Harmonization of calving traits

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This report documents results from 2021 in relation to harmonization of calving traits in Nordic dairy cattle evaluations.

Test of input data for bulls with many offspring
Holstein
- o_data: current data with heterogenous variance correction for august official run
- n_data: snell score data for august (HOLevalny)

for each bull the mean of each trait from o_data and from n_data is calculated based on the offspring.
correlations of means are studied for Nordic AI bulls born 2010-2015

The lowest correlations are seen for CE1 and for CE2 both when looking at the two sexes together and separately.

correlations between mean_o_data and mean_n_data for each trait (both sexes together)

	>=100 offspring	>=500 offspring	>=1000 offspring
no of bulls	896	515	378
SB1	0.983	0.970	0.972
CE1	0.957	0.962	0.972
CS1	0.976	0.967	0.971
SB2	0.996	0.995	0.994
CE2	0.957	0.955	0.961
CS2	0.995	0.997	0.998

Divided by sex of the calf:
correlations of mean_o_data and mean_n_data for each trait (separately by sex)

	Male calves			Females calves		
	>=100 offspring	>=500 offspring	>=1000 offspring	>=100 offspring	>=500 offspring	>=1000 offspring
no of bulls	624	362	177	647	385	202
SB1	1.000	1.000	1.000	0.991	0.995	0.996
CE1	0.968	0.982	0.988	0.953	0.976	0.985
CS1	0.999	0.999	1.000	0.997	0.999	0.999
SB2	1.000	0.999	1.000	0.989	0.989	0.989
CE2	0.953	0.958	0.976	0.943	0.955	0.970
CS2	0.999	0.999	1.000	0.999	0.999	1.000

RDC

Correlations for mean phenotypic values for November data for bulls born 2010 to 2015.

	>=100 offspring	>=200 offspring	>=300 offspring
no of bulls	233	179	132
SB1	0.979	0.976	0.974
CE1	0.895	0.892	0.897
CS1	0.984	0.983	0.981
SB2	0.901	0.911	0.919
CE2	0.785	0.810	0.788
CS2	0.998	0.998	0.998

Divided by sex of the calf:

correlations of mean_o_data and mean_n_data for each trait (separately by sex)

	Male calves			Females calves		
	>=100 offspring	>=200 offspring	>=300 offspring	>=100 offspring	>=200 offspring	>=300 offspring
no of bulls	172	77	17	176	106	58
SB1	0.991	0.996	0.999	0.948	0.940	0.941
CE1	0.941	0.914	0.943	0.820	0.871	0.856
CS1	0.999	1.000	0.999	0.999	1.000	0.999
SB2	0.943	0.939	0.937	0.819	0.862	0.821
CE2	0.834	0.760	0.921	0.734	0.784	0.682
CS2	0.999	0.999	1.000	0.999	0.999	0.999

Test of new parameters (heritability and genetic correlations)

Holstein

Four different Solani is compared

- Current data, current model, current parameters (called ooo)
- Current data, current model, new parameters   (called oon)
- Current data, new model with permanent cow effect, new parameters (called onn)

  The permanent cow effect is not estimated on current data, therefor the parameters for snell score data is used for permanent cow effect.

- Snell score data, new model with permanent cow effect[a] model, new parameters (called nnn) (HOLevalny)

Comparison of all bulls with more than 100 offspring and 50 daughters with offspring (for SB and CE), see appendix page1. Comparison of all bulls with more than 500 offspring and 250 daughters with offspring (for SB and CE), see appendix page2.

Correlations for Solutions are estimated for Nordic AI bulls born 2010 – 2015.

Bulls with many offspring (>500) have high correlations between the different solutions. For direct traits the correlations between ooo, oon, onn and nnn are close to 1 except for CE2. For maternal traits the correlations between ooo, oon, onn and nnn are close to 1 except for SB2 and CE2.

Jersey

Five different Solani is compared

- Current data, current model, current parameters (called ooo)
- Current data, current model, new parameters   (called oon)
- Current data, new model with permanent cow effect, new parameters (called onn)

  The permanent cow effect is not estimated on current data, therefor the parameters for snell score data is used for permanent cow effect.

- Snell score data, new model with permanent cow effect[a] model, new parameters (called nnn)
- Snell score data, old model and old parameters (called noo)

Comparison of all bulls with more than 100 offspring and 50 daughters with offspring (for SB and CE), see appendix page 3.
Correlations for Solutions are estimated for Nordic AI bulls born 2010 – 2015.

For direct traits the correlations between ooo, oon, onn and nnn are close to 1 except for CE2. For maternal traits the correlations between ooo, oon, onn and nnn are close to 1 except for SB2 and CE2. When looking at noo then it can be concluded that the reason correlations for CE is low is because of new parameters. The old parameters were unrealistic and therefor new parameters may be an improvement.

RDC
For RDC the comparison is based on November data.
Three solani are compared

- Current data, current model, current parameters (called ooo)
- Snell score data, new model with permanent cow effect model, new parameters, with heterosis (called nnn) (RDCevalny)
- Snell score data, new model with permanent cow effect model, new parameters, without heterosis (called nnh) (RDCevalny1)

Correlations for bulls with more than 300 offspring and 100 daughters with offspring (for SB and CE). see appendix page4.
Correlations for Solutions are estimated for Nordic AI bulls born 2010 – 2015.
The correlations for maternal traits is low especially for SB2 and CE2

Genetic trends
Holstein
The genetic trend for new GEBVs and current GEBVs are very similar. Therefor no effect of harmonization.
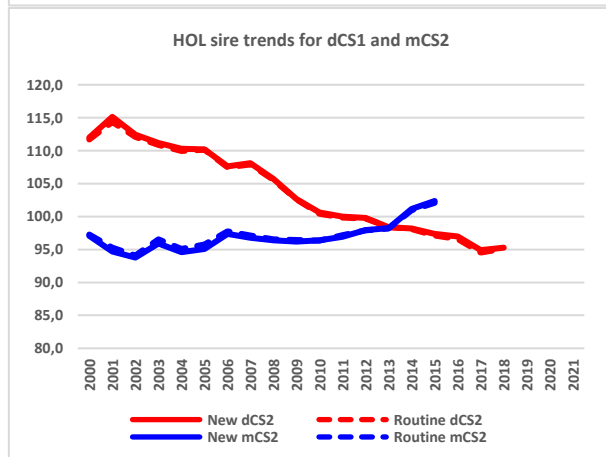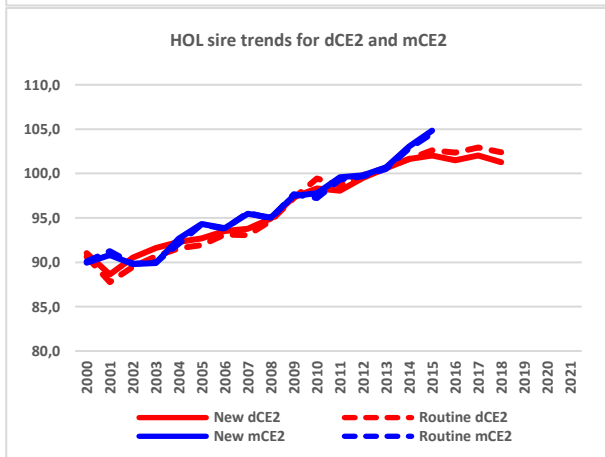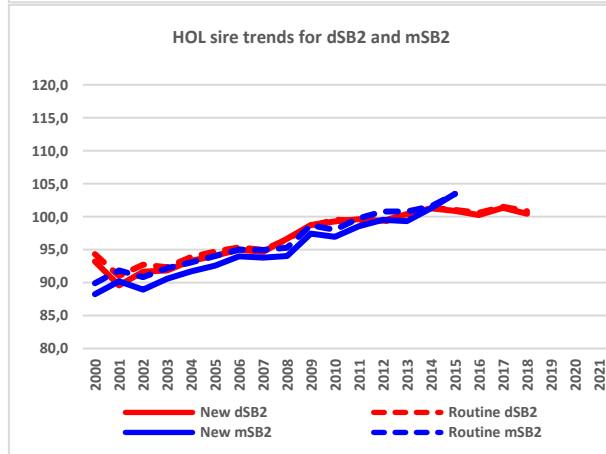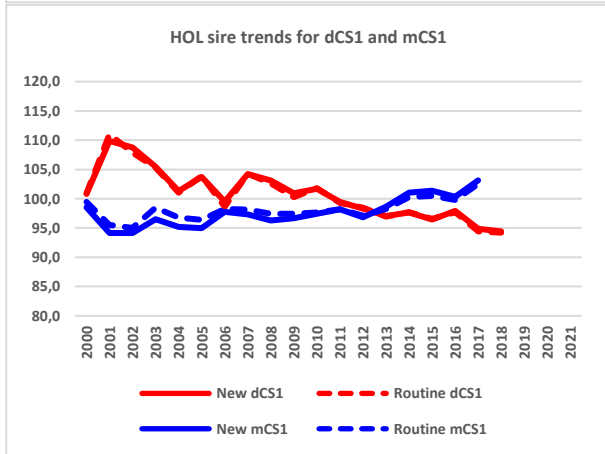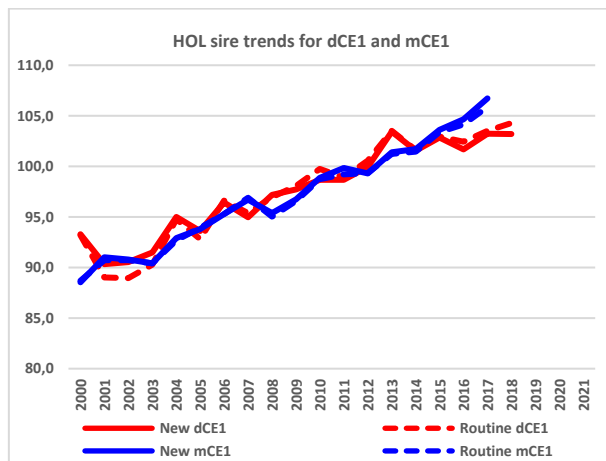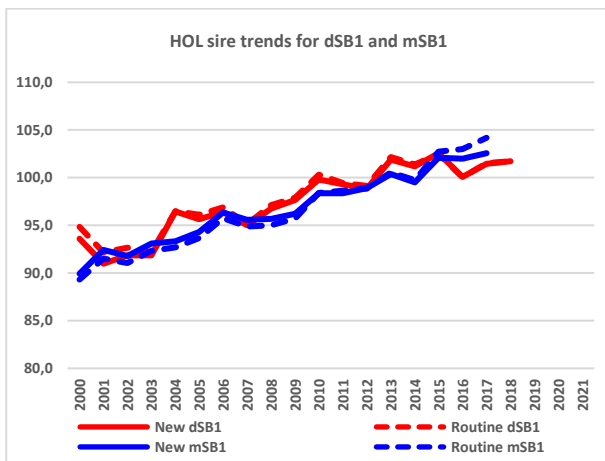
Jersey

The genetic trend for new GEBVs and current GEBVs are very similar. Therefor limited effect of harmonization.

