AARHUS UNIVERSITY

CENTER FOR QUANTITATIVE GENETICS AND GENOMICS QGG

Break-even genetic correlation related to GxE[1] using genomic selection

Lu Cao

QGG, MBG, AU, DK

1. GxE: Genotype by environment interaction

General framework

- 2 environments（equal size）

  20 discrete generations

  Single-trait breeding goal

  GxE ($r_{g_{(env1,env2)}}$)

- Breeding goal

  Env 1: $H = 1 \times G_{T_1} + 0 \times G_{T_2}$

  Env 2: $H = 0 \times G_{T_1} + 1 \times G_{T_2}$

  T_1: performance in env 1

  T_2: performance in env 2

- Main tool: ADAM (20 replicates),

  R

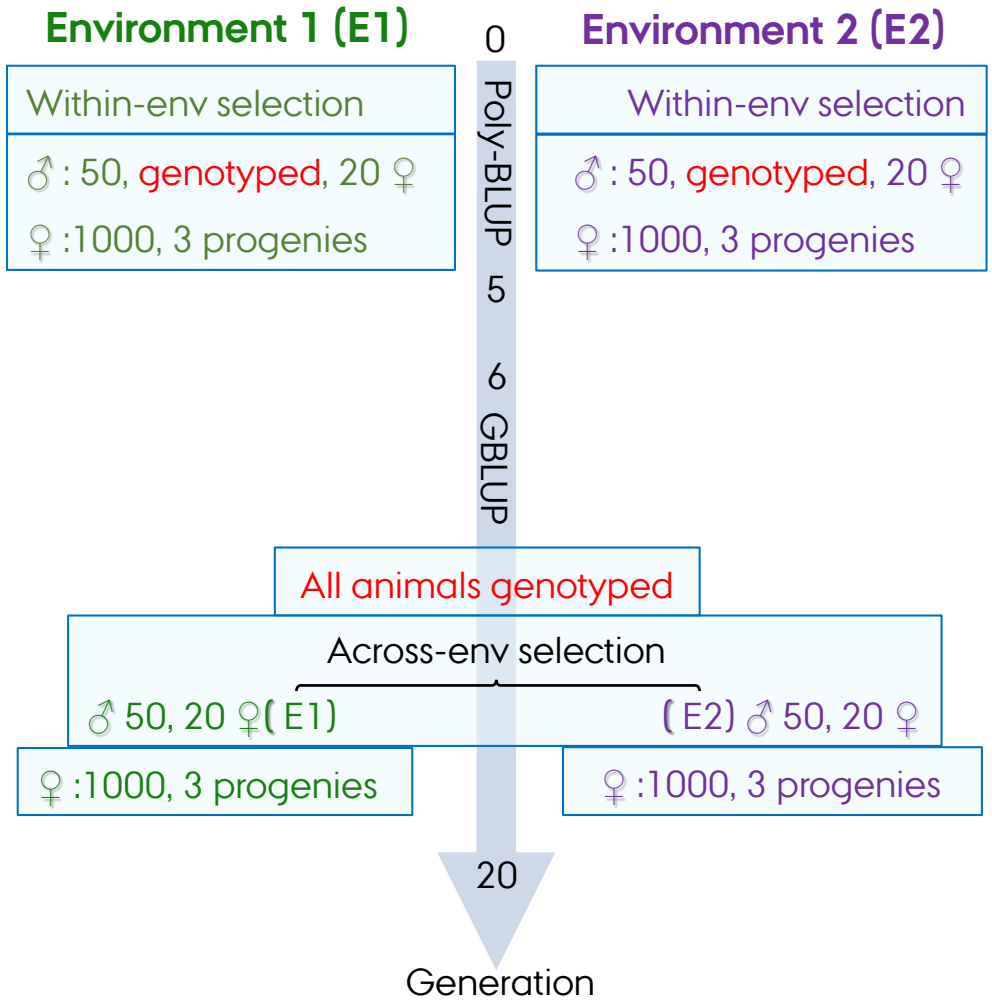
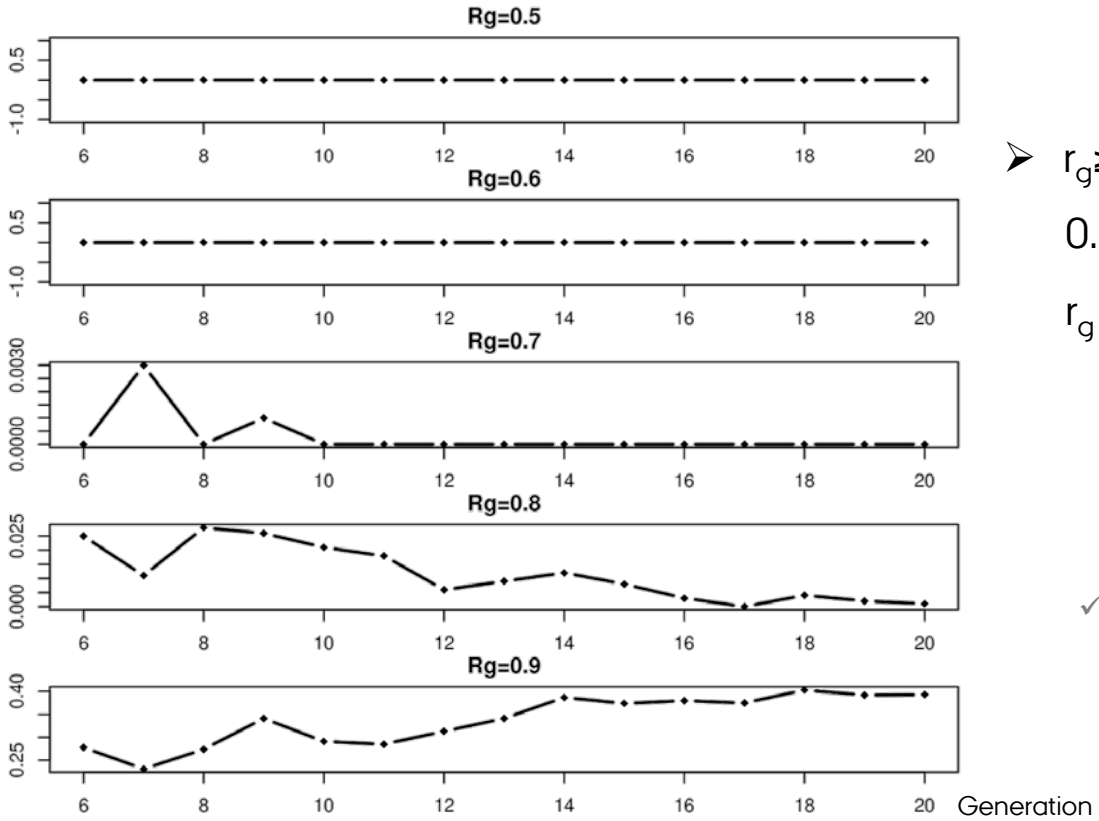


