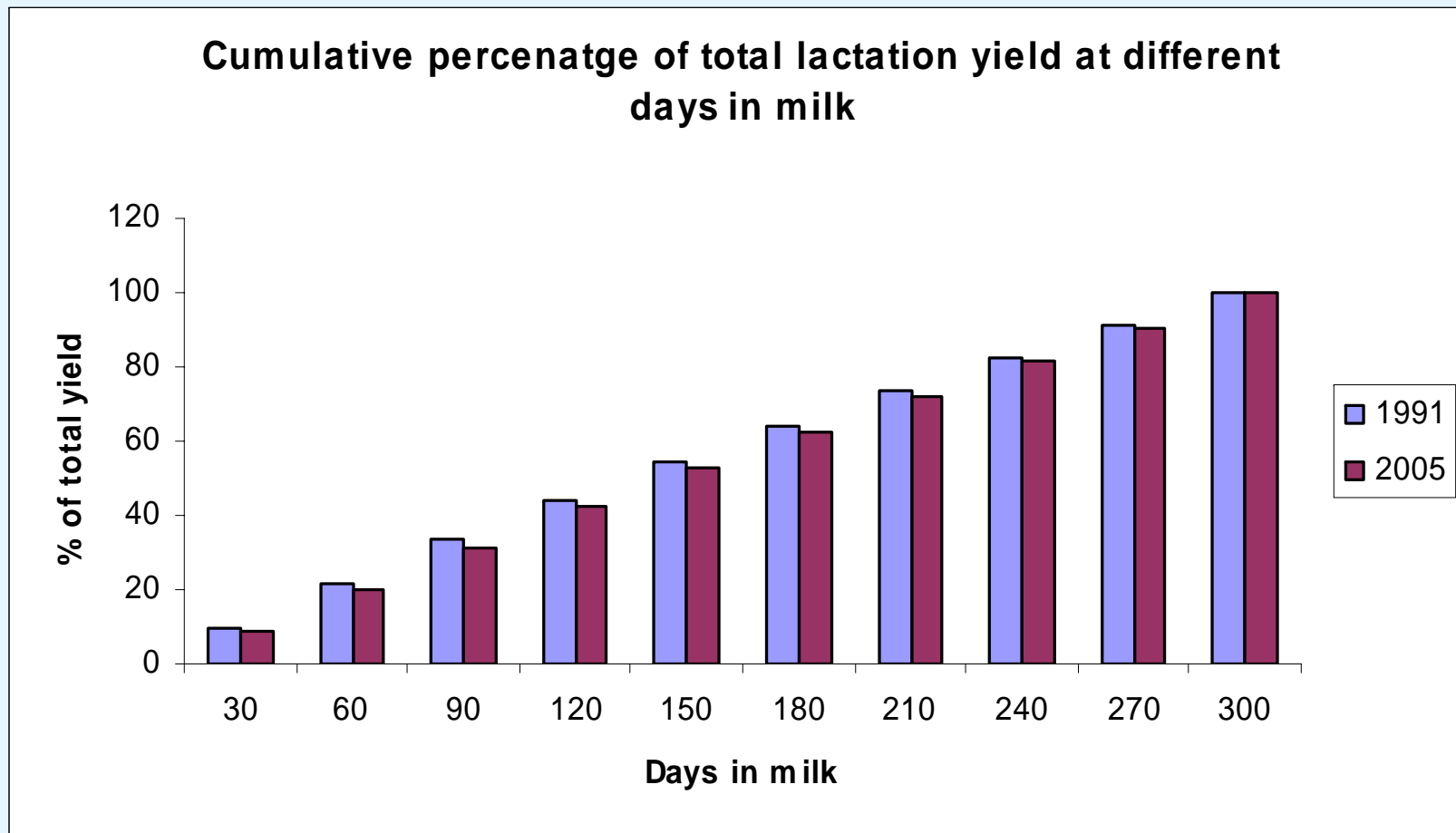
# Bull genetic trends for milk at different days in milk