JER sire trends for dSB1 and mSB1

JER sire trends for dCE1 and mCE1

JER sire trends for dCS1 and mCS1

JER sire trends for dSB2 and mSB2

JER sire trends for dCE2 and mCE2

JER sire trends for dCS1 and mCS2
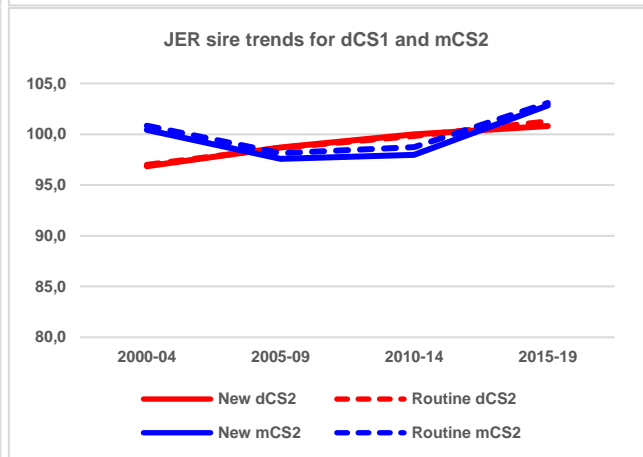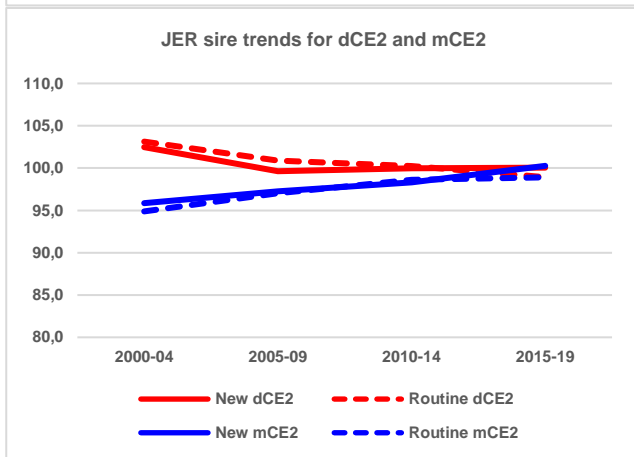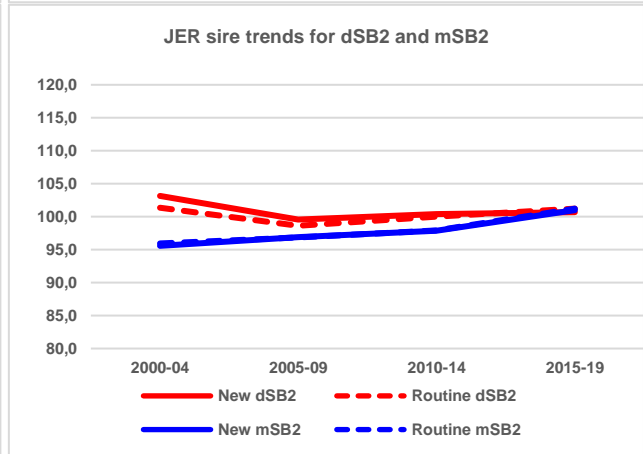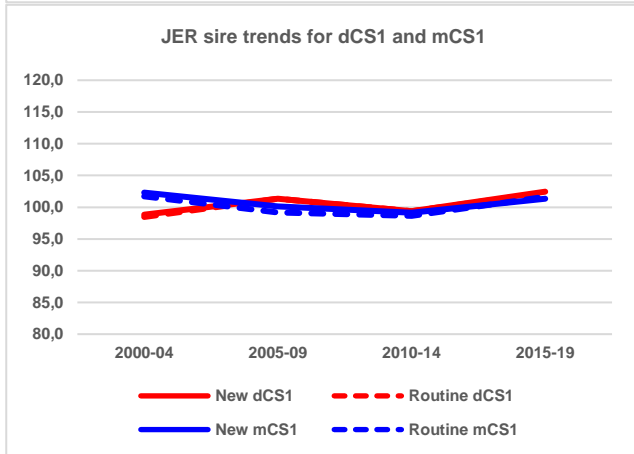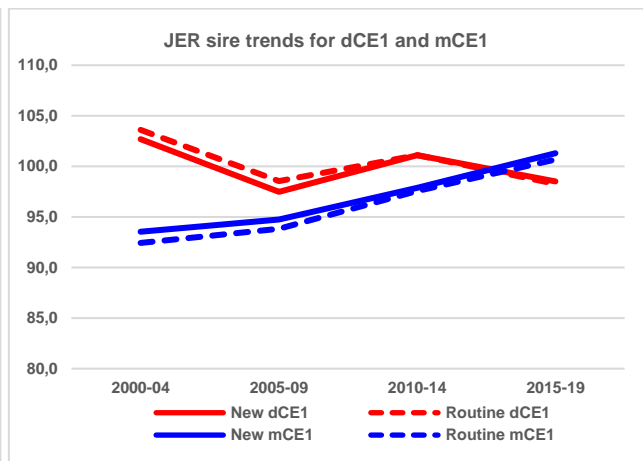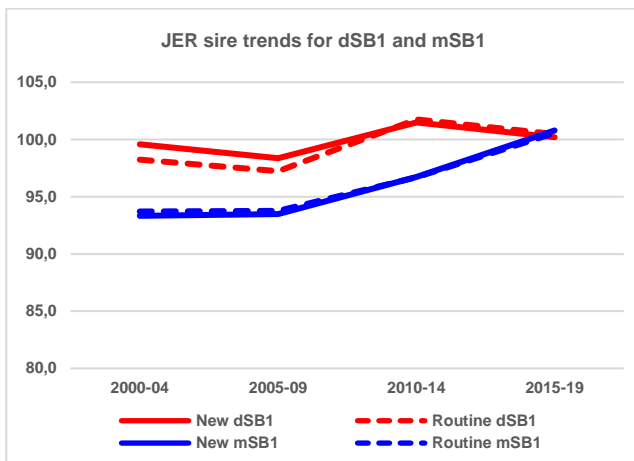
RDC

The genetic trend for new GEBVs and current GEBVs are very similar. Therefor limited effect of harmonization.
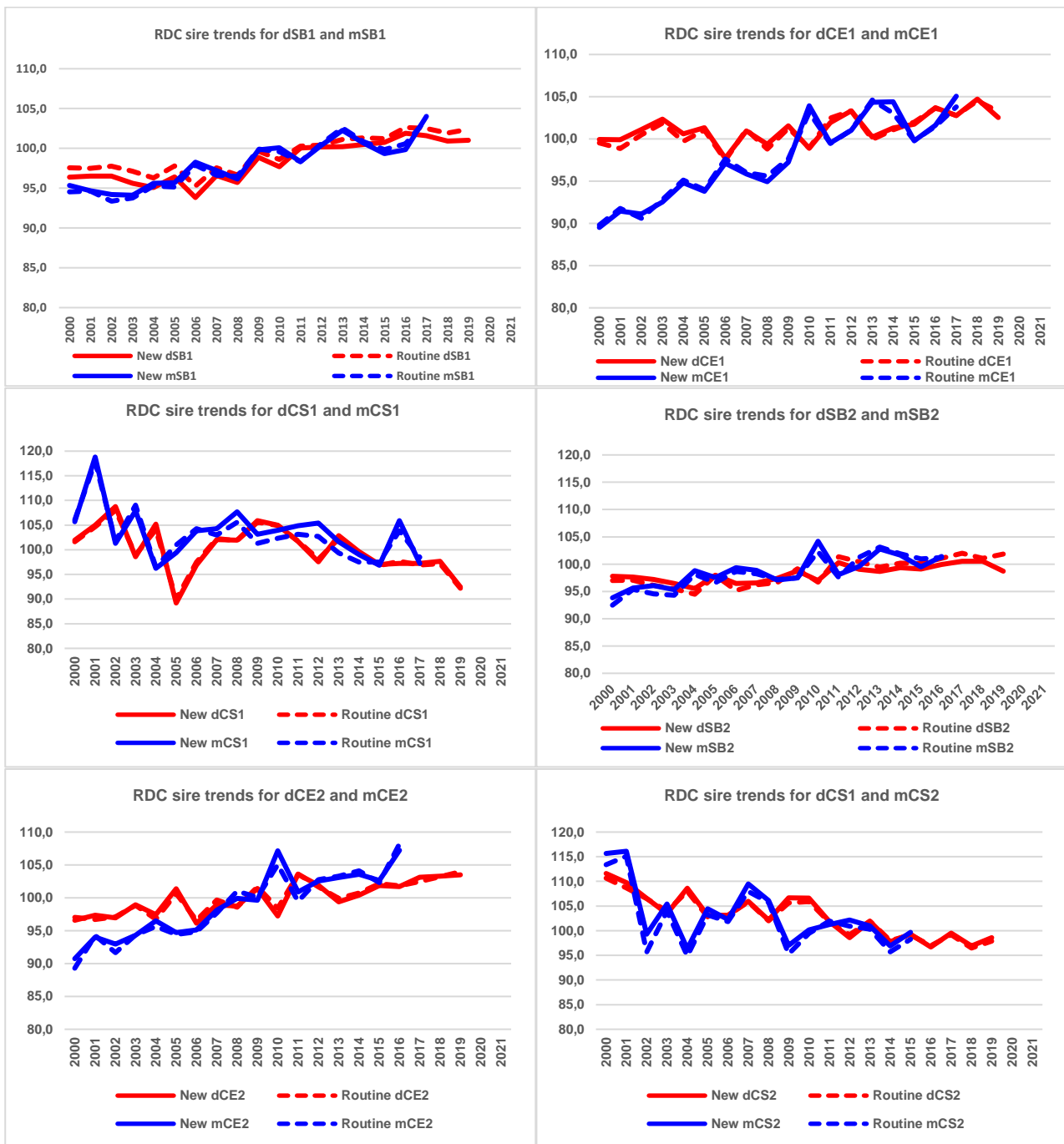
Heterosis effects in RDC in the current evaluation

In the current RDC evaluation the heterosis is included. There are two types of heterosis, the Nordic heterosis (others than RDM) and the rest heterosis (RDM). There is heterosis both for direct and for maternal part. Heterosis effects are standardized to index units.

