

# NØK 2014

## Steinkjer, Norway

New technics in animal breeding  
Genomic selection

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## Genomic selection

- VikingGenetics started to use GS in selection of candidates and test bulls and culling of waiting bulls in the autumn 2008 in Holstein and one year later in VikingRed/RDC and Jersey.
- The implementation of GS in the breeding programs has just started!

## What is Genomic Selection?

- GS gives us an opportunity to select young animals based on a blended index (Genomic Enhanced Breeding Value) with a considerable higher reliability than traditional breeding values (Estimated Breeding Values) when the animals DNA-profile is known.
- The improvement of the reliability depends on several factors such as the marker density, the size of the reference population, the inbreeding level of the population, the quality of the phenotypic data, method of evaluation ...

## Why is the reliability of GEBV higher in Holstein?



## • Genomic Selection- marker density

- Several different DNA-chip exist with a marker density between 2 K and 777 K.
- Some of the chips are customized to be more suitable for a certain breed or traits
- A conversion from one density to a higher density can be done through IMPUTATION, this can be done with a high accuracy.

## • Genomic selection– reference population size

- It is beneficial to have large reference population
- Co-operation across countries
  - Common EBV scale for all bulls through INTERBULL
  - Hol- EuroGenomics, RDC- VG and GENO, Jersey- VG and US
- Adding females to the reference population
  - The VG LD-project is subsidizing the DNA-test cost of more than 40 000 females with a low density chip
  - The inclusion of females in the reference population was first used in the proofs of females published in July 2014
  - In August 2014 will the same reference population be used for bulls
- Using reference population across breeds
  - In general is the experience negative with the exception of KIWI-cross in NZ.

- Adding females to the reference populations has increased the reliability with 5-8 % in RDC



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[vikinggenetics.com](http://vikinggenetics.com)

- Genomic Selection- young bulls are superior!
  - Young bulls are 4-5 years younger than daughter proven bulls and with a genetic trend of 0.2-0.3 STD per year the difference is considerable in the favor to the younger bulls.
  - Less than 1 of 10 DNA-tested bull calves are started as AI-bulls. This quota will most likely increase in the future.
  - The semen sale of young selected bulls (GenVIKPLUS-bulls) has increased and is today higher than the sale of daughter proven bulls.

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## • Genomic Selection- young bulls are superior!

- Unofficial results from July 2014 shows that the highest ranked bull-(calves) are young
- Young bulls-(calves) are between 2 and 30 months of age.
- The highest rank daughter proven Jersey bulls have an NTM of 25. 9 young bulls have a NTM between 30 and 26.
- The highest ranked daughter proven Holstein bull is VH Grafit with a NTM of 35 and second best are VH OP and VH Alonso with a NTM of 31. 72 young bulls have a NTM between 46 and 36.

## • Genomic Selection- RDC case study

- The highest ranked VikingRed bulls is Fanfare with a NTM of 30 and second best is Buckarby with a NTM of 29.
- 89 young bulls have a NTM between 41-31!
- The young bulls are after 33 different sires!
- 11 of the sires are daughter proven bulls and they are the sires of 15 young bulls
  
- A majority of the highest ranked bulls have a none daughter proven bull as sire!

## • Genomic Selection- RDC case study

Name of daughter proven sire	Number of high ranked sons
Womtorp	1
Leroy	1
Buckarby	1
E-post	1
Cigar	3
Pell-Pers	2
Record	1
Solero	1
Valpas	2
S Adam	1
Haslev	1

## • Genomic Selection- RDC case study

Name of sire	Number of sons	Name of sire	Number of sons
VR Auror	2	VR Hammer	5
VR Borsse	5	Harvey	1
VR Ejstrup	3	Niki	2
VR Eragon	1	Sampo	1
VR Fergus *	5	Tornado	2
VR Filip	1	Toumi	3
VR Fimbe*	10	Ultimo***	4
VR Flame**	14	Ulv***	1
VR Freak*	5	Urut***	2
VR Fruity**	2	Uudin***	3
VR Hambo	1	Vivaldi	1

\*sons of Facet

\*\* sons of V Föske

\*\*\*sons of Ullimulli

## • Genomic Selection- genetic defects

- The large number of genetic markers have also help researchers to find many possible genetic defects.
- Some defects have a relative high proportion carriers, higher than the contribution of any bull. This indicates that we actively selected for a traits that is correlated to the defect.
- By testing females we can avoid that the defects are phenotypically expressed by adding a control in the herd breeding programs.

Thank you for your attention

