

Genotyping cows for the reference makes a small breed competitive

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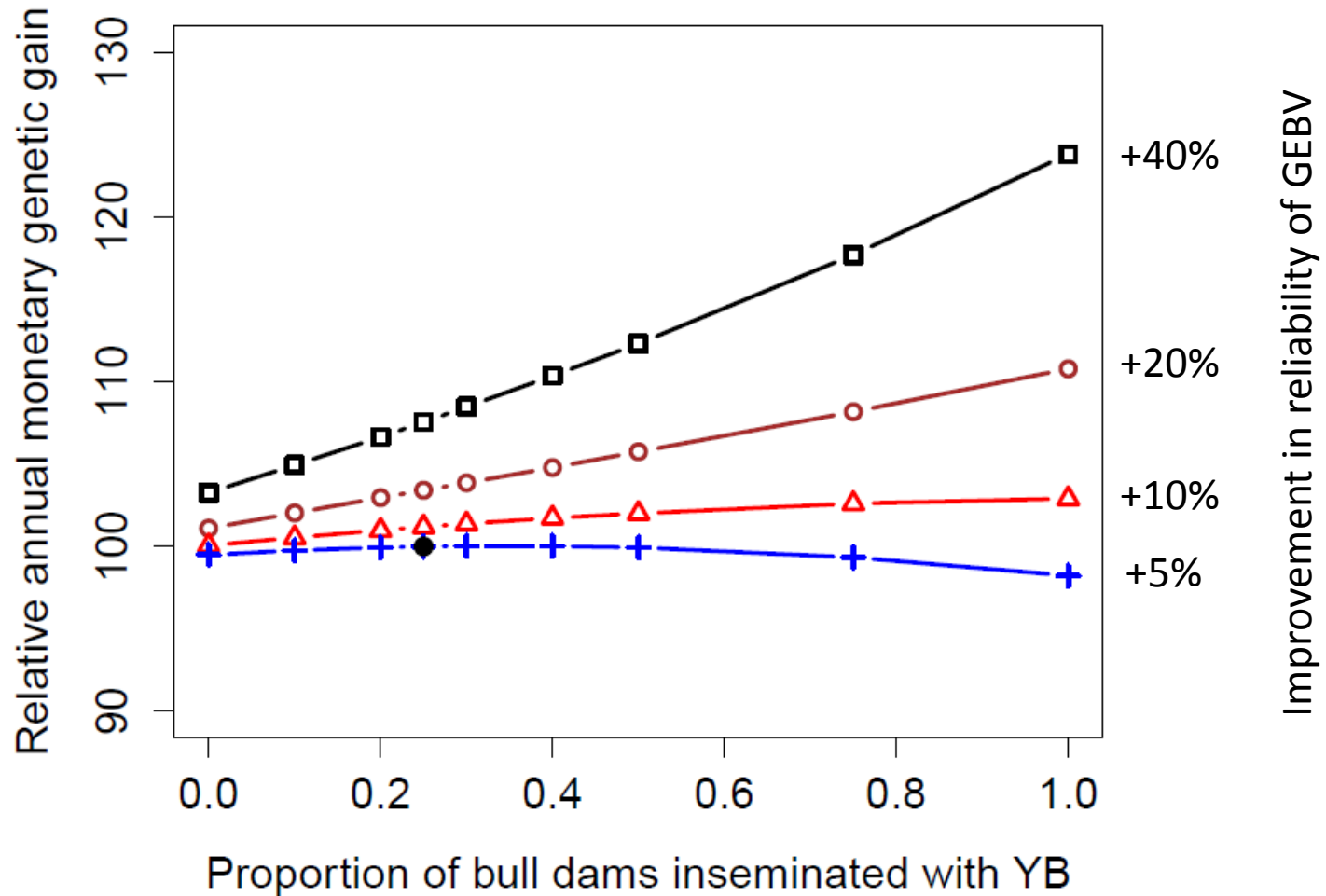
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Small active populations challenged by Genomic Selection

- Low reliabilities of genomic predictions due to small sire reference population
- Limited possibilities for cooperation compared to Holstein
- Across breed predictions – limited gain in reliability so far