To study if the stability of the heterosis effects, heterosis from August 2021 and August 2020 are compared. The levels are similar for 2021 and 2020, therefor the stability is high.

	2021				2020			
	direct		maternal		direct		maternal	
	nordhet	resthet	mnordhet	mresthet	nordhet	resthet	mnordhet	mresthet
SB1	1.65	3.29	3.12	4.87	1.73	3.41	3.26	4.97
CE1	-1.24	-1.03	3.91	5.23	-1.18	-1.03	3.66	5.12

CS1	2.36	4.12	6.68	4.59	2.43	4.14	7.60	4.48
SB2	2.47	1.90	2.07	3.29	2.62	1.98	1.87	3.12
CE2	0.87	-1.07	3.71	4.21	1.00	-1.08	3.66	4.19
CS2	2.72	4.33	-0.87	2.88	2.59	4.29	-0.75	2.83

Heterosis effects in RDC in the snell score evaluation

In RDCevalny the heterosis effect is included. It is November 2021 data.

The effect for maternal "Nordic" heterosis for CS1 is higher in snell score evaluation than in the current evaluation, but otherwise the heterosis effects are as excepted.

	direct		maternal	
	nordhet	resthet	mnordhet	mresthet
SB1	2.23	4.18	2.35	4.87
CE1	-0.88	0.00	3.51	4.52
CS1	2.93	4.53	9.95	5.43
SB2	1.67	1.52	1.16	2.80
CE2	1.25	0.37	3.71	2.94
CS2	2.75	4.54	0.73	3.22

Page1
Correlations for different models for holstein bulls (born 2010-2015) with more than 100 offspring and 50 daugthers with offspring for SB and CE

Direct traits

TYPE	_NAME_	oooSBd1	oonSBd1	onnSBd1	nnnSBd1	oooCEd1	oonCEd1	onnCEd1	nnnCEd1	oooCSd1	oonCSd1	onnCSd1	nnnCSd1	oooSBd2	oonSBd2	onnSBd2	nnnSBd2	oooCEd2	oonCEd2	onnCEd2	nnnCEd2	oooCSd2	oonCSd2	onnCSd2	nnnCSd2
MEAN		0.064027	0.06663	0.066349	0.166614	0.1139	0.118532	0.117242	0.195469	0.01024	-0.00396	-0.00482	-0.00164	0.038531	0.039418	0.039382	0.118836	0.082833	0.090325	0.089431	0.138964	-0.02864	-0.02904	-0.02823	0.032026
STD		0.031743	0.03193	0.031937	0.054754	0.103311	0.1059	0.105975	0.110842	0.172237	0.172656	0.172678	0.204116	0.008981	0.009047	0.009027	0.017699	0.050386	0.051498	0.051356	0.058964	0.153034	0.151023	0.15096	0.182691
N		1381	1381	1381	1381	1381	1381	1381	1381	1381	1381	1381	1381	1381	1381	1381	1381	1381	1381	1381	1381	1381	1381	1381	1381
CORR	oooSBd1	1	1.00	1.00	0.98	0.62	0.62	0.62	0.60	-0.33	-0.31	-0.31	-0.31	0.62	0.62	0.62	0.55	0.45	0.47	0.47	0.45	-0.31	-0.31	-0.31	-0.31
CORR	oonSBd1	1.00	1	1.00	0.99	0.64	0.64	0.64	0.62	-0.37	-0.36	-0.36	-0.36	0.63	0.63	0.64	0.57	0.48	0.49	0.49	0.47	-0.35	-0.35	-0.34	-0.35
CORR	onnSBd1	1.00	1.00	1	0.98	0.64	0.64	0.64	0.62	-0.37	-0.36	-0.36	-0.36	0.63	0.63	0.64	0.57	0.48	0.49	0.49	0.47	-0.35	-0.35	-0.35	-0.35
CORR	nnnSBd1	0.98	0.99	0.98	1	0.59	0.58	0.58	0.60	-0.32	-0.32	-0.32	-0.33	0.60	0.60	0.60	0.57	0.43	0.43	0.44	0.45	-0.30	-0.30	-0.30	-0.32
CORR	oooCEd1	0.62	0.64	0.64	0.59	1	1.00	1.00	0.95	-0.78	-0.75	-0.75	-0.74	0.56	0.57	0.57	0.47	0.72	0.72	0.72	0.70	-0.75	-0.73	-0.73	-0.72
CORR	oonCEd1	0.62	0.64	0.64	0.58	1.00	1	1.00	0.95	-0.76	-0.73	-0.73	-0.72	0.56	0.57	0.57	0.47	0.72	0.73	0.73	0.70	-0.72	-0.70	-0.70	-0.69
CORR	onnCEd1	0.62	0.64	0.64	0.58	1.00	1.00	1	0.95	-0.76	-0.73	-0.73	-0.72	0.56	0.57	0.57	0.47	0.72	0.73	0.73	0.70	-0.72	-0.70	-0.70	-0.69
CORR	nnnCEd1	0.60	0.62	0.62	0.60	0.95	0.95	0.95	1	-0.73	-0.72	-0.72	-0.74	0.55	0.56	0.56	0.50	0.70	0.71	0.71	0.74	-0.71	-0.70	-0.70	-0.71
CORR	oooCSd1	-0.33	-0.37	-0.37	-0.32	-0.78	-0.76	-0.76	-0.73	1	0.99	0.99	0.97	-0.47	-0.49	-0.49	-0.41	-0.77	-0.72	-0.72	-0.67	0.93	0.91	0.91	0.90
CORR	oonCSd1	-0.31	-0.36	-0.36	-0.32	-0.75	-0.73	-0.73	-0.72	0.99	1	1.00	0.99	-0.43	-0.45	-0.46	-0.39	-0.72	-0.66	-0.66	-0.64	0.90	0.90	0.90	0.89
CORR	onnCSd1	-0.31	-0.36	-0.36	-0.32	-0.75	-0.73	-0.73	-0.72	0.99	1.00	1	0.99	-0.43	-0.45	-0.46	-0.39	-0.72	-0.66	-0.66	-0.64	0.90	0.90	0.90	0.89
CORR	nnnCSd1	-0.31	-0.36	-0.36	-0.33	-0.74	-0.72	-0.72	-0.74	0.97	0.99	0.99	1	-0.43	-0.45	-0.45	-0.41	-0.71	-0.65	-0.65	-0.65	0.89	0.90	0.90	0.90
CORR	oooSBd2	0.62	0.63	0.63	0.60	0.56	0.56	0.56	0.55	-0.47	-0.43	-0.43	-0.43	1	1.00	1.00	0.96	0.66	0.66	0.66	0.60	-0.45	-0.43	-0.43	-0.43
CORR	oonSBd2	0.62	0.63	0.63	0.60	0.57	0.57	0.57	0.56	-0.49	-0.45	-0.45	-0.45	1.00	1	1.00	0.96	0.66	0.66	0.66	0.60	-0.47	-0.45	-0.45	-0.45
CORR	onnSBd2	0.62	0.64	0.64	0.60	0.57	0.57	0.57	0.56	-0.49	-0.46	-0.46	-0.45	1.00	1.00	1	0.96	0.67	0.67	0.67	0.61	-0.47	-0.46	-0.46	-0.46
CORR	nnnSBd2	0.55	0.57	0.57	0.57	0.47	0.47	0.47	0.50	-0.41	-0.39	-0.39	-0.41	0.96	0.96	0.96	1	0.55	0.55	0.55	0.55	-0.40	-0.39	-0.39	-0.41
CORR	oooCEd2	0.45	0.48	0.48	0.43	0.72	0.72	0.72	0.70	-0.77	-0.72	-0.72	-0.71	0.66	0.66	0.67	0.55	1	0.99	0.99	0.91	-0.76	-0.73	-0.73	-0.71
CORR	oonCEd2	0.47	0.49	0.49	0.43	0.72	0.73	0.73	0.71	-0.72	-0.66	-0.66	-0.65	0.66	0.66	0.67	0.55	0.99	1	1.00	0.92	-0.70	-0.68	-0.68	-0.66
CORR	onnCEd2	0.47	0.49	0.49	0.44	0.72	0.73	0.73	0.71	-0.72	-0.66	-0.66	-0.65	0.66	0.66	0.67	0.55	0.99	1.00	1	0.92	-0.71	-0.68	-0.68	-0.66
CORR	nnnCEd2	0.45	0.47	0.47	0.45	0.70	0.70	0.70	0.74	-0.67	-0.64	-0.64	-0.65	0.60	0.60	0.61	0.55	0.91	0.92	0.92	1	-0.67	-0.66	-0.66	-0.67
CORR	oooCSd2	-0.31	-0.35	-0.35	-0.30	-0.75	-0.72	-0.72	-0.71	0.93	0.90	0.90	0.89	-0.45	-0.47	-0.47	-0.40	-0.76	-0.70	-0.71	-0.67	1	0.99	0.99	0.98
CORR	oonCSd2	-0.31	-0.35	-0.35	-0.30	-0.73	-0.70	-0.70	-0.70	0.91	0.90	0.90	0.90	-0.43	-0.45	-0.46	-0.39	-0.73	-0.68	-0.68	-0.66	0.99	1	1.00	0.99
CORR	onnCSd2	-0.31	-0.34	-0.35	-0.30	-0.73	-0.70	-0.70	-0.70	0.91	0.90	0.90	0.90	-0.43	-0.45	-0.46	-0.39	-0.73	-0.68	-0.68	-0.66	0.99	1.00	1	0.99
CORR	nnnCSd2	-0.31	-0.35	-0.35	-0.32	-0.72	-0.69	-0.69	-0.71	0.90	0.89	0.89	0.90	-0.43	-0.45	-0.46	-0.41	-0.71	-0.66	-0.66	-0.67	0.98	0.99	0.99	1