Fig . Framework of the simulation experiment

Results

❖ Proportion of foreign breeding sires used in environment 1 (h^2=0.25)



➢ $r_g \geq 0.7$, cooperation possible ;

$0.7 \leq r_g \leq 0.8$, cooperation lasted shortly;

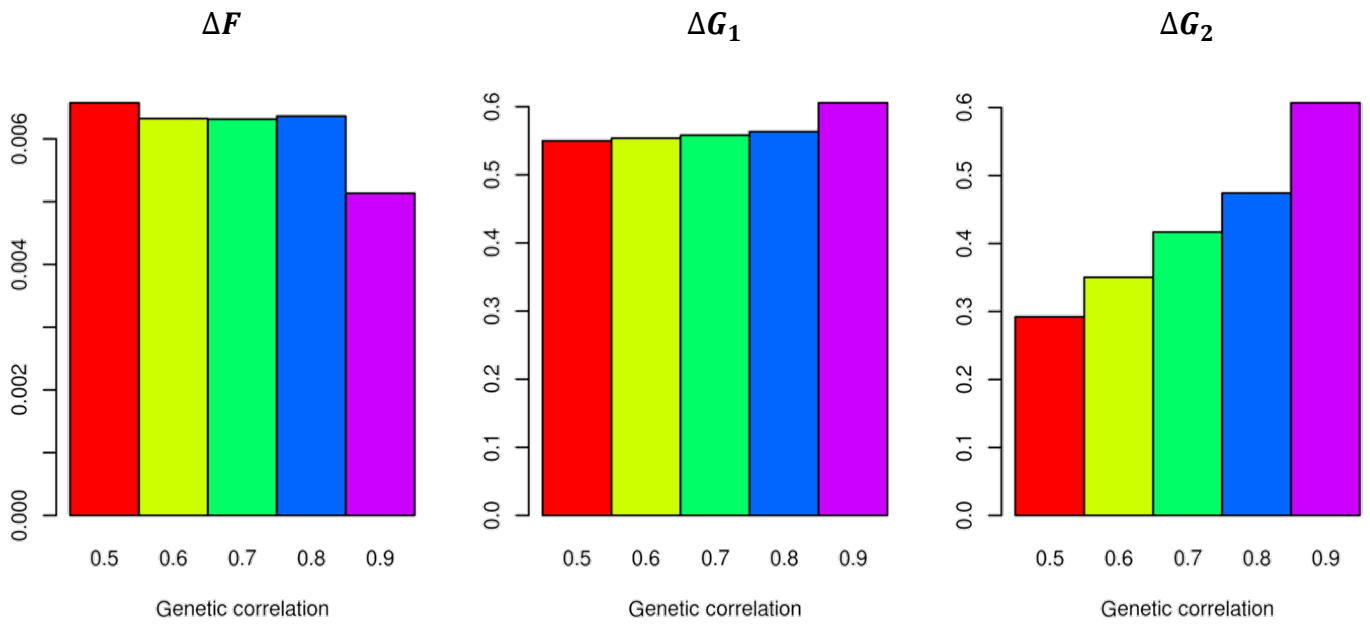
$r_g = 0.9$, cooperation not affected by GxE

✓ Trick: different scales on vertical axes is only for clear visualization

Rg: genetic correlation

Results

- Annual rate of inbreeding and genetic gain for different r_g scenarios (h^2=0.25)



ΔF: average annual rate of inbreeding depression

$\Delta G_1/\Delta G_2$: average annual genetic gain of trait performance in environment 1/2

- Genetic gains of performances increased as r_g increased, and rate of inbreeding also behaved better as r_g increased

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