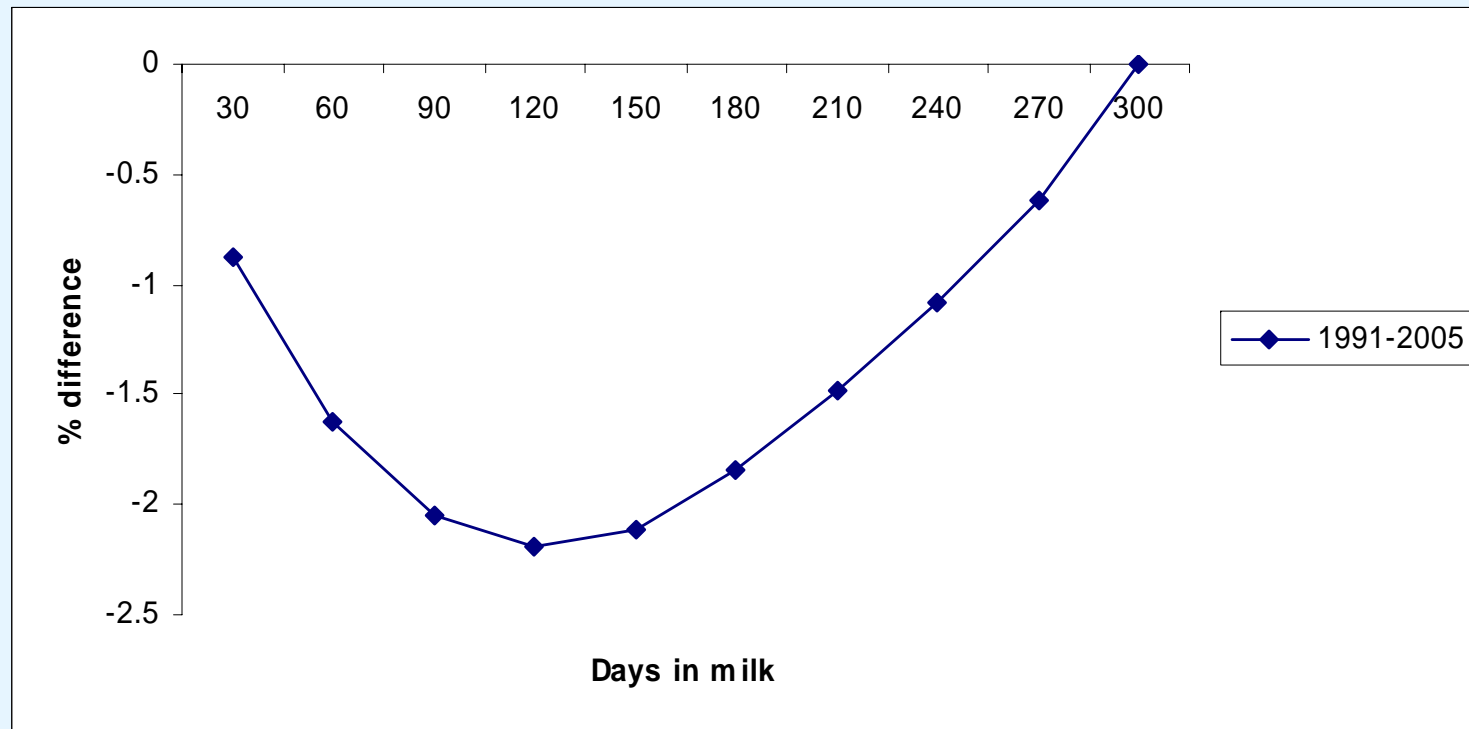
# Phenotypic trends for milk yield