Danish Jersey as model breed

Low reliabilities limit efficiency of genomic selection



Aim

- Evaluate the value of increasing the reference population
 - Adding genotyped cows
 - 2,000 annually
 - Adding progeny tested bulls
 - From 15 to 500 annually

Method and traits

- Stochastic approach
 - Finite locus model

- Breeding goal condensed into two traits
 - Production trait
 - $h^2=0.30$
 - Economic value: 83 Euro
 - Functional trait
 - $h^2=0.04$
 - Economic value: 82 Euro
 - Genetic correlation between traits -0.30

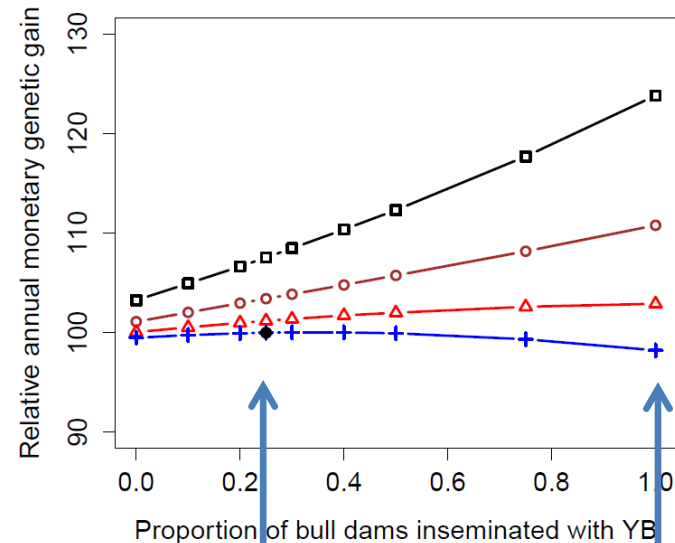
