SFA3
Assessment and optimisation tools
- for designing breeding programs

Christian Sørensen

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Decision making in animal breeding

- **Strategic decisions**

  Do we use genomic selection?

- **Tactical decisions**

  How many animals to genotype?

- **Operational decisions**

  Which animals to genotype?

Strategic decisions

Do we use genomic selection

     in wheat breeding? (Biructawit)

     in barley?

     in mink?

     in horse?

     in potato, tetraploid ryegrass, and rainbow trout?

Tactical decisions

How many animals to genotype in pig breeding? (Mark and Tage)

Should two breeding programs cooperate? (Lu)

Should we use pedigree or genomic versions of Optimum Contribution Selection? (Mark)

Operational decisions

Which animals to genotype?

Which animals to select?

Tools to help us make decisions

ADAM & ADAM-plant   **General simulation tool**
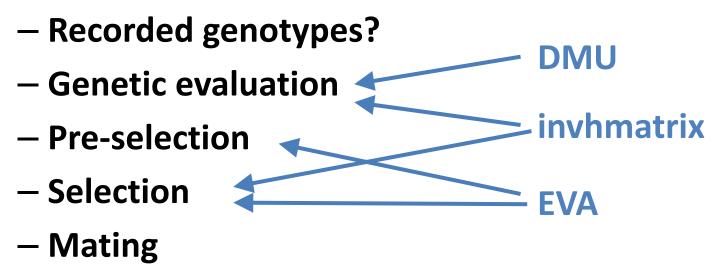
xbreed   **R-package for simulation of crossbreds**

EVA   **for Optimum Contribution Selection (Peer Berg)**

DMU   **for predicting breeding values (Per Madsen)**

invhmatrix   **for calculating Gmatrices (Guosheng Su)**

ADAM & ADAM-plant

- **Modelling the sequence of decisions made**
  - **Recorded phenotypes**
  - **Recorded genotypes?**
  - **Genetic evaluation**
  - **Pre-selection**
  - **Selection**
  - **Mating**

DMU

invhmatrix

EVA

ADAM & ADAM-plant

- **Differences**
  - **Ploidy**
  - **Selfing**
  - **Whole-family selection**
  - **Double haploids**

Evaluation of alternatives

Genetic gain

Rate of inbreeding

Accuracy

Generation interval

…

Simulation can't find the optimum for you

- but it can find the best of your proposals

**Good proposals depend on
understanding the mechanisms
behind genetic gain and rate of inbreeding**

Mechanisms

Uncovered by hypothesis testing

Generic across species

Help us propose the 'right' alternatives

Session 3:

Introduction to the session by the chair (Christian)

Pedigree relationships to control inbreeding in optimum-contribution selection realize more genetic gain than genomic relationships (Mark)

Impacts of GxE on breeding program decision-making using genomic selection (Lu)

Application of genomic selection in wheat breeding (Biructawit)

Changes in the pig breeding program in Denmark after GenSAP (Mark and Tage)