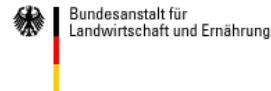




Genetic parameters for somatic cell score in early lactation

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Motivation



- On-farm measurement of somatic cell count (SCC) is easy & affordable
- Some farmers use SCC in early lactation (DIM=3) as a successful mastitis detection
 - especially for heifers

Aim: Is SCCel ...

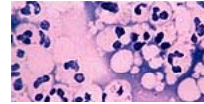
- ... a proper mastitis prophylaxis ?
- ... useful for selective treatments ?
- Genetic background ?





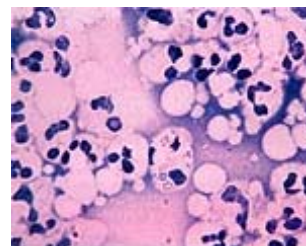
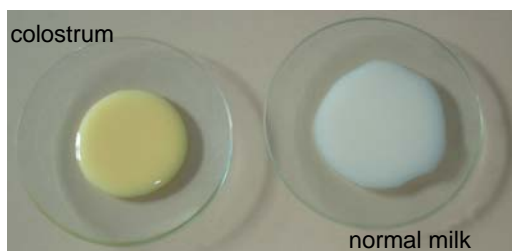
Project: BHNP - Breed for Health Neo Partus

- Somatic cell count in early lactation
- On-going project
 - data set 1.1.2010 to 30.04.2011
- 8,884 observed calvings, well documented
 - 3,367 heifer and 5,517 cow calvings
 - 8,060 HF animals in total
 - 824 cows with repeated calvings
 - in 7 German herds
 - Herd size between 600 and 1,500 cows
- Documented Health Treatments



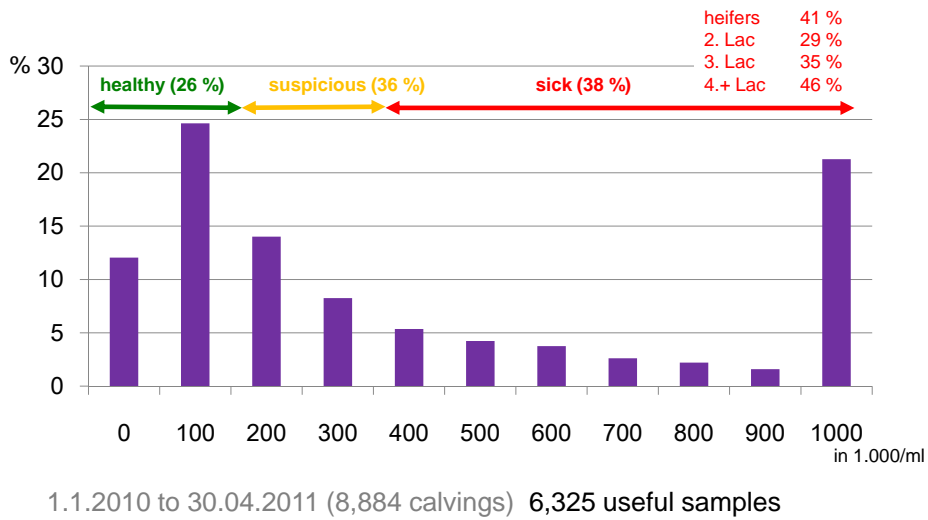
Somatic cell count in early lactation

- 1.1.2010 to 30.04.2011
- Samples from DIM 0 to 20 (mean DIM=5.05)
- analysed like official test day milk samples (milk control agency)
- 6,325 useful samples (5,779 animals)

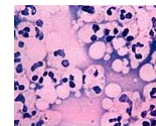




Somatic cell count in early lactation



Somatic cell score in early lactation & test days



- **Fixed effects:** herd (7), year/season of calving (6), lactation # (4)
- DIM as covariate

LSMeans SCS	n	Lac1	Lac2	Lac3	Lac4+
SCSel	6325	4.46^a (0.05)	3.91^b (0.06)	4.14^c (0.07)	4.80^d (0.06)
SCS/TD 1	8254	2.73 ^a (0.04)	2.34 ^b (0.04)	2.69 ^a (0.05)	3.16 ^c (0.05)
SCS/TD 2	7468	2.13 ^a (0.04)	2.06 ^a (0.04)	2.30 ^b (0.06)	2.87 ^c (0.05)





