

Experiences with genomic prediction

NAV workshop

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Genomic prediction

Past and present

- First genomic prediction for HOL in fall 2008
- Results from research project that continuously is exploited in practice

GEBV's published for candidates bulls calves in May 2011- only small changes since

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Methods to analyse quality of genomic prediction

- Objective tests:
 - Test increase in reliability by genomic prediction in relation to pedigree index for recent cohorts of bulls with offspring
 - Testing if traditional breeding values and GEBV is expressed on the same scale (Interbull genomic test)
- Practical results:
 - Analysis bulls that have got traditional breeding values

Reliabilities for Holstein

	Reliability (%)		Gain	
	Genomic	Pedigree	Reliability (%)	Daugh.
Yield	55	23	32	9
Growth	48	23	25	8
Fertility	47	18	28	66
Udder health	45	14	31	43
Other diseases	39	20	19	77
Body	35	11	24	5
Feet and legs	33	16	17	12
Mammary	58	10	48	19
Longevity	52	33	19	35

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Reliabilities for RDC

	Reliability (%)		Gain	
	Genomic	Pedigree	Reliability (%)	Daugh.
Yield	35	11	24	4
Growth	43	34	9	3
Fertility	29	12	17	27
Udder health	28	9	19	19
Other diseases	30	16	14	47
Body	40	16	24	6
Feet and legs	31	11	20	13
Mammary	34	21	13	4
Longevity	44	29	15	22

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Reliabilities for Jersey

	Reliability (%)		Gain	
	Genomic	Pedigree	Reliability (%)	Daugh.
Yield	22	22	0	0
Fertility	17	17	0	0
Udder health	37	17	20	25
Other diseases	11	5	6	14
Body	31	19	12	3
Feet and legs	15	12	3	2
Mammary	19	7	12	2
Longevity	17	11	6	5

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Reasons for different reliabilities

- **No. of bulls in reference population**
- **Definition of traits across countries**
 - Euro Genomics, Geno
- **Homogeneity of reference population**
- **Reliability of traditional EBV**
 - Heritability
 - Size of progeny group

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Stability of NTM

- **Comparison of breeding values for bulls where breeding values were based :**
 - **Exclusively on genomic information in May 2011**
 - **Exclusively on progeny test in November 2012**

These bulls are selected as young bulls before start of genomic prediction

The bulls are grouped according to their GEBV's in May 2011

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Stability of NTM

EBV's based on progeny test are indicator of the efficiency of genomic prediction, but:

- Reliability is not 100 %
- Genomic test and a progeny test are two independent tests of the same animal, and the changes will be bigger compared to a progeny test based on few daughters and a later test based on more daughters

Stability of NTM

**Genomic
prediction**

Equals

10 daughters

Progeny test

100 daughters

10 daughters

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Stability af NTM - differences

Holstein November 2012 EBV's versus May 2011 GEBV's

Dif.	Level of GEBV in May 2011									
	-8	-4	0	4	8	12	16	20	24	28+
<-10	1	7	2	4	9	15	10	2	3	1
-10 - -6	1	6	4	5	19	13	16	13	2	4
-5 - -1	3	8	14	16	35	30	22	8	7	
0 - 5	2	8	22	18	19	15	18	11	1	
6 - 10	5	4	7	8	16	6	3		1	
>10	2	1	5	2	1	1	1	1		

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Stability af NTM - level

Holstein November 2012 EBV's versus May 2011 GEBV's

Level Nov. 2012	Level of GEBV, May 2011									
	-8	-4	0	4	8	12	16	20	24	28+
<11	13	34	49	46	86	52	28	8	2	
11-12	1		3	3	9	12	7	6	1	
13-14			1	3	6	4	9	3	1	
15-16			1		6	7	11	3	1	
17-18				1	1	2	5	3	1	
19-20					1	2	5	2	3	3
21-22						1	4	6	3	1
23-24								3		1
25-26							1		1	1
27-28										1
29-								1	1	

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Stability af NTM - differences

RDC November 2012 EBV's versus May 2011 GEBV's

Dif.	Level of GEBV in May 2011							
	-8	-4	0	4	8	12	16	20
<-10			2	5	3	2	1	
-10 - -6	1	3	3	13	11	11	3	1
-5 - -1	1	13	7	26	12	9	5	1
0 - 5	1	11	21	20	18	9	5	2
6 - 10	1	7	16	15	19	3	1	
>10	3	2	6	7	4	4	2	

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Stability af NTM - level

RDC November 2012 EBV's versus May 2011 GEBV's

Level Nov. 2012	Level of GEBV, May 2011							
	-8	-4	0	4	8	12	16	20
<11	11	34	48	69	36	18	6	1
11-12		1	3	5	6	4	3	
13-14		1	2	6	4	2		
15-16			1	4	5	2	1	1
17-18			1	1	2	5	1	
19-20					2	1	3	1
21-22				1	1	2	1	1
23-24					1	1		
25-26								
27-28						1	1	
29-30							1	

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Stability af NTM - differences

Jersey November 2012 EBV's versus May 2011 GEBV's

Dif.	Level of GEBV in May 2011					
	-4	0	4	8	12	16
<-10			2	1		1
-10- -6			1	3	4	
-5 - -1		1	6	9	4	
0 – 5	1	2	9	7	5	4
6 - 10	3		5	4	4	1
>10		3		2		

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Stability af NTM - level

Jersey November 2012 EBV's versus May 2011 GEBV's

Level Nov. 2012	Level of GEBV, May 2011					
	-4	0	4	8	12	16
<11	4	3	19	14	8	1
11-12			3	4		
13-14		1	1	2	3	
15-16		2		2	1	1
17-18				2	2	1
19-20				1	3	1
21-22						
23-24						
25-26				1		
27-28						
29-30						

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Summary

- **Effective selection of bull calves- the level of young bulls is raised significantly**
- **Among the selected bulls it is difficult to identify the very best**
- **The best HOL bulls drop in level, whereas RDC and JER are stable**