Maternal traits

TYPE	_NAME_	oooSBd1	oonSBd1	onnSBd1	nnnSBd1	oooCEd1	oonCEd1	onnCEd1	nnnCEd1	oooCSd1	oonCSd1	onnCSd1	nnnCSd1	oooSBd2	oonSBd2	onnSBd2	nnnSBd2	oooCEd2	oonCEd2	onnCEd2	nnnCEd2	oooCSd2	oonCSd2	onnCSd2	nnnCSd2
MEAN		0.009226	0.004834	0.004918	-0.04036	0.12098	0.115966	0.115508	0.071499	0.032704	0.067633	0.066581	0.125441	-0.00217	-0.00241	-0.00251	-0.03421	0.06144	0.056755	0.056758	0.041262	-0.01609	-0.00518	-0.00593	0.036991
STD		0.041288	0.040629	0.040629	0.073622	0.08849	0.088376	0.088369	0.095639	0.085294	0.086574	0.086536	0.102684	0.0104	0.010138	0.010123	0.019003	0.04087	0.040843	0.040673	0.047297	0.083874	0.084179	0.083877	0.100752
N		1381	1381	1381	1381	1381	1381	1381	1381	1381	1381	1381	1381	1381	1381	1381	1381	1381	1381	1381	1381	1381	1381	1381	1381
CORR	oooSBd1	1	0.99	0.99	0.99	0.64	0.65	0.65	0.64	0.17	0.21	0.21	0.20	0.67	0.73	0.73	0.70	0.37	0.38	0.38	0.34	0.29	0.27	0.28	0.27
CORR	oonSBd1	0.99	1	1.00	0.99	0.65	0.65	0.65	0.64	0.10	0.13	0.13	0.12	0.69	0.72	0.72	0.69	0.37	0.37	0.37	0.32	0.23	0.21	0.21	0.21
CORR	onnSBd1	0.99	1.00	1	0.99	0.65	0.65	0.65	0.64	0.10	0.13	0.13	0.12	0.69	0.72	0.72	0.69	0.37	0.37	0.37	0.32	0.23	0.21	0.21	0.21
CORR	nnnSBd1	0.99	0.99	0.99	1	0.62	0.62	0.62	0.63	0.11	0.14	0.14	0.13	0.67	0.70	0.70	0.69	0.34	0.34	0.34	0.31	0.24	0.23	0.23	0.22
CORR	oooCEd1	0.64	0.65	0.65	0.62	1	1.00	1.00	0.95	-0.29	-0.19	-0.19	-0.21	0.66	0.65	0.65	0.53	0.73	0.72	0.72	0.66	-0.14	-0.12	-0.12	-0.12
CORR	oonCEd1	0.65	0.65	0.65	0.62	1.00	1	1.00	0.96	-0.27	-0.17	-0.17	-0.18	0.65	0.65	0.65	0.53	0.73	0.72	0.72	0.66	-0.12	-0.10	-0.10	-0.11
CORR	onnCEd1	0.65	0.65	0.65	0.62	1.00	1.00	1	0.95	-0.27	-0.17	-0.17	-0.18	0.65	0.65	0.65	0.53	0.72	0.71	0.72	0.65	-0.12	-0.10	-0.10	-0.11
CORR	nnnCEd1	0.64	0.64	0.64	0.63	0.95	0.96	0.95	1	-0.24	-0.16	-0.16	-0.18	0.65	0.66	0.66	0.59	0.69	0.68	0.69	0.70	-0.11	-0.10	-0.10	-0.10
CORR	oooCSd1	0.17	0.10	0.10	0.11	-0.29	-0.27	-0.27	-0.24	1	0.98	0.98	0.98	-0.23	-0.01	-0.01	0.04	-0.26	-0.19	-0.20	-0.17	0.82	0.79	0.79	0.79
CORR	oonCSd1	0.21	0.13	0.13	0.14	-0.19	-0.17	-0.17	-0.16	0.98	1	1.00	1.00	-0.15	0.08	0.08	0.10	-0.15	-0.09	-0.09	-0.08	0.81	0.80	0.80	0.80
CORR	onnCSd1	0.21	0.13	0.13	0.14	-0.19	-0.17	-0.17	-0.16	0.98	1.00	1	1.00	-0.15	0.08	0.08	0.10	-0.15	-0.09	-0.09	-0.08	0.81	0.80	0.80	0.80
CORR	nnnCSd1	0.20	0.12	0.12	0.13	-0.21	-0.18	-0.18	-0.18	0.98	1.00	1.00	1	-0.16	0.06	0.06	0.09	-0.17	-0.10	-0.10	-0.10	0.81	0.80	0.80	0.80
CORR	oooSBd2	0.67	0.69	0.69	0.67	0.66	0.65	0.65	0.65	-0.23	-0.15	-0.15	-0.16	1	0.95	0.95	0.91	0.69	0.66	0.66	0.58	-0.15	-0.12	-0.12	-0.13
CORR	oonSBd2	0.73	0.72	0.72	0.70	0.65	0.65	0.65	0.66	-0.01	0.08	0.08	0.06	0.95	1	1.00	0.96	0.67	0.67	0.67	0.60	0.08	0.11	0.11	0.10
CORR	onnSBd2	0.73	0.72	0.72	0.70	0.65	0.65	0.65	0.66	-0.01	0.08	0.08	0.06	0.95	1.00	1	0.96	0.67	0.67	0.67	0.60	0.08	0.11	0.11	0.10
CORR	nnnSBd2	0.70	0.69	0.69	0.69	0.53	0.53	0.53	0.59	0.04	0.10	0.10	0.09	0.91	0.96	0.96	1	0.56	0.56	0.56	0.55	0.13	0.15	0.15	0.15
CORR	oooCEd2	0.37	0.37	0.37	0.34	0.73	0.73	0.72	0.69	-0.26	-0.15	-0.15	-0.17	0.69	0.67	0.67	0.56	1	0.99	0.99	0.90	-0.21	-0.17	-0.17	-0.17
CORR	oonCEd2	0.38	0.37	0.37	0.34	0.72	0.72	0.71	0.68	-0.19	-0.09	-0.09	-0.10	0.66	0.67	0.67	0.56	0.99	1	1.00	0.91	-0.15	-0.10	-0.10	-0.10
CORR	onnCEd2	0.38	0.37	0.37	0.34	0.72	0.72	0.72	0.69	-0.20	-0.09	-0.09	-0.10	0.66	0.67	0.67	0.56	0.99	1.00	1	0.91	-0.15	-0.10	-0.10	-0.10
CORR	nnnCEd2	0.34	0.32	0.32	0.31	0.66	0.66	0.65	0.70	-0.17	-0.08	-0.08	-0.10	0.58	0.60	0.60	0.55	0.90	0.91	0.91	1	-0.13	-0.10	-0.10	-0.10
CORR	oooCSd2	0.29	0.23	0.23	0.24	-0.14	-0.12	-0.12	-0.11	0.82	0.81	0.81	0.81	-0.15	0.08	0.08	0.13	-0.21	-0.15	-0.15	-0.13	1	0.99	0.99	0.99
CORR	oonCSd2	0.27	0.21	0.21	0.23	-0.12	-0.10	-0.10	-0.10	0.79	0.80	0.80	0.80	-0.12	0.11	0.11	0.15	-0.17	-0.10	-0.10	-0.10	0.99	1	1.00	1.00
CORR	onnCSd2	0.28	0.21	0.21	0.23	-0.12	-0.10	-0.10	-0.10	0.79	0.80	0.80	0.80	-0.12	0.11	0.11	0.15	-0.17	-0.10	-0.10	-0.10	0.99	1.00	1	1.00
CORR	nnnCSd2	0.27	0.21	0.21	0.22	-0.12	-0.11	-0.11	-0.10	0.79	0.80	0.80	0.80	-0.13	0.10	0.10	0.15	-0.17	-0.10	-0.10	-0.10	0.99	1.00	1.00	1

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Correlations for different models for holstein bulls (born 2010-2015) with more than 500 offspring and 250 daugthers with offspring for SB and CE

