Genomic selection for healthy dairy cattle

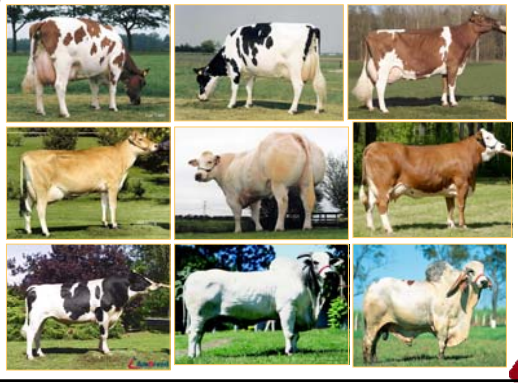
Sander de Roos

What is CRV?

- Cattle breeding and herd improvement
- Owned by 2 co-ops:
  - CR Delta — The Netherlands — 25,000 farmers
  - VRV — Belgium — 8,000 farmers
- Annual turnover € 135 million
  - DHI Services — 40%
  - Information products — 15%
  - Genetic products — 45%
- ~1300 employees

What is CRV?

What is CRV?



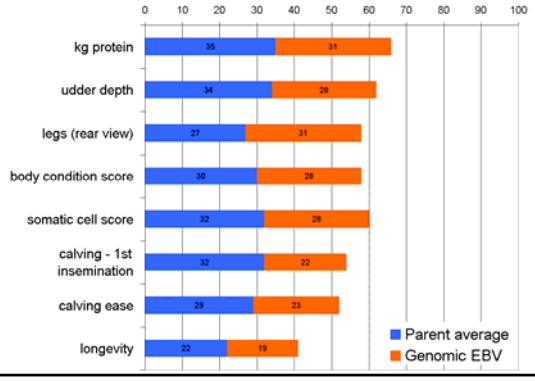
Genomic selection

- 2005: G-Lection project
  - Wageningen, Lelystad, Liege, Theo Meuwissen
  - CRV, Hendrix Genetics, Institute for Pig Genetics
  - SNP genotyping
  - genomic prediction software
- 2006: First use of GS
  - 3000 SNPs
  - 1500 reference bulls
  - 1000 selection candidates (1 year)

Genomic selection

- 2007: 60K SNPs
  - Illumina custom 60K SNP chip
  - 4400 reference bulls (now)
  - 4400 selection candidates (2 years)
- 2008: Introduction of ***InSire***
- 2008: CRV Ambreed, New Zealand
- 2009: EuroGenomics
  - with France, Germany, and Denmark/Sweden
  - 16000 reference bulls

Reliability (cross-validation)



InSire breeding program

- Source

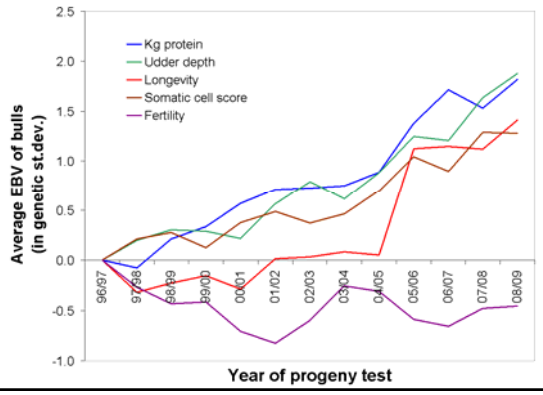
	Nucleus	Breeders
# heifers genotyped	500	500
# heifers selected as dam	100	100
# bulls genotyped	500	500
# ***InSire*** bulls	200	

- ET/IVP: 20 embryos per dam
- Use top ***InSire*** bulls as sires
- Consider 'new' families

Breeding for health traits

- Breeding goal is a choice
  - what product do your (future) clients want?
  - which direction?
- CRV total merit index
  - 40% Production
  - 30% Type
  - 30% Longevity & Health
- GS does not change the direction

Genetic trends



Market segments

Milk	3.0	1.2	1.9	1.5
%Protein	-0.8	1.1	-0.4	-0.1
Type	2.5	2.3	3.8	2.3
Longevity	1.8	1.7	1.8	2.0
Somatic cell count	0.8	0.8	1.0	1.3
Fertility	-1.0	-0.8	-0.8	0.0
Total merit index	2.9	3.2	3.0	2.9

Prospects (2009-2010)

- Higher reliabilities
  - 16000 reference bulls from EuroGenomics
- Genotype test for cows (€ 20-50)
  - infer high density genotypes
  - expand reference population with cows
  - new service, information product
- Genomic info in national genetic evaluation
  - April 2010

Prospects (>2010)

- Re-design breeding program
  - no more progeny testing schemes?
  - embryo / reproduction techniques
  - use cow population & intensive nucleus schemes
- Multiple breed GS
  - need ~500K SNP chip to capture cattle-wide LD
  - cross-breeding, beef
- Novel traits
  - milk composition, feed efficiency, disease resistance

Thank you for your attention!