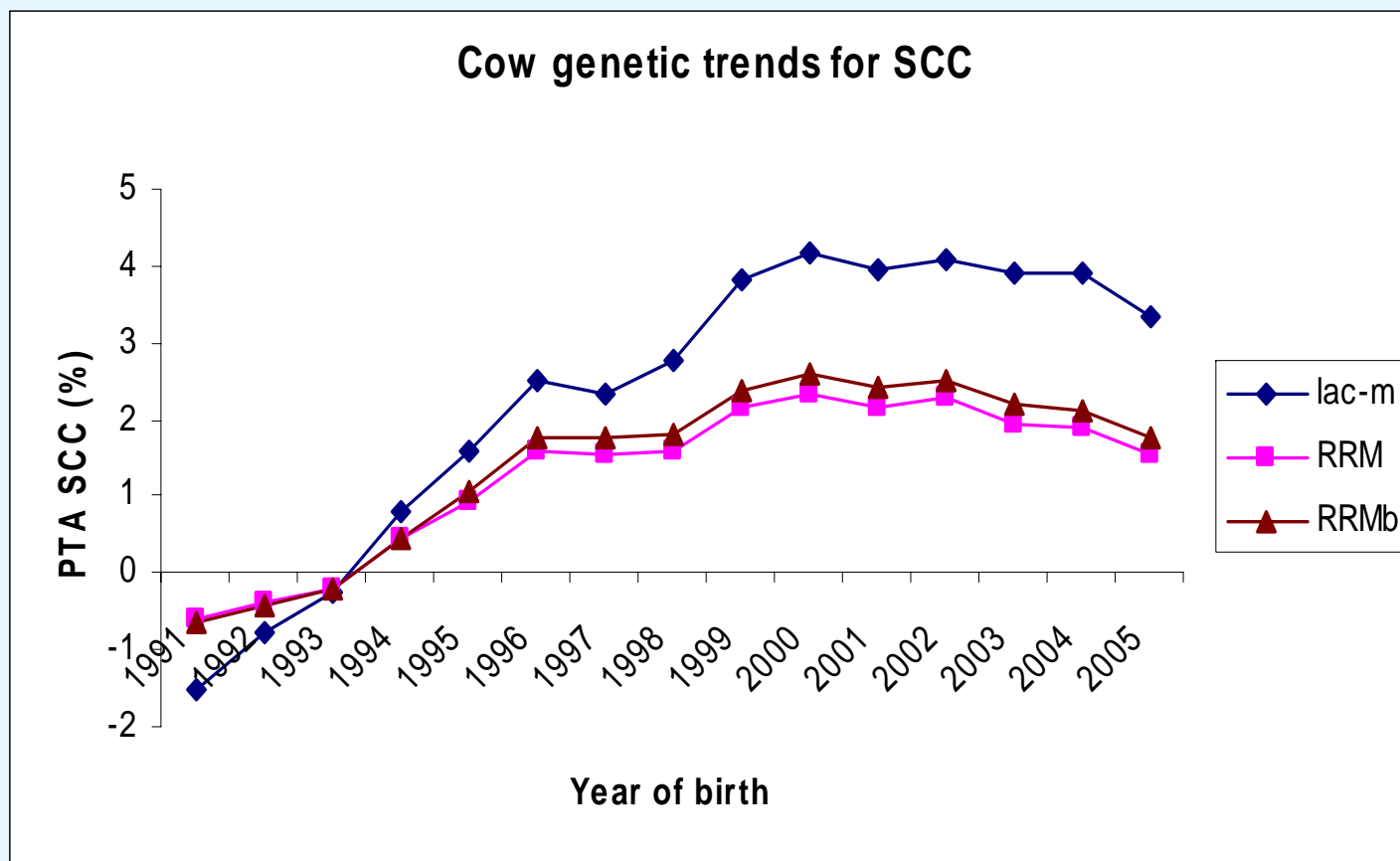
# Cumulative percentage of total yield at DIM