Comparisons between schemes

- **Hybrid**

- Mixed use of YB and PB as bull sires
- Actual genomic scheme in Danish Jersey

- **The Turbo** breeding scheme

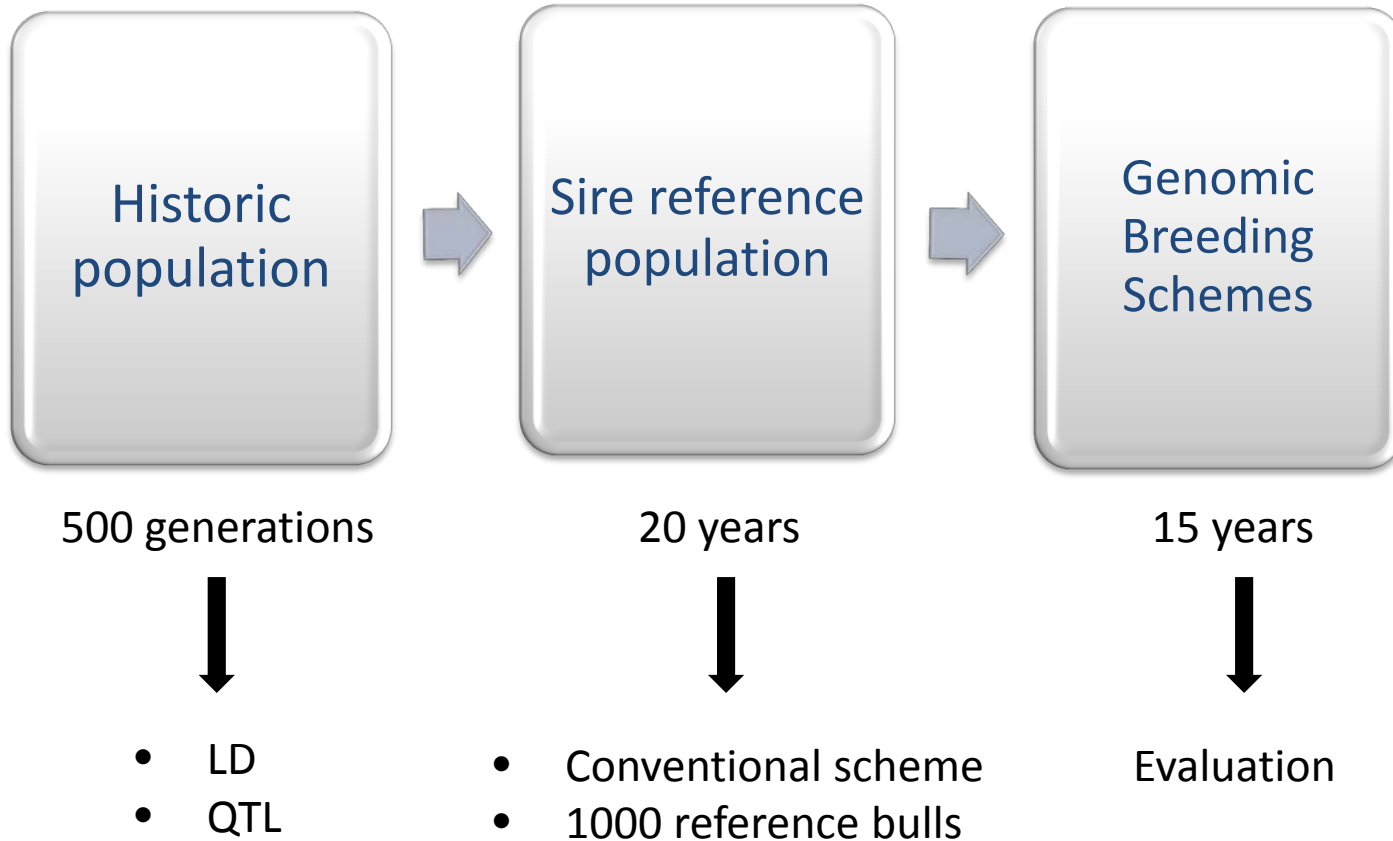
- No use of proven bulls



Hybrid

Turbo

Simulation design

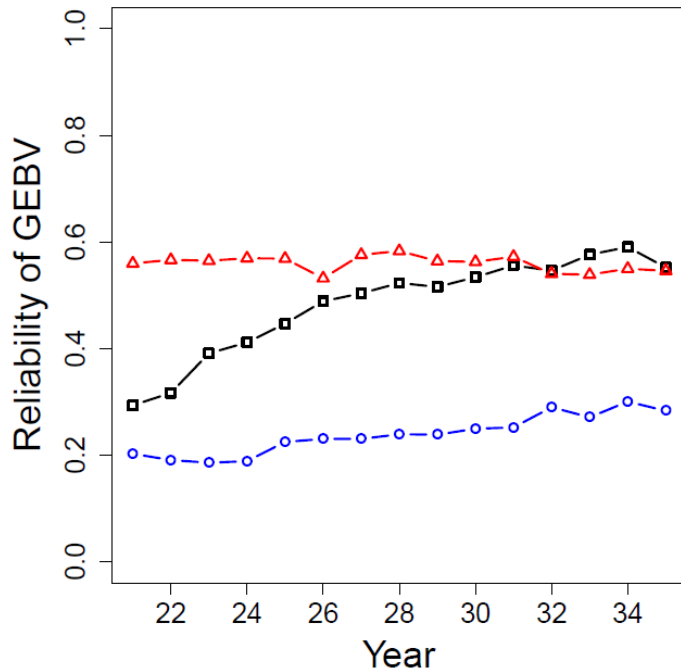


Comparisons of breeding schemes

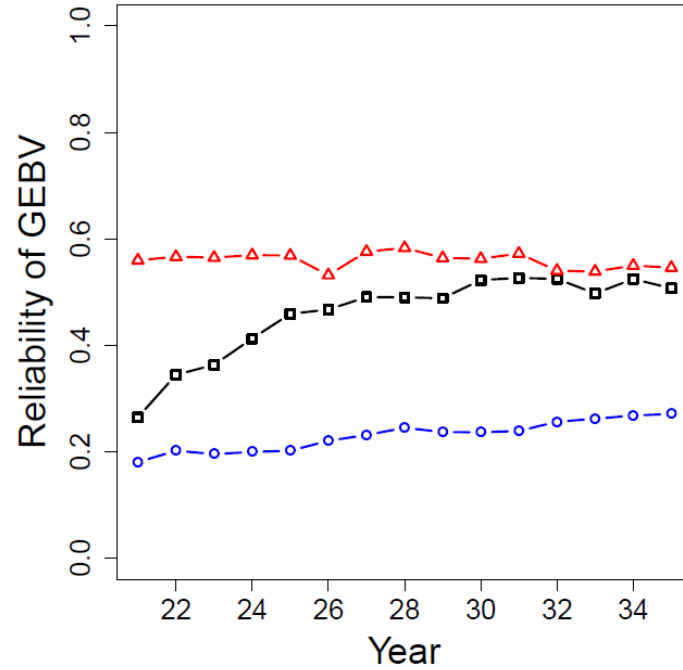
Scheme	Info	$\Delta G/\text{year}$ (€)	$\Delta F/\text{gen.}$ (%)
Hybrid	60 PB/yr	24.9 ^a	1.97 ^a
Hybrid	+ 2,000 cows/yr	27.4 ^b	1.55 ^b
Turbo	60 PB/yr	28.1 ^b	1.78 ^a
Turbo	+ 2,000 cows/yr	34.6 ^c	1.43 ^b