Direct traits

TYPE	_NAME_	oooSBd1	oonSBd1	onnSBd1	nnnSBd1	oooCEd1	oonCEd1	onnCEd1	nnnCEd1	oooCSd1	oonCSd1	onnCSd1	nnnCSd1	oooSBd2	oonSBd2	onnSBd2	nnnSBd2	oooCEd2	oonCEd2	onnCEd2	nnnCEd2	oooCSd2	oonCSd2	onnCSd2	nnnCSd2
MEAN		0.066836	0.069991	0.069707	0.173129	0.133187	0.138778	0.137574	0.22107	-0.01928	-0.03496	-0.03588	-0.04088	0.039052	0.039832	0.039795	0.120054	0.094758	0.102534	0.101532	0.154627	-0.05803	-0.05962	-0.05888	-0.00527
STD		0.032317	0.03229	0.032292	0.058922	0.096473	0.096989	0.097008	0.101899	0.175201	0.175026	0.175029	0.208396	0.00762	0.007622	0.007601	0.016962	0.040134	0.040238	0.040232	0.049329	0.156972	0.156711	0.156683	0.190261
N		583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583
CORR	oooSBd1	1	1.00	1.00	1.00	0.52	0.53	0.53	0.53	-0.21	-0.21	-0.21	-0.22	0.55	0.55	0.55	0.52	0.37	0.38	0.38	0.38	-0.21	-0.22	-0.21	-0.22
CORR	oonSBd1	1.00	1	1.00	1.00	0.54	0.54	0.54	0.54	-0.24	-0.23	-0.23	-0.24	0.56	0.56	0.56	0.53	0.39	0.40	0.40	0.39	-0.23	-0.23	-0.23	-0.24
CORR	onnSBd1	1.00	1.00	1	1.00	0.54	0.54	0.54	0.54	-0.24	-0.23	-0.23	-0.24	0.56	0.56	0.56	0.53	0.39	0.40	0.40	0.39	-0.23	-0.23	-0.23	-0.24
CORR	nnnSBd1	1.00	1.00	1.00	1	0.52	0.52	0.52	0.52	-0.22	-0.21	-0.21	-0.22	0.56	0.56	0.56	0.53	0.37	0.38	0.38	0.38	-0.21	-0.22	-0.22	-0.23
CORR	oooCEd1	0.52	0.54	0.54	0.52	1	1.00	1.00	0.99	-0.81	-0.80	-0.80	-0.80	0.50	0.51	0.52	0.44	0.84	0.84	0.84	0.83	-0.79	-0.78	-0.78	-0.79
CORR	oonCEd1	0.53	0.54	0.54	0.52	1.00	1	1.00	0.99	-0.80	-0.79	-0.79	-0.79	0.50	0.51	0.51	0.44	0.84	0.84	0.84	0.83	-0.78	-0.78	-0.78	-0.78
CORR	onnCEd1	0.53	0.54	0.54	0.52	1.00	1.00	1	0.99	-0.80	-0.79	-0.79	-0.79	0.50	0.51	0.52	0.44	0.84	0.84	0.84	0.83	-0.78	-0.78	-0.77	-0.78
CORR	nnnCEd1	0.53	0.54	0.54	0.52	0.99	0.99	0.99	1	-0.78	-0.78	-0.78	-0.79	0.49	0.50	0.50	0.43	0.83	0.83	0.83	0.82	-0.77	-0.77	-0.77	-0.77
CORR	oooCSd1	-0.21	-0.24	-0.24	-0.22	-0.81	-0.80	-0.80	-0.78	1	1.00	1.00	1.00	-0.45	-0.47	-0.47	-0.41	-0.80	-0.77	-0.77	-0.74	0.96	0.95	0.95	0.95
CORR	oonCSd1	-0.21	-0.23	-0.23	-0.21	-0.80	-0.79	-0.79	-0.78	1.00	1	1.00	1.00	-0.44	-0.46	-0.46	-0.41	-0.79	-0.76	-0.76	-0.73	0.95	0.95	0.95	0.95
CORR	onnCSd1	-0.21	-0.23	-0.23	-0.21	-0.80	-0.79	-0.79	-0.78	1.00	1.00	1	1.00	-0.44	-0.46	-0.46	-0.41	-0.79	-0.76	-0.76	-0.73	0.95	0.95	0.95	0.95
CORR	nnnCSd1	-0.22	-0.24	-0.24	-0.22	-0.80	-0.79	-0.79	-0.79	1.00	1.00	1.00	1	-0.45	-0.46	-0.47	-0.41	-0.80	-0.76	-0.77	-0.74	0.95	0.95	0.95	0.95
CORR	oooSBd2	0.55	0.56	0.56	0.56	0.50	0.50	0.50	0.49	-0.45	-0.44	-0.44	-0.45	1	1.00	1.00	0.99	0.56	0.55	0.55	0.51	-0.42	-0.41	-0.41	-0.42
CORR	oonSBd2	0.55	0.56	0.56	0.56	0.51	0.51	0.51	0.50	-0.47	-0.46	-0.46	-0.46	1.00	1	1.00	0.99	0.57	0.56	0.56	0.52	-0.44	-0.43	-0.43	-0.44
CORR	onnSBd2	0.55	0.56	0.56	0.56	0.52	0.51	0.52	0.50	-0.47	-0.46	-0.46	-0.47	1.00	1.00	1	0.99	0.57	0.57	0.57	0.52	-0.44	-0.44	-0.44	-0.44
CORR	nnnSBd2	0.52	0.53	0.53	0.53	0.44	0.44	0.44	0.43	-0.41	-0.41	-0.41	-0.41	0.99	0.99	0.99	1	0.51	0.50	0.50	0.46	-0.38	-0.38	-0.38	-0.38
CORR	oooCEd2	0.37	0.39	0.39	0.37	0.84	0.84	0.84	0.83	-0.80	-0.79	-0.79	-0.80	0.56	0.57	0.57	0.51	1	1.00	1.00	0.96	-0.80	-0.79	-0.79	-0.79
CORR	oonCEd2	0.38	0.40	0.40	0.38	0.84	0.84	0.84	0.83	-0.77	-0.76	-0.76	-0.76	0.55	0.56	0.57	0.50	1.00	1	1.00	0.96	-0.77	-0.76	-0.76	-0.77
CORR	onnCEd2	0.38	0.40	0.40	0.38	0.84	0.84	0.84	0.83	-0.77	-0.76	-0.76	-0.77	0.55	0.56	0.57	0.50	1.00	1.00	1	0.96	-0.77	-0.76	-0.76	-0.77
CORR	nnnCEd2	0.38	0.39	0.39	0.38	0.83	0.83	0.83	0.82	-0.74	-0.73	-0.73	-0.74	0.51	0.52	0.52	0.46	0.96	0.96	0.96	1	-0.74	-0.73	-0.73	-0.74
CORR	oooCSd2	-0.21	-0.23	-0.23	-0.21	-0.79	-0.78	-0.78	-0.77	0.96	0.95	0.95	0.95	-0.42	-0.44	-0.44	-0.38	-0.80	-0.77	-0.77	-0.74	1	1.00	1.00	1.00
CORR	oonCSd2	-0.22	-0.23	-0.23	-0.22	-0.78	-0.78	-0.78	-0.77	0.95	0.95	0.95	0.95	-0.41	-0.43	-0.44	-0.38	-0.79	-0.76	-0.76	-0.73	1.00	1	1.00	1.00
CORR	onnCSd2	-0.21	-0.23	-0.23	-0.22	-0.78	-0.78	-0.77	-0.77	0.95	0.95	0.95	0.95	-0.41	-0.43	-0.44	-0.38	-0.79	-0.76	-0.76	-0.73	1.00	1.00	1	1.00
CORR	nnnCSd2	-0.22	-0.24	-0.24	-0.23	-0.79	-0.78	-0.78	-0.77	0.95	0.95	0.95	0.95	-0.42	-0.44	-0.44	-0.38	-0.79	-0.77	-0.77	-0.74	1.00	1.00	1.00	1