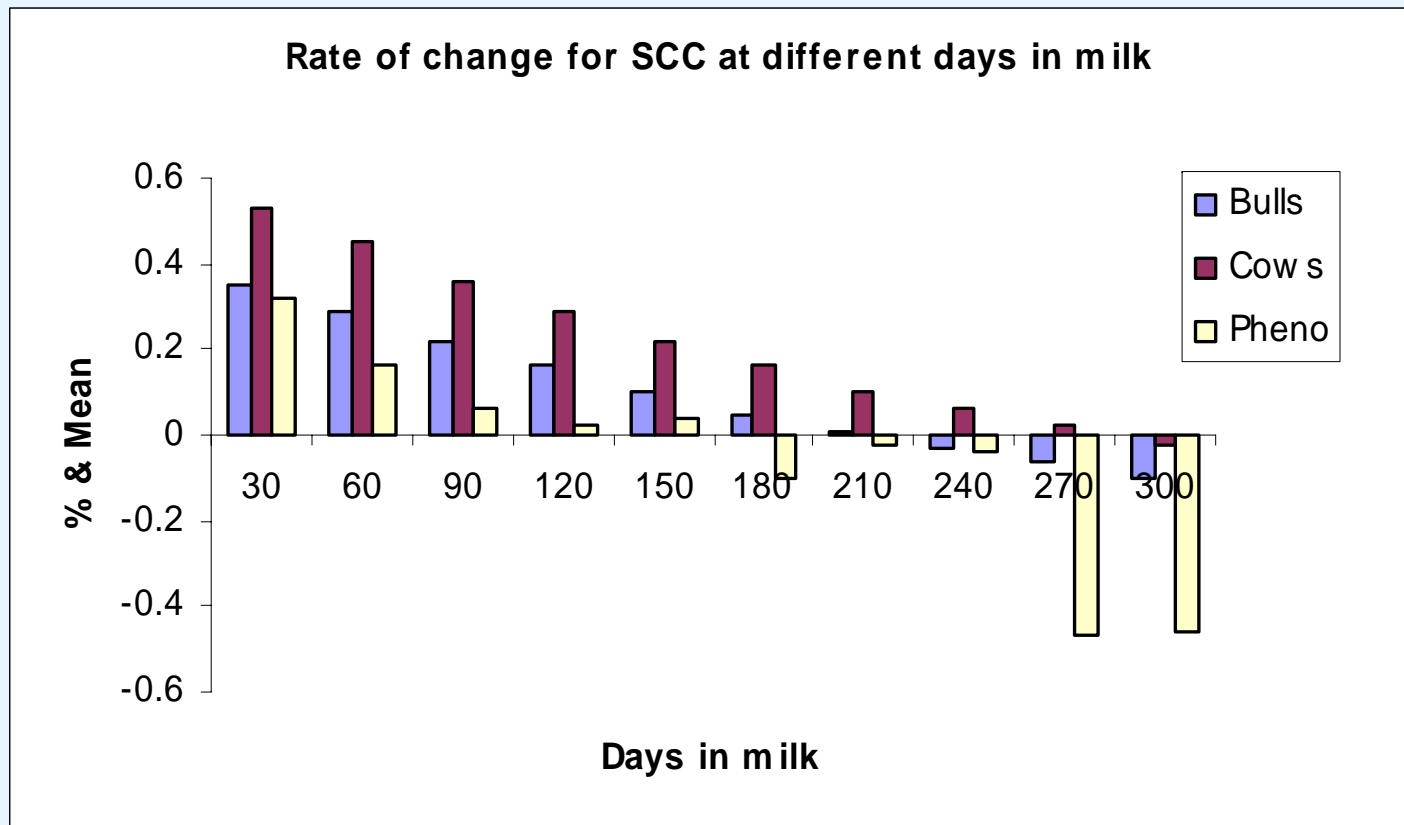
# Differences in percentage cumulative yield at different DIM



