

Using fatty acid contents in milk to improve fertility of dairy cows?

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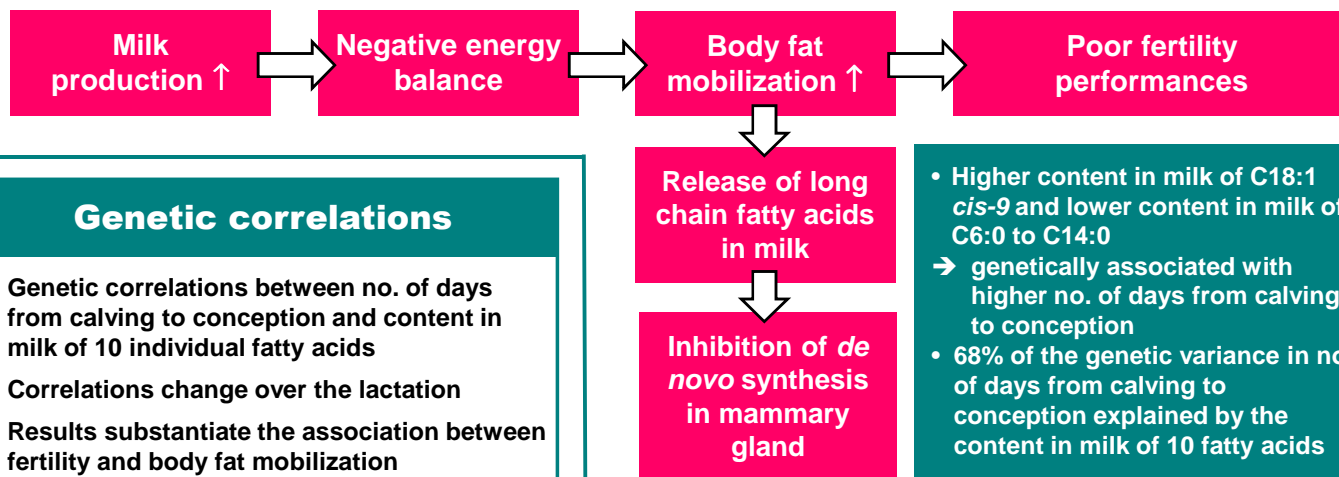
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- Dairy production systems have suffered a decline in cow fertility over the past five decades.
- Improving fertility by means of genetic selection has become increasingly important.
- Direct selection for fertility is not always possible but indirect selection using heritable correlated traits can augment the accuracy of selection and thus genetic gain.

Objectives:

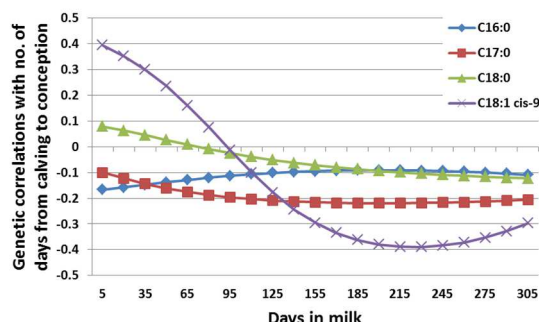
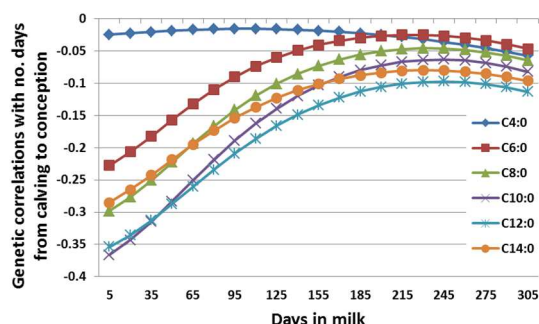
- 1) Estimate genetic correlations between fertility and content in milk of major fatty acids
- 2) What proportion of the genetic variance in fertility can be explained by milk fatty acids?

Conclusion: in early lactation ...



Genetic correlations

- Genetic correlations between no. of days from calving to conception and content in milk of 10 individual fatty acids
- Correlations change over the lactation
- Results substantiate the association between fertility and body fat mobilization



Part of the genetic variance in fertility explained by fatty acids

From the selection index theory:

$$\frac{\sigma_i^2}{\sigma_{do}^2} = 68\%$$

σ_i^2 = variance of the index which is a linear combination of the genetic merit of the 10 fatty acid contents in milk

= $g' P^{-1} g$ where:

- g = genetic covariances between no. of days from calving to conception and fatty acid contents in milk (from this study)
- P = genetic covariances among fatty acids contents in milk (from Bastin et al., 2011, J. Dairy Sci., 94:4152-4163)

σ_{do}^2 = variance of the no. of days from calving to conception (from this study)

Model and data

- Contents (g/dL of milk) of 10 individual fatty acids predicted by mid-infrared spectrometry
- 29,792 1st-parity Holstein cows with both no. of days from calving to conception and at least 2 fatty acids records
- Genetic covariances estimated using a series of 2-trait test-day animal models that included random regressions for FA traits

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