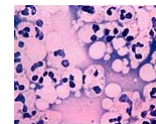
Culled cows (DIM < 100)

8,884 calvings; 1,181 (13.3 %) culled in DIM < 100

DIM	%	N	Reasons for culling	%
< 10	22.0	260	metabolism	30.7
10-20	18.1	214	udder health	24.6
20-30	14.7	174	claw & limbs	14.7
30-40	11.9	141	milkability	11.6
40-50	8.6	101	small yield	8.3
50-100	24.6	291	other diseases	5.2
			others	3.6
			fertility	1.0
			age	0.2



Udder treatments (DIM < 10) & SCSel



- **Fixed effects:** herd (7), year/season of calving (6), lactation # (4)
udder treatments in the first 10 DIM coded as binary trait
- DIM as covariate

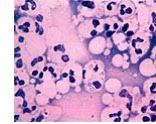
Udder treatment	LSMeans SCS				
	n	Lac1	Lac2	Lac3	Lac4+
Yes*	717	5.54 (0.13)	5.50 (0.20)	5.14 (0.20)	6.02 (0.16)
No	3593	4.29 (0.07)	3.81 (0.08)	4.11 (0.09)	4.62 (0.08)

- Here: udder treatment is an independent trait !
- Managers didn't get the SCSel information in time !





Somatic cell score in early lactation & testdays

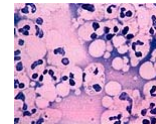


- Genetic parameters (VCE 6.0.2)
phenotypic correlation above diagonal / genetic correlation below diagonal

h^2	SCSel	SCS/TD 1	SCS/TD 2
SCSel	0.08 (\pm 0.02)	0.33	0.23
SCS/TD 1	0.85	0.09 (\pm 0.02)	0.50
SCS/TD 2	0.70	0.97	0.09 (\pm 0.02)



Somatic cell score in early lactation & testdays



- Genetic parameters (VCE 6.0.2)
phenotypic correlation above diagonal / genetic correlation below diagonal

h^2	SCSel	SCS/TD 1	SCS/TD 2
SCSel	DIM \emptyset 5.05 (0 to 20)		
SCS/TD 1	DIM \emptyset 21.91 (5 to 83)		
SCS/TD 2	DIM \emptyset 54.19 (27 to 118)		
SCS/TD 2	0.70	0.97	0.09 (\pm 0.02)





Somatic cell score

Averages by DIM interval

LSMeans SCS		n	Lac1	Lac2	Lac3	Lac4+
SCS el	DIM 0-4	3190	5.18 ^a (0.08)	4.49 ^b (0.09)	4.62 ^b (0.11)	5.35 ^a (0.10)
	DIM 5-10	2701	4.01 ^a (0.08)	3.61 ^b (0.09)	4.06 ^a (0.12)	4.47 ^c (0.10)
	DIM 11-20	434	3.23 ^a (0.25)	2.88 ^a (0.28)	2.55 ^a (0.34)	4.15 ^b (0.27)
SCS/ TD 1	DIM 5-10	1488	3.47 ^a (0.08)	2.93 ^b (0.10)	3.24 ^a (0.12)	3.87 ^c (0.11)
	DIM 11-20	2555	2.83 ^a (0.06)	2.49 ^b (0.08)	2.89 ^{ac} (0.09)	3.08 ^c (0.09)
	DIM 21-30	2473	2.54 ^a (0.06)	2.07 ^b (0.08)	2.48 ^a (0.10)	3.09 ^c (0.09)
	DIM 31-40	1310	2.42 ^a (0.09)	2.00 ^b (0.11)	2.25 ^{ab} (0.14)	2.86 ^c (0.13)
SCS/ TD 2	DIM 31-40	1134	2.42 ^a (0.10)	2.12 ^a (0.12)	2.49 ^b (0.14)	3.09 ^c (0.14)
	DIM 41-50	2159	2.15 ^a (0.07)	2.01 ^a (0.09)	2.24 ^a (0.11)	2.70 ^b (0.10)
	DIM 51-60	2119	2.11 ^a (0.07)	2.07 ^a (0.08)	2.14 ^a (0.11)	2.79 ^b (0.10)
	DIM 61-70	1224	1.99 ^a (0.10)	1.95 ^a (0.11)	2.44 ^b (0.14)	3.11 ^c (0.13)