# Cow genetic trends for SCC



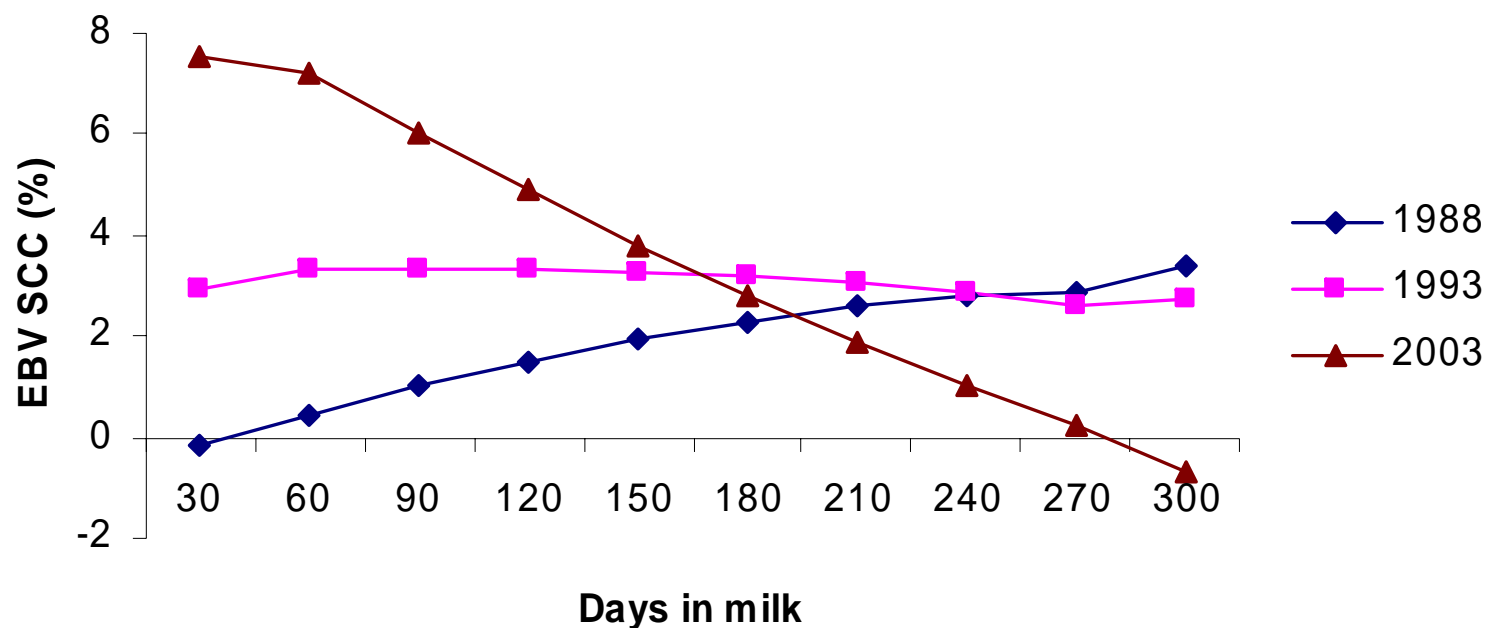
# Rate of genetic change for SCC at different DIM