Maternal traits

TYPE	_NAME_	oooSBm1	oonSBm1	onnSBm1	nnnSBm1	oooCEm1	oonCEm1	onnCEm1	nnnCEm1	oooCSm1	oonCSm1	onnCSm1	nnnCSm1	oooSBm2	oonSBm2	onnSBm2	nnnSBm2	oooCEm2	oonCEm2	onnCEm2	nnnCEm2	oooCSm2	oonCSm2	onnCSm2	nnnCSm2
MEAN		0.016484	0.011145	0.011227	-0.0282	0.134887	0.129712	0.129249	0.08755	0.046558	0.081621	0.080545	0.141802	-0.00113	-0.00094	-0.00105	-0.03085	0.069271	0.064967	0.065044	0.05233	-0.0002	0.009796	0.009096	0.055103
STD		0.041171	0.041114	0.041119	0.07634	0.085979	0.085895	0.085889	0.092062	0.083418	0.083797	0.083786	0.099458	0.008814	0.008587	0.008585	0.017683	0.033108	0.032921	0.032882	0.037115	0.086834	0.087851	0.087686	0.105968
N		583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583
CORR	oooSBm1	1	1.00	1.00	1.00	0.64	0.64	0.64	0.63	0.09	0.11	0.11	0.11	0.65	0.67	0.67	0.64	0.27	0.27	0.27	0.23	0.26	0.24	0.24	0.24
CORR	oonSBm1	1.00	1	1.00	1.00	0.64	0.64	0.64	0.63	0.06	0.07	0.07	0.07	0.66	0.66	0.67	0.64	0.27	0.27	0.27	0.22	0.22	0.21	0.21	0.21
CORR	onnSBm1	1.00	1.00	1	1.00	0.64	0.64	0.64	0.63	0.06	0.07	0.07	0.07	0.66	0.66	0.67	0.64	0.27	0.27	0.27	0.22	0.22	0.21	0.21	0.21
CORR	nnnSBm1	1.00	1.00	1.00	1	0.63	0.63	0.63	0.62	0.06	0.07	0.07	0.07	0.65	0.66	0.66	0.64	0.26	0.26	0.26	0.21	0.23	0.21	0.21	0.21
CORR	oooCEm1	0.64	0.64	0.64	0.63	1	1.00	1.00	0.99	-0.37	-0.33	-0.33	-0.34	0.57	0.55	0.56	0.47	0.65	0.64	0.64	0.61	-0.16	-0.17	-0.16	-0.16
CORR	oonCEm1	0.64	0.64	0.64	0.63	1.00	1	1.00	0.99	-0.37	-0.33	-0.33	-0.33	0.57	0.55	0.56	0.47	0.65	0.64	0.64	0.61	-0.16	-0.16	-0.16	-0.16
CORR	onnCEm1	0.64	0.64	0.64	0.63	1.00	1.00	1	0.99	-0.37	-0.33	-0.33	-0.33	0.57	0.55	0.56	0.47	0.65	0.64	0.64	0.61	-0.16	-0.16	-0.16	-0.16
CORR	nnnCEm1	0.63	0.63	0.63	0.62	0.99	0.99	0.99	1	-0.37	-0.34	-0.34	-0.34	0.58	0.55	0.56	0.48	0.65	0.63	0.64	0.62	-0.18	-0.19	-0.19	-0.18
CORR	oooCSm1	0.09	0.06	0.06	0.06	-0.37	-0.37	-0.37	-0.37	1	1.00	1.00	0.99	-0.21	-0.03	-0.03	0.01	-0.29	-0.25	-0.25	-0.26	0.80	0.79	0.79	0.79
CORR	oonCSm1	0.11	0.07	0.07	0.07	-0.33	-0.33	-0.33	-0.34	1.00	1	1.00	1.00	-0.19	0.00	-0.01	0.03	-0.25	-0.21	-0.22	-0.23	0.80	0.79	0.79	0.79
CORR	onnCSm1	0.11	0.07	0.07	0.07	-0.33	-0.33	-0.33	-0.34	1.00	1.00	1	1.00	-0.19	0.00	-0.01	0.03	-0.25	-0.21	-0.22	-0.23	0.80	0.79	0.79	0.79
CORR	nnnCSm1	0.11	0.07	0.07	0.07	-0.34	-0.33	-0.33	-0.34	0.99	1.00	1.00	1	-0.19	-0.01	-0.01	0.02	-0.25	-0.21	-0.21	-0.23	0.80	0.79	0.79	0.80
CORR	oooSBm2	0.65	0.66	0.66	0.65	0.57	0.57	0.57	0.58	-0.21	-0.19	-0.19	-0.19	1	0.96	0.96	0.95	0.59	0.58	0.58	0.51	-0.10	-0.10	-0.10	-0.10
CORR	oonSBm2	0.67	0.66	0.66	0.66	0.55	0.55	0.55	0.55	-0.03	0.00	0.00	-0.01	0.96	1	1.00	0.99	0.58	0.58	0.58	0.51	0.10	0.10	0.10	0.10
CORR	onnSBm2	0.67	0.67	0.67	0.66	0.56	0.56	0.56	0.56	-0.03	-0.01	-0.01	-0.01	0.96	1.00	1	0.99	0.58	0.58	0.58	0.51	0.10	0.10	0.10	0.10
CORR	nnnSBm2	0.64	0.64	0.64	0.64	0.47	0.47	0.47	0.48	0.01	0.03	0.03	0.02	0.95	0.99	0.99	1	0.52	0.52	0.52	0.46	0.14	0.14	0.14	0.14
CORR	oooCEm2	0.27	0.27	0.27	0.26	0.65	0.65	0.65	0.65	-0.29	-0.25	-0.25	-0.25	0.59	0.58	0.58	0.52	1	1.00	1.00	0.95	-0.24	-0.24	-0.23	-0.22
CORR	oonCEm2	0.27	0.27	0.27	0.26	0.64	0.64	0.64	0.63	-0.25	-0.21	-0.21	-0.21	0.58	0.58	0.58	0.52	1.00	1	1.00	0.95	-0.20	-0.19	-0.19	-0.18
CORR	onnCEm2	0.27	0.27	0.27	0.26	0.64	0.64	0.64	0.64	-0.25	-0.22	-0.22	-0.21	0.58	0.58	0.58	0.52	1.00	1.00	1	0.95	-0.20	-0.20	-0.20	-0.19
CORR	nnnCEm2	0.23	0.22	0.22	0.21	0.61	0.61	0.61	0.62	-0.26	-0.23	-0.23	-0.23	0.51	0.51	0.51	0.46	0.95	0.95	0.95	1	-0.23	-0.23	-0.23	-0.22
CORR	oooCSm2	0.26	0.22	0.22	0.23	-0.16	-0.16	-0.16	-0.18	0.80	0.80	0.80	0.80	-0.10	0.10	0.10	0.14	-0.24	-0.20	-0.20	-0.23	1	1.00	1.00	1.00
CORR	oonCSm2	0.24	0.21	0.21	0.21	-0.17	-0.16	-0.16	-0.19	0.79	0.79	0.79	0.79	-0.10	0.10	0.10	0.14	-0.24	-0.19	-0.19	-0.23	1.00	1	1.00	1.00
CORR	onnCSm2	0.24	0.21	0.21	0.21	-0.16	-0.16	-0.16	-0.19	0.79	0.79	0.79	0.79	-0.10	0.10	0.10	0.14	-0.23	-0.19	-0.20	-0.23	1.00	1.00	1	1.00
CORR	nnnCSm2	0.24	0.21	0.21	0.21	-0.16	-0.16	-0.16	-0.18	0.79	0.79	0.79	0.80	-0.10	0.10	0.10	0.14	-0.22	-0.18	-0.19	-0.22	1.00	1.00	1.00	1

Correlations for different models for Jersey bulls (born 2010-2015) with more than 100 offspring and 50 daugthers with offspring for SB and CE

