Program

Session 3:

9:10   Assessment and optimization tools in genomic breeding programs
Senior Researcher Christian Sørensen, QGG, , AU

9:30   Genomic selection and the design of breeding schemes
Professor Theo Meuwissen, University of Life Sciences, Norway

10:10   *Coffee break*

10:40   On the doorsteps of a new era in plant breeding
Senior Scientist Christian Sig Jensen, DLF Trifolium, Denmark

11:05   Making a world-class pig-breeding program even better with genomic selection
Chief Geneticist Mark Henryon, Danish Pig Research Center

11:30   Medium to long-term effects of selection in finite locus models with non-additive effects
EGS-ABG PhD Student Hadi Esfandyari, Wageningen University/QGG, AU

11:45   General assembly meeting

12:30   Lunch

13:30   PhD defense: Genomic predictions using combined populations and SNP marker panels
PhD Candidate Rasmus Froberg Brøndum, QGG, AU

Scientific Focus Area 3: Assessment and optimisation tools
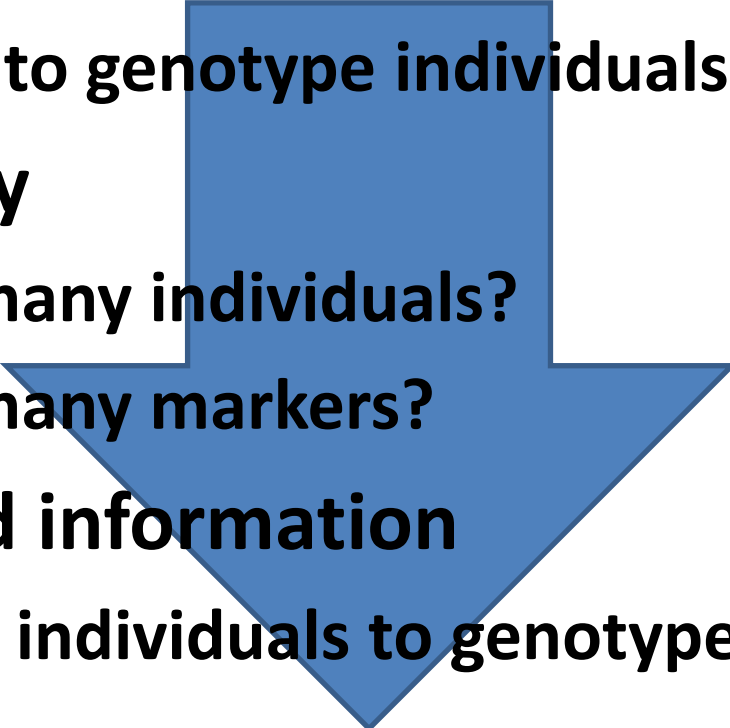
Christian Sørensen

14.06.2013

Genetic improvement programs

Challenges from genomic information

↓

- **Breeding objective**

- **Trait recording**

- **Genetic evaluation** ← **Genomic prediction**

- **Selection and mating** ← **Optimisation**

Optimise use of genomic information

- **Timing**
  - **When to genotype individuals?**

- **Quantity**
  - **How many individuals?**
  - **How many markers?**

- **Selected information**
  - **Which individuals to genotype?**

Can it be implemented in the ongoing program, or does it require re-structuring?

Assessment

- **Modelling genetic improvement programs**
  - **Realistic genetic architecture**
  - **Realistic sequence of decisions**
  - **Realistic breeding structure**
- **Evaluate consequences of alternative strategies**
  - **Genetic improvement**
  - **Genetic variability**
  - **Inbreeding**

**Optimisation comes from picking
the best alternative**

Specific challenges adressed in GenSAP SFA3

Extended tool box

- **Existing software works well for sexually reproducing, diploid species**
- **Needs to be extended to**
  - **Asexual reproduction**
  - **Polyploidity**
  - **Non-additive genetics**
  - **Multiple populations**
  - **Genotype-by-Environment interactions**

Non-additive genetic variation

- **How can this be exploited in animal and plant breeding**
  - Effect of more accurate additive predictions
  - Exploiting non-additive effects in breeding
- **Long-term effects of selection**

Selection across multiple environments

- **Value of genomic and phenotypic information across environments**
  - **For selection directly**
  - **For merging reference populations**
- **In the presence of Genotype-by-Environment interactions**

Use of genomic information for handling inbreeding

- **Define and assess properties of a genomic inbreeding estimator**

- **Include genomic information in dynamic selection tools designed for controlling inbreeding**

Proof-of-Concept

- **Providing first evidence that including genomic information will speed up genetic improvement**
  - **Mink**
  - **Potatoe**
  - **Wheat**
  - **Barley**
  - **Ryegrass**

Genomic selection and the design of breeding schemes

Prof. Theo Meuwissen, University of Life Sciences, Norway

On the doorsteps of a new era in plant breeding

Senior Scientist Christian Sig Jensen, DLF Trifolium

Making a world-class pig-breeding program even better with genomic selection

Chief Geneticist Mark Henryon, Danish Pig Research Center

Medium to long-term effects of selection in finite locus models with non-additive effects

EGS-ABG PhD Student Hadi Esfandyari, Wageningen University/QGG, AU