Status of Genomic Selection in The Netherlands

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CRV Company

- Breeding programs in New Zealand, Brazil, CZ, NLD
- More than 6 million doses sold world wide
- Invested several millions € in development of Genomic selection
CRV’s history in GS

- 2005 - 2007: G-Lection project
  - Uo Wageningen, ASG Lelystad, Uo Liege, pig/poultry breeders
- October 2006: First use of GS in breeding program
  - 3000 SNPs
  - ~1500 reference bulls, ~1000 calves
- Spring 2007: Development of custom 60K SNP chip
- October 2007: First use of GS with 60K SNP
  - NLD: ~1500 reference bulls, ~2500 selection candidates
  - NZL: ~1000 reference bulls, ~300 selection candidates

CRV 60K SNP chip

- Developed with University of Liege
- Illumina Infinium technology
- SNPs from public databases
- Number of SNPs
  - #SNPs ordered: 57,660
  - #SNPs on chip: 52,384 (91%)
  - #SNPs used in GS: 47,557 (91%)
Model

\[ y_i = \mu + u_i + \sum_{j=1}^{50000} z_{ij} q_j + e_i \]

- \( y_i \) : progeny EBV (n=1500)
- \( u_i \) : random polygenic effect
- \( z_{ij} \) : \([ 2 0 ], [ 1 1 ], [ 0 2 ]\)
- \( q_j \) : random SNP effect
- \( e_i \) : residual

SNP effects ~ mixed distribution
- Meuwissen & Goddard (2004)
- Gibbs sampling with residual updating

Reliability of genomic EBVs

- Additional reliability
  - protein production +17%
  - overall conformation +14%
  - somatic cell count +11%

- More reference bulls will increase reliability
  - Autumn 2008
InSire bulls

- CRV launches ‘InSire’ bulls per June 1, 2008
- InSire is CRV’s brand name for GS selected bulls
- From September 1, only InSire bulls will be progeny tested for breeds Holstein and Jersey

New Breeding program

- Screen more than 1500 young InSire bulls
- Select 1:5, instead of 1:2 previously
- Screen bulls dams also on genomic information
  - towards GEBV within 1 month after birth
    - weekly genotyping & genetic evaluation
Effects by use of Insire Bulls

- Increased genetic improvement (30-40%)
- Higher genetic level of test sires
- Higher genetic level of Delta embryo’s
- Wider portfolio of commercial bulls & higher level
- More outcross; less inbreeding