Direct traits

TYPE	_NAME_	oooSBd1	oonSBd1	onnSBd1	nnnSBd1	nooSBd1	oooCEd1	oonCEd1	onnCEd1	nnnCEd1	nooCEd1	oooCSd1	oonCSd1	onnCSd1	nnnCSd1	nooCSd1	oooSBd2	oonSBd2	onnSBd2	nnnSBd2	nooSBd2	oooCEd2	oonCEd2	onnCEd2	nnnCEd2	nooCEd2	oooCSd2	oonCSd2	onnCSd2	nnnCSd2	nooCSd2
MEAN		0.073448	0.070458	0.070442	0.184739	0.187449	0.076068	0.101005	0.100944	0.177633	0.131168	0.004098	-0.01627	-0.01648	0.014219	0.03676	0.051183	0.048994	0.049007	0.144926	0.146527	0.080671	0.093125	0.093067	0.183992	0.153796	-0.02261	-0.02902	-0.03033	-0.00574	-0.00911
STD		0.020701	0.020172	0.020174	0.040772	0.040677	0.023415	0.021452	0.021458	0.033361	0.030802	0.133076	0.136661	0.136664	0.171231	0.164894	0.008077	0.007874	0.007858	0.017217	0.016191	0.014634	0.012429	0.012406	0.020698	0.019649	0.127726	0.128378	0.128267	0.163772	0.161324
N		310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310
CORR	oooSBd1	1	0.98	0.98	0.97	1.00	0.35	0.54	0.54	0.49	0.43	0.14	0.14	0.14	0.13	0.14	0.84	0.83	0.83	0.75	0.83	0.21	0.41	0.41	0.33	0.29	0.14	0.15	0.15	0.14	0.15
CORR	oonSBd1	0.98	1	1.00	0.99	0.99	0.40	0.50	0.50	0.45	0.47	0.09	0.10	0.10	0.09	0.09	0.84	0.83	0.83	0.75	0.83	0.27	0.38	0.38	0.30	0.35	0.06	0.05	0.05	0.05	0.07
CORR	onnSBd1	0.98	1.00	1	0.99	0.99	0.40	0.50	0.50	0.45	0.47	0.09	0.10	0.10	0.09	0.09	0.84	0.83	0.83	0.75	0.83	0.27	0.38	0.38	0.30	0.35	0.06	0.05	0.05	0.05	0.07
CORR	nnnSBd1	0.97	0.99	0.99	1	0.98	0.42	0.54	0.54	0.50	0.50	0.07	0.09	0.09	0.08	0.08	0.87	0.86	0.86	0.81	0.86	0.29	0.42	0.42	0.36	0.38	0.04	0.04	0.04	0.04	0.05
CORR	nooSBd1	1.00	0.99	0.99	0.98	1	0.37	0.54	0.54	0.49	0.45	0.13	0.12	0.12	0.12	0.13	0.84	0.83	0.83	0.76	0.84	0.22	0.40	0.40	0.33	0.31	0.11	0.12	0.12	0.12	0.12
CORR	oooCEd1	0.35	0.40	0.40	0.42	0.37	1	0.82	0.82	0.79	0.98	-0.79	-0.74	-0.74	-0.74	-0.79	0.30	0.36	0.36	0.33	0.31	0.89	0.75	0.75	0.66	0.89	-0.81	-0.78	-0.78	-0.78	-0.80
CORR	oonCEd1	0.54	0.50	0.50	0.54	0.54	0.82	1	1.00	0.95	0.82	-0.44	-0.40	-0.40	-0.40	-0.43	0.43	0.42	0.42	0.39	0.42	0.63	0.86	0.86	0.73	0.65	-0.45	-0.42	-0.42	-0.42	-0.44
CORR	onnCEd1	0.54	0.50	0.50	0.54	0.54	0.82	1.00	1	0.95	0.82	-0.44	-0.40	-0.40	-0.40	-0.43	0.43	0.42	0.42	0.39	0.42	0.63	0.86	0.86	0.73	0.65	-0.45	-0.42	-0.42	-0.42	-0.44
CORR	nnnCEd1	0.49	0.45	0.45	0.50	0.49	0.79	0.95	0.95	1	0.81	-0.43	-0.39	-0.39	-0.39	-0.43	0.43	0.41	0.41	0.41	0.42	0.64	0.86	0.86	0.84	0.69	-0.45	-0.42	-0.42	-0.41	-0.44
CORR	nooCEd1	0.43	0.47	0.47	0.50	0.45	0.98	0.82	0.82	0.81	1	-0.76	-0.70	-0.70	-0.70	-0.76	0.39	0.44	0.44	0.41	0.40	0.88	0.76	0.76	0.69	0.91	-0.78	-0.76	-0.76	-0.76	-0.77
CORR	oooCSd1	0.14	0.09	0.09	0.07	0.13	-0.79	-0.44	-0.44	-0.43	-0.76	1	0.97	0.97	0.97	1.00	0.14	0.03	0.03	0.04	0.11	-0.81	-0.50	-0.50	-0.46	-0.78	0.96	0.93	0.93	0.93	0.95
CORR	oonCSd1	0.14	0.10	0.10	0.09	0.12	-0.74	-0.40	-0.40	-0.39	-0.70	0.97	1	1.00	1.00	0.97	0.18	0.03	0.03	0.03	0.13	-0.75	-0.47	-0.47	-0.42	-0.72	0.88	0.84	0.84	0.84	0.88
CORR	onnCSd1	0.14	0.10	0.10	0.09	0.12	-0.74	-0.40	-0.40	-0.39	-0.70	0.97	1.00	1	1.00	0.97	0.18	0.03	0.03	0.03	0.13	-0.75	-0.47	-0.47	-0.42	-0.72	0.88	0.84	0.84	0.84	0.88
CORR	nnnCSd1	0.13	0.09	0.09	0.08	0.12	-0.74	-0.40	-0.40	-0.39	-0.70	0.97	1.00	1.00	1	0.97	0.17	0.02	0.02	0.03	0.12	-0.75	-0.47	-0.47	-0.42	-0.72	0.88	0.83	0.83	0.83	0.88
CORR	nooCSd1	0.14	0.09	0.09	0.08	0.13	-0.79	-0.43	-0.43	-0.43	-0.76	1.00	0.97	0.97	0.97	1	0.15	0.04	0.04	0.04	0.12	-0.80	-0.49	-0.49	-0.46	-0.78	0.96	0.93	0.93	0.93	0.96
CORR	oooSBd2	0.84	0.84	0.84	0.87	0.84	0.30	0.43	0.43	0.43	0.39	0.14	0.18	0.18	0.17	0.15	1	0.97	0.97	0.95	0.99	0.27	0.43	0.43	0.40	0.37	0.09	0.08	0.08	0.07	0.09
CORR	oonSBd2	0.83	0.83	0.83	0.86	0.83	0.36	0.42	0.42	0.41	0.44	0.03	0.03	0.03	0.02	0.04	0.97	1	1.00	0.98	0.99	0.35	0.44	0.44	0.41	0.45	0.03	0.04	0.04	0.04	0.03
CORR	onnSBd2	0.83	0.83	0.83	0.86	0.83	0.36	0.42	0.42	0.41	0.44	0.03	0.03	0.03	0.02	0.04	0.97	1.00	1	0.98	0.98	0.35	0.44	0.44	0.41	0.45	0.03	0.04	0.04	0.04	0.03
CORR	nnnSBd2	0.75	0.75	0.75	0.81	0.76	0.33	0.39	0.39	0.41	0.41	0.04	0.03	0.03	0.03	0.04	0.95	0.98	0.98	1	0.97	0.34	0.43	0.43	0.43	0.44	0.03	0.04	0.04	0.03	0.03
CORR	nooSBd2	0.83	0.83	0.83	0.86	0.84	0.31	0.42	0.42	0.42	0.40	0.11	0.13	0.13	0.12	0.12	0.99	0.99	0.98	0.97	1	0.28	0.41	0.41	0.39	0.39	0.08	0.08	0.08	0.07	0.08
CORR	oooCEd2	0.21	0.27	0.27	0.29	0.22	0.89	0.63	0.63	0.64	0.88	-0.81	-0.75	-0.75	-0.75	-0.80	0.27	0.35	0.35	0.34	0.28	1	0.79	0.79	0.74	0.98	-0.81	-0.78	-0.78	-0.78	-0.80
CORR	oonCEd2	0.41	0.38	0.38	0.42	0.40	0.75	0.86	0.86	0.86	0.76	-0.50	-0.47	-0.47	-0.47	-0.49	0.43	0.44	0.44	0.43	0.41	0.79	1	1.00	0.91	0.79	-0.49	-0.45	-0.45	-0.45	-0.48
CORR	onnCEd2	0.41	0.38	0.38	0.42	0.40	0.75	0.86	0.86	0.86	0.76	-0.50	-0.47	-0.47	-0.47	-0.49	0.43	0.44	0.44	0.43	0.41	0.79	1.00	1	0.91	0.79	-0.49	-0.45	-0.45	-0.45	-0.48
CORR	nnnCEd2	0.33	0.30	0.30	0.36	0.33	0.66	0.73	0.73	0.84	0.69	-0.46	-0.42	-0.42	-0.42	-0.46	0.40	0.41	0.41	0.43	0.39	0.74	0.91	0.91	1	0.79	-0.45	-0.42	-0.42	-0.42	-0.46
CORR	nooCEd2	0.29	0.35	0.35	0.38	0.31	0.89	0.65	0.65	0.69	0.91	-0.78	-0.72	-0.72	-0.72	-0.78	0.37	0.45	0.44	0.44	0.39	0.98	0.79	0.79	0.79	1	-0.78	-0.76	-0.76	-0.76	-0.78
CORR	oooCSd2	0.14	0.06	0.06	0.04	0.11	-0.81	-0.45	-0.45	-0.45	-0.78	0.96	0.88	0.88	0.88	0.96	0.09	0.03	0.03	0.03	0.08	-0.81	-0.49	-0.49	-0.45	-0.78	1	0.99	0.99	0.99	1.00
CORR	oonCSd2	0.15	0.05	0.05	0.04	0.12	-0.78	-0.42	-0.42	-0.42	-0.76	0.93	0.84	0.84	0.83	0.93	0.08	0.04	0.04	0.04	0.08	-0.78	-0.45	-0.45	-0.42	-0.76	0.99	1	1.00	1.00	0.99
CORR	onnCSd2	0.15	0.05	0.05	0.04	0.12	-0.78	-0.42	-0.42	-0.42	-0.76	0.93	0.84	0.84	0.83	0.93	0.08	0.04	0.04	0.04	0.08	-0.78	-0.45	-0.45	-0.42	-0.76	0.99	1.00	1	1.00	0.99
CORR	nnnCSd2	0.14	0.05	0.05	0.04	0.12	-0.78	-0.42	-0.42	-0.41	-0.76	0.93	0.84	0.84	0.83	0.93	0.07	0.03	0.03	0.03	0.07	-0.78	-0.45	-0.45	-0.42	-0.76	0.99	1.00	1.00	1	0.99
CORR	nooCSd2	0.15	0.07	0.07	0.05	0.12	-0.80	-0.44	-0.44	-0.44	-0.77	0.95	0.88	0.88	0.88	0.96	0.09	0.03	0.03	0.03	0.08	-0.80	-0.48	-0.48	-0.46	-0.78	1.00	0.99	0.99	0.99	1