Reliability increases remarkably by adding genotyped cows to reference

Hybrid

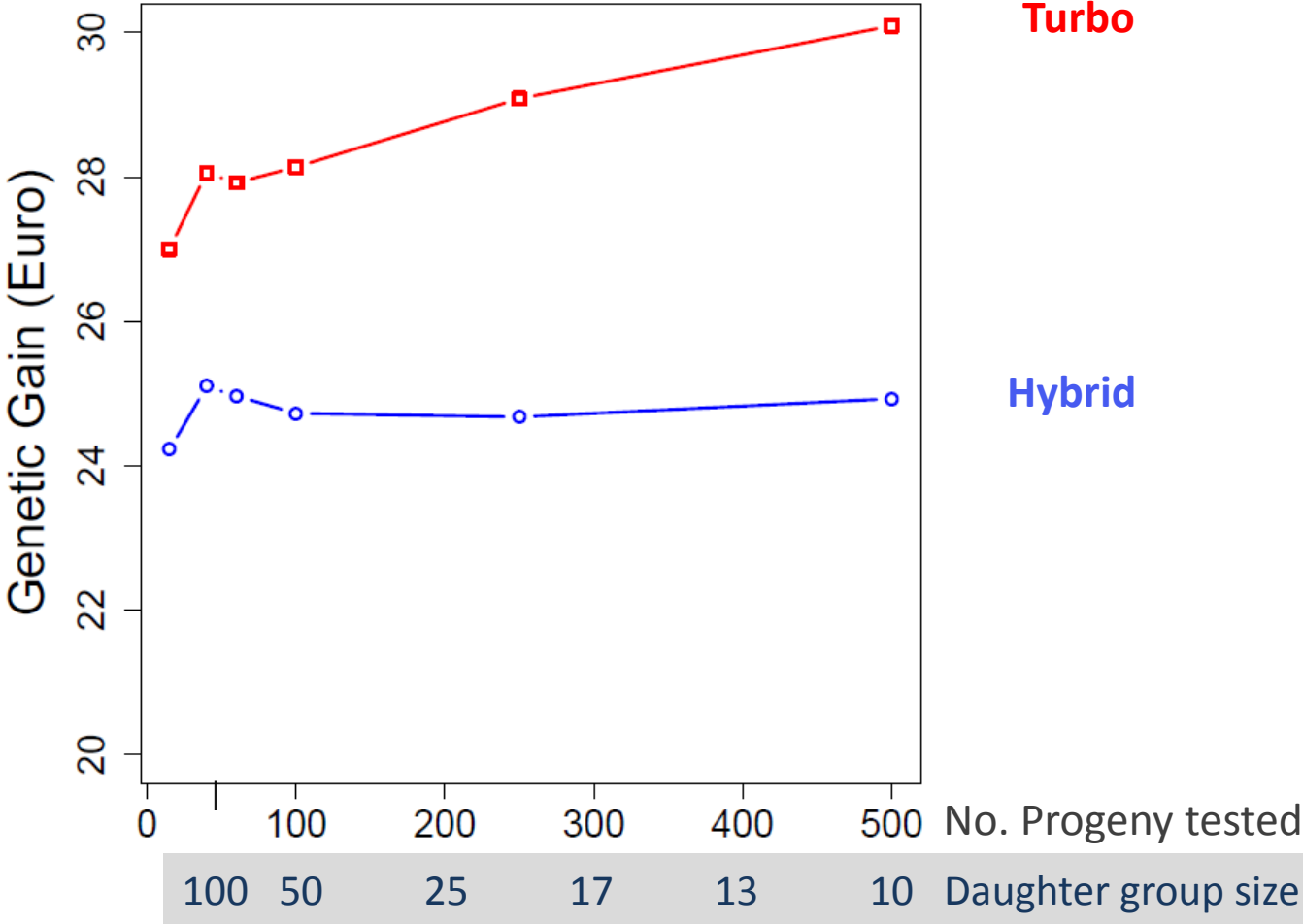


Turbo



Progeny test
+2000 cows/yr
+60 PB/yr

Progeny tested bulls and genetic gain



Economic evaluation of hybrid scheme

- Assumption
 - Cost of genotyping: € 60 per cow (10K chip)

Scenario	Gain in reliability	Relative Profit* (€)
Sire reference +60 PB/yr		100
+2000 cows/yr	0.38 (Simulation)	111.1
+2000 cows/yr	0.20	106.5
+2000 cows/yr	0.10	102.6