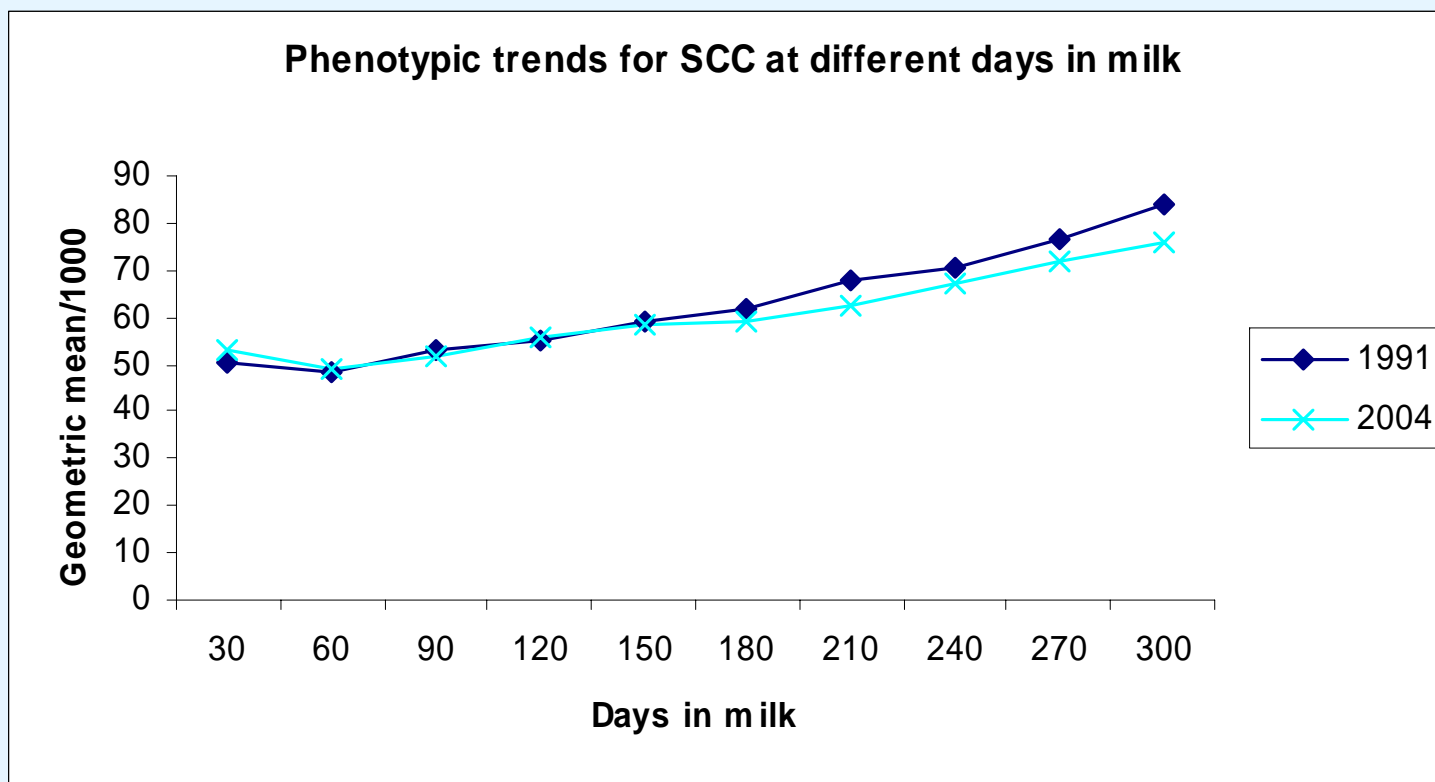
# Bull genetic trends for SCC



**Bull genetic trends for SCC at different days in milk in several years**



# Phenotypic trends for SCC



# Genetic correlations between Milk and SCC at DIM



<b>Days in milk</b>	<b>30</b>	<b>60</b>	<b>120</b>	<b>180</b>	<b>240</b>	<b>300</b>
<b>30</b>	<b>0.27</b>					
<b>60</b>	<b>0.26</b>	<b>0.27</b>				
<b>120</b>	<b>0.27</b>	<b>0.21</b>	<b>0.12</b>			
<b>180</b>	<b>0.31</b>	<b>0.18</b>	<b>0.04</b>	<b>-0.05</b>		
<b>240</b>	<b>0.37</b>	<b>0.18</b>	<b>-0.01</b>	<b>-0.12</b>	<b>-0.21</b>	
<b>300</b>	<b>0.47</b>	<b>0.23</b>	<b>-0.03</b>	<b>-0.19</b>	<b>-0.29</b>	<b>-0.37</b>

# Conclusions



- Rate of change of milk PTAs at various DIM was highest at about 121 to 150 days
- Thus genetic progress has been accompanied by slight shift in the peak of the genetic lactation curve
- While the use of a 305-d genetic correlation there has resulted in a reduction in the rate of increase in SCC, this has been accompanied by
  - increasing rate of change in early lactation
  - and decreasing rate of change in late lactation both at the phenotypic and genetic level

# Conclusions



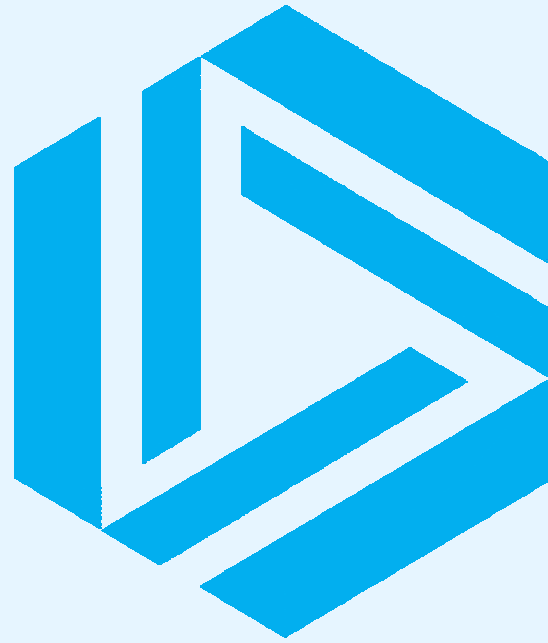
- The above is a result of different genetic correlations between milk and SCC in the early and late parts of the lactation.
- Improvements in SCC through a national selection index will be better modelled by accounting for the genetic correlations at the DIM

# Acknowledgements



Funding of this study by DairyCo gratefully acknowledged

Thank you



# SAC

**S**✓**ccess** through **Knowledge**