Somatic cell score

Averages by DIM interval

LSMeans SCS		n	Lac1	Lac2	Lac3	Lac4+
SCS el	DIM 0-4	1 3190	5.18 ^a (0.08)	4.49 ^b (0.09)	4.62 ^b (0.11)	5.35 ^a (0.10)
	DIM 5-10	2 2701	4.01 ^a (0.08)	3.61 ^b (0.09)	4.06 ^a (0.12)	4.47 ^c (0.10)
	DIM 11-20	3 434	3.23 ^a (0.25)	2.88 ^a (0.28)	2.55 ^a (0.34)	4.15 ^b (0.27)
SCS/ TD 1	DIM 5-10	2 1488	3.47 ^a (0.08)	2.93 ^b (0.10)	3.24 ^a (0.12)	3.87 ^c (0.11)
	DIM 11-20	3 2555	2.83 ^a (0.06)	2.49 ^b (0.08)	2.89 ^{ac} (0.09)	3.08 ^c (0.09)
	DIM 21-30	2473	2.54 ^a (0.06)	2.07 ^b (0.08)	2.48 ^a (0.10)	3.09 ^c (0.09)
	DIM 31-40	1310	2.42 ^a (0.09)	2.00 ^b (0.11)	2.25 ^{ab} (0.14)	2.86 ^c (0.13)
SCS/ TD 2	DIM 31-40	1134	2.42 ^a (0.10)	2.12 ^a (0.12)	2.49 ^b (0.14)	3.09 ^c (0.14)
	DIM 41-50	2159	2.15 ^a (0.07)	2.01 ^a (0.09)	2.24 ^a (0.11)	2.70 ^b (0.10)
	DIM 51-60	2119	2.11 ^a (0.07)	2.07 ^a (0.08)	2.14 ^a (0.11)	2.79 ^b (0.10)
	DIM 61-70	1224	1.99 ^a (0.10)	1.95 ^a (0.11)	2.44 ^b (0.14)	3.11 ^c (0.13)



Somatic cell score

Newly grouped data (use first sample of each cow per class; no duplicates)

LSMeans SCS	n	Lac1	Lac2	Lac3	Lac4+
1 DIM 0-4	3190	5.18 ^a (0.08)	4.49 ^b (0.09)	4.62 ^b (0.11)	5.35 ^a (0.10)
2 DIM 5-10	3849	3.88 ^a (0.06)	3.41 ^b (0.07)	3.82 ^a (0.09)	4.32 ^c (0.08)
3 DIM 11-20	2895	2.96 ^a (0.06)	2.56 ^b (0.08)	2.87 ^a (0.09)	3.32 ^c (0.09)



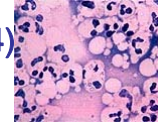
Somatic cell score

- Genetic parameters (ASReml 3.0)
phenotypic correlation above diagonal / genetic correlation below diagonal

	h ²	1 DIM 0 to 4	2 DIM 5 to 10	3 DIM 11 to 22
1 DIM 0 to 4		0.10 (±0.02)	0.32	0.26
2 DIM 5 to 10		0.62	0.08 (±0.02)	0.38
3 DIM 11 to 20		0.73	0.99	0.11 (±0.02)



Udder treatments (DIM < 10) & SCS (DIM 0-4)



- **Fixed effects:** herd (7), year/season of calving (6), lactation # (4)
udder treatments in the first 10 DIM coded as binary trait
- DIM as covariate

Udder treatment	LSMeans SCS				
	n	Lac1	Lac2	Lac3	Lac4+
Yes*	373	6.34 (0.18)	5.59 (0.29)	5.55 (0.27)	6.41 (0.22)
No	1771	5.18 (0.12)	4.64 (0.13)	4.72 (0.14)	5.28 (0.13)

- Here: udder treatment is an independent trait !
- Managers didn't get the SCSel information in time !



Conclusions

SCS in early lactation ...

- ... typically shows high values, but early cullings and sick animals are included
- ... is a practical tool to control the health status of transition cows and for individual treatment
- ... is heritable; genetic correlations with TD SCS suggest that SCS in very early lactation is a different trait





Many thanks go to project partner, sponsoring



and you for your attention