+2000 cows/yr	0	98.8

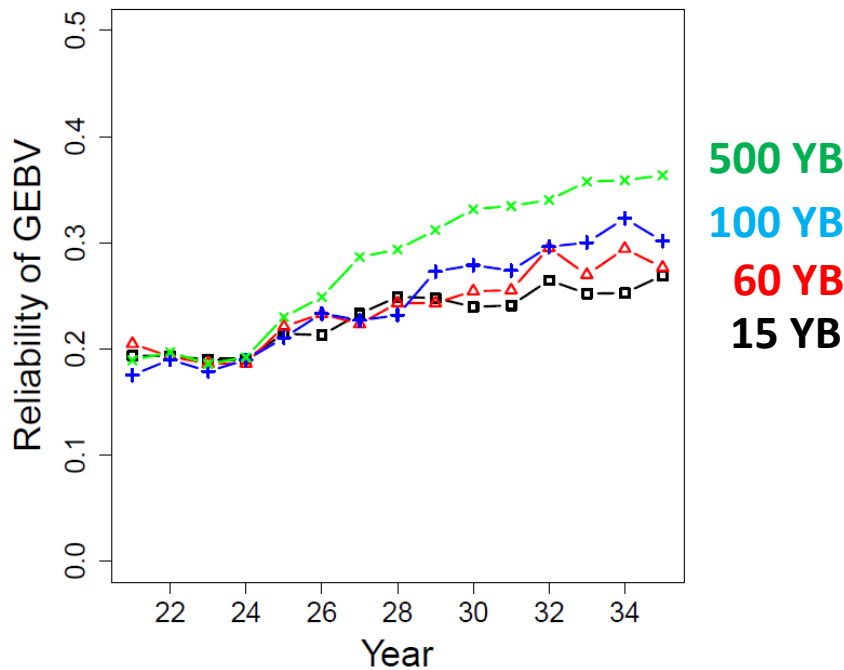
* Deterministic (ZPLAN)

Genotyping Cows

- Genotyping cows:
 - Increases monetary genetic gain (10% to 23%)
 - Reduces rate of inbreeding (~20%)
 - Increases reliabilities of GEBV
 - Is profitable
- Most benefit in turbo schemes
- Genotyping cows makes a small breed competitive
- Next Step
 - Genotyping of 10,000 Danish Jersey females this year

Reliability of GEBV- varied number of progeny tested bulls

Hybrid



Turbo

