

Marker-assisted selection reduces true inbreeding in dairy cattle breeding programmes

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How does the use of genotype information in the selection criteria affect true inbreeding in a dairy cattle breeding scheme compared to traditional BLUP selection?

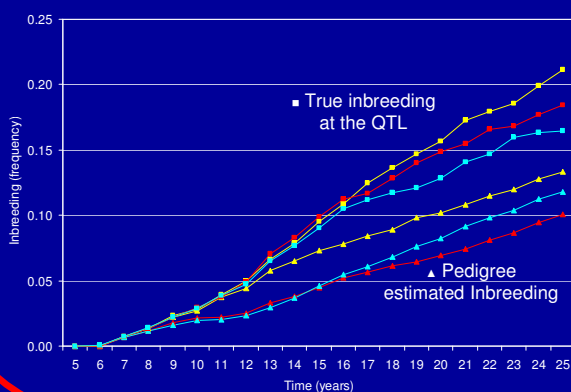
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Use of genotype information
 → *increases Mendelian selection differential*
 → *increases founder allele retention*
 → *decreases inbreeding while increasing genetic gain*

Using genotype information decreases the rate and level of true inbreeding compared to traditional BLUP selection!

Materials and methods

- Stochastic simulation using the program ADAM
- **Population:** dairy cattle breeding nucleus
- **Selection:** BLUP, MAS, and GAS
- **Trait:** $h^2 = 0.04$, only expressed in females
- **Genome:** 1 QTL ($p = 0.1$, $\sigma^2_{QTL} = 0.25\sigma^2_G$, 2.5cM)
 4 markers (0.0, 1.0, 3.5, 4.0 cM)
 - in LD



Results

- True inbreeding reduced 22% in GAS and 13% in MAS compared to traditional BLUP selection
- Pedigree estimated inbreeding red. 11% in GAS and 24% in MAS comp. to BLUP selection
- Higher retention of founder alleles at the QTL when using genotype information
- Increased Mendelian selection differential in the QTL when using genotype information
- Genetic gain increased 37% in GAS and 17% in MAS comp. to BLUP selection