Maternal traits

TYPE	_NAME_	oooSBm1	oonSBm1	onnSBm1	nnnSBm1	nooSBm1	oooCEm1	oonCEm1	onnCEm1	nnnCEm1	nooCEm1	oooCSm1	oonCSm1	onnCSm1	nnnCSm1	nooCSm1	oooSBm2	oonSBm2	onnSBm2	nnnSBm2	nooSBm2	oooCEm2	oonCEm2	onnCEm2	nnnCEm2	nooCEm2	oooCSm2	oonCSm2	onnCSm2	nnnCSm2	nooCSm2
MEAN		-0.03942	-0.04011	-0.04008	-0.10533	-0.10759	-0.02952	-0.03888	-0.03901	-0.06836	-0.05862	0.03667	0.046164	0.046472	0.035054	0.019838	-0.02722	-0.02601	-0.02603	-0.07859	-0.08044	-0.03071	-0.03544	-0.03545	-0.07565	-0.06626	0.027302	0.018332	0.018749	-0.00844	0.010937
STD		0.024433	0.023876	0.023873	0.046795	0.04551	0.033716	0.033466	0.033462	0.048883	0.04321	0.064577	0.066072	0.066033	0.079578	0.07977	0.007573	0.00741	0.00737	0.017018	0.015357	0.012318	0.011981	0.011913	0.02156	0.01646	0.060511	0.058924	0.058428	0.071963	0.074763
N		310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310	310
CORR	oooSBm1	1	0.99	0.99	0.98	0.99	0.79	0.79	0.79	0.73	0.81	0.25	0.27	0.27	0.25	0.29	0.51	0.54	0.54	0.48	0.54	0.34	0.38	0.38	0.30	0.30	0.10	0.12	0.12	0.12	0.06
CORR	oonSBm1	0.99	1	1.00	1.00	0.99	0.77	0.75	0.75	0.69	0.80	0.21	0.18	0.18	0.17	0.25	0.54	0.55	0.55	0.48	0.56	0.33	0.35	0.36	0.28	0.29	0.07	0.13	0.13	0.12	0.04
CORR	onnSBm1	0.99	1.00	1	1.00	0.99	0.77	0.75	0.75	0.69	0.80	0.21	0.18	0.18	0.17	0.25	0.53	0.55	0.55	0.48	0.56	0.33	0.35	0.36	0.28	0.29	0.07	0.13	0.13	0.12	0.04
CORR	nnnSBm1	0.98	1.00	1.00	1	0.99	0.77	0.76	0.76	0.71	0.80	0.21	0.19	0.19	0.18	0.25	0.55	0.56	0.57	0.51	0.58	0.34	0.36	0.37	0.29	0.30	0.08	0.13	0.13	0.12	0.04
CORR	nooSBm1	0.99	0.99	0.99	0.99	1	0.77	0.76	0.76	0.70	0.80	0.24	0.24	0.24	0.23	0.28	0.54	0.56	0.56	0.50	0.57	0.34	0.37	0.37	0.29	0.30	0.09	0.12	0.12	0.11	0.05
CORR	oooCEm1	0.79	0.77	0.77	0.77	0.77	1	0.97	0.97	0.93	0.98	-0.12	-0.08	-0.08	-0.09	-0.08	0.38	0.40	0.40	0.34	0.39	0.65	0.63	0.63	0.53	0.59	-0.16	-0.09	-0.09	-0.09	-0.19
CORR	oonCEm1	0.79	0.75	0.75	0.76	0.76	0.97	1	1.00	0.97	0.95	0.04	0.07	0.07	0.06	0.07	0.36	0.39	0.39	0.33	0.38	0.59	0.64	0.65	0.54	0.54	0.01	0.07	0.07	0.07	-0.01
CORR	onnCEm1	0.79	0.75	0.75	0.76	0.76	0.97	1.00	1	0.97	0.95	0.04	0.07	0.07	0.06	0.07	0.36	0.38	0.39	0.33	0.37	0.59	0.64	0.65	0.54	0.54	0.01	0.07	0.07	0.07	-0.01
CORR	nnnCEm1	0.73	0.69	0.69	0.71	0.70	0.93	0.97	0.97	1	0.94	0.03	0.07	0.07	0.06	0.06	0.35	0.37	0.37	0.32	0.36	0.59	0.64	0.64	0.58	0.56	0.01	0.06	0.06	0.07	-0.01
CORR	nooCEm1	0.81	0.80	0.80	0.80	0.80	0.98	0.95	0.95	0.94	1	-0.11	-0.08	-0.08	-0.09	-0.08	0.41	0.43	0.43	0.36	0.42	0.63	0.61	0.61	0.54	0.59	-0.16	-0.09	-0.09	-0.09	-0.19
CORR	oooCSm1	0.25	0.21	0.21	0.21	0.24	-0.12	0.04	0.04	0.03	-0.11	1	0.96	0.96	0.95	0.99	0.03	0.04	0.04	0.04	0.05	-0.32	-0.09	-0.09	-0.10	-0.30	0.94	0.87	0.88	0.87	0.93
CORR	oonCSm1	0.27	0.18	0.18	0.19	0.24	-0.08	0.07	0.07	0.07	-0.08	0.96	1	1.00	0.99	0.95	0.01	0.05	0.05	0.05	0.04	-0.24	-0.03	-0.03	-0.04	-0.23	0.85	0.74	0.74	0.74	0.84
CORR	onnCSm1	0.27	0.18	0.18	0.19	0.24	-0.08	0.07	0.07	0.07	-0.08	0.96	1.00	1	0.99	0.95	0.01	0.05	0.05	0.05	0.04	-0.24	-0.03	-0.03	-0.04	-0.23	0.85	0.74	0.74	0.73	0.84
CORR	nnnCSm1	0.25	0.17	0.17	0.18	0.23	-0.09	0.06	0.06	0.06	-0.09	0.95	0.99	0.99	1	0.95	0.02	0.06	0.06	0.06	0.04	-0.24	-0.03	-0.03	-0.03	-0.22	0.84	0.73	0.74	0.74	0.84
CORR	nooCSm1	0.29	0.25	0.25	0.25	0.28	-0.08	0.07	0.07	0.06	-0.08	0.99	0.95	0.95	0.95	1	0.05	0.05	0.05	0.05	0.07	-0.30	-0.08	-0.08	-0.09	-0.29	0.93	0.87	0.87	0.87	0.93
CORR	oooSBm2	0.51	0.54	0.53	0.55	0.54	0.38	0.36	0.36	0.35	0.41	0.03	0.01	0.01	0.02	0.05	1	0.99	0.99	0.97	0.99	0.55	0.58	0.58	0.52	0.56	0.02	0.09	0.08	0.07	0.01
CORR	oonSBm2	0.54	0.55	0.55	0.56	0.56	0.40	0.39	0.38	0.37	0.43	0.04	0.05	0.05	0.06	0.05	0.99	1	1.00	0.99	0.99	0.56	0.58	0.58	0.52	0.56	0.00	0.03	0.03	0.02	-0.01
CORR	onnSBm2	0.54	0.55	0.55	0.57	0.56	0.40	0.39	0.39	0.37	0.43	0.04	0.05	0.05	0.06	0.05	0.99	1.00	1	0.99	0.99	0.56	0.58	0.58	0.52	0.57	0.00	0.03	0.03	0.02	-0.01
CORR	nnnSBm2	0.48	0.48	0.48	0.51	0.50	0.34	0.33	0.33	0.32	0.36	0.04	0.05	0.05	0.06	0.06	0.97	0.99	0.99	1	0.98	0.53	0.56	0.56	0.53	0.56	0.01	0.03	0.03	0.02	0.00
CORR	nooSBm2	0.54	0.56	0.56	0.58	0.57	0.39	0.38	0.37	0.36	0.42	0.05	0.04	0.04	0.04	0.07	0.99	0.99	0.99	0.98	1	0.51	0.54	0.54	0.49	0.53	0.03	0.08	0.08	0.07	0.02
CORR	oooCEm2	0.34	0.33	0.33	0.34	0.34	0.65	0.59	0.59	0.59	0.63	-0.32	-0.24	-0.24	-0.24	-0.30	0.55	0.56	0.56	0.53	0.51	1	0.95	0.95	0.90	0.96	-0.33	-0.28	-0.28	-0.28	-0.34
CORR	oonCEm2	0.38	0.35	0.35	0.36	0.37	0.63	0.64	0.64	0.64	0.61	-0.09	-0.03	-0.03	-0.03	-0.08	0.58	0.58	0.58	0.56	0.54	0.95	1	1.00	0.94	0.92	-0.09	-0.05	-0.05	-0.06	-0.10
CORR	onnCEm2	0.38	0.36	0.36	0.37	0.37	0.63	0.65	0.65	0.64	0.61	-0.09	-0.03	-0.03	-0.03	-0.08	0.58	0.58	0.58	0.56	0.54	0.95	1.00	1	0.93	0.92	-0.09	-0.05	-0.05	-0.06	-0.10
CORR	nnnCEm2	0.30	0.28	0.28	0.29	0.29	0.53	0.54	0.54	0.58	0.54	-0.10	-0.04	-0.04	-0.03	-0.09	0.52	0.52	0.52	0.53	0.49	0.90	0.94	0.93	1	0.94	-0.09	-0.06	-0.06	-0.06	-0.11
CORR	nooCEm2	0.30	0.29	0.29	0.30	0.30	0.59	0.54	0.54	0.56	0.59	-0.30	-0.23	-0.23	-0.22	-0.29	0.56	0.56	0.57	0.56	0.53	0.96	0.92	0.92	0.94	1	-0.30	-0.25	-0.25	-0.26	-0.31
CORR	oooCSm2	0.10	0.07	0.07	0.08	0.09	-0.16	0.01	0.01	0.01	-0.16	0.94	0.85	0.85	0.84	0.93	0.02	0.00	0.00	0.01	0.03	-0.33	-0.09	-0.09	-0.09	-0.30	1	0.97	0.97	0.96	0.99
CORR	oonCSm2	0.12	0.13	0.13	0.13	0.12	-0.09	0.07	0.07	0.06	-0.09	0.87	0.74	0.74	0.73	0.87	0.09	0.03	0.03	0.03	0.08	-0.28	-0.05	-0.05	-0.06	-0.25	0.97	1	1.00	0.99	0.96
CORR	onnCSm2	0.12	0.13	0.13	0.13	0.12	-0.09	0.07	0.07	0.06	-0.09	0.88	0.74	0.74	0.74	0.87	0.08	0.03	0.03	0.03	0.08	-0.28	-0.05	-0.05	-0.06	-0.25	0.97	1.00	1	0.99	0.96
CORR	nnnCSm2	0.12	0.12	0.12	0.12	0.11	-0.09	0.07	0.07	0.07	-0.09	0.87	0.74	0.73	0.74	0.87	0.07	0.02	0.02	0.02	0.07	-0.28	-0.06	-0.06	-0.06	-0.26	0.96	0.99	0.99	1	0.97
CORR	nooCSm2	0.06	0.04	0.04	0.04	0.05	-0.19	-0.01	-0.01	-0.01	-0.19	0.93	0.84	0.84	0.84	0.93	0.01	-0.01	-0.01	0.00	0.02	-0.34	-0.10	-0.10	-0.11	-0.31	0.99	0.96	0.96	0.97	1

Correlations for different models for RDC bulls (born 2010-2015) with more than 300 offspring and 100 daugthers with offspring for SB and CE

Direct traits

TYPE	_NAME_	oooSBd1	nnnSBd1	nnhSBd1	oooCEd1	nnnCEd1	nnhCEd1	oooCSd1	nnnCSd1	nnhCSd1	oooSBd2	nnnSBd2	nnhSBd2	oooCEd2	nnnCEd2	nnhCEd2	oooCSd2	nnnCSd2	nnhCSd2
MEAN		0.034537	0.11587	0.10643	0.022677	0.048208	0.033613	0.10558	0.135673	0.171725	0.011915	0.087538	0.085554	-0.00089	0.023724	0.025106	0.034375	0.008617	0.037319
STD		0.022535	0.043698	0.044094	0.13537	0.159051	0.159007	0.297074	0.331798	0.331947	0.010777	0.032704	0.032674	0.066429	0.083366	0.083356	0.273776	0.30462	0.305033
N		353	353	353	353	353	353	353	353	353	353	353	353	353	353	353	353	353	353
CORR	oooSBd1	1	0.98	0.98	0.76	0.75	0.75	-0.64	-0.67	-0.67	0.60	0.57	0.57	0.66	0.61	0.61	-0.63	-0.63	-0.63
CORR	nnnSBd1	0.98	1	1.00	0.72	0.71	0.71	-0.62	-0.67	-0.67	0.61	0.57	0.57	0.63	0.58	0.58	-0.62	-0.63	-0.63
CORR	nnhSBd1	0.98	1.00	1	0.71	0.70	0.70	-0.61	-0.66	-0.66	0.60	0.56	0.56	0.62	0.57	0.57	-0.61	-0.62	-0.62
CORR	oooCEd1	0.76	0.72	0.71	1	0.98	0.98	-0.94	-0.92	-0.93	0.45	0.42	0.42	0.96	0.92	0.92	-0.92	-0.89	-0.89
CORR	nnnCEd1	0.75	0.71	0.70	0.98	1	1.00	-0.91	-0.91	-0.91	0.42	0.40	0.40	0.93	0.91	0.91	-0.88	-0.86	-0.86
CORR	nnhCEd1	0.75	0.71	0.70	0.98	1.00	1	-0.91	-0.91	-0.91	0.42	0.40	0.40	0.93	0.91	0.91	-0.88	-0.86	-0.86
CORR	oooCSd1	-0.64	-0.62	-0.61	-0.94	-0.91	-0.91	1	0.98	0.98	-0.47	-0.40	-0.40	-0.96	-0.91	-0.91	0.95	0.93	0.93
CORR	nnnCSd1	-0.67	-0.67	-0.66	-0.92	-0.91	-0.91	0.98	1	1.00	-0.47	-0.40	-0.40	-0.93	-0.88	-0.88	0.93	0.92	0.92
CORR	nnhCSd1	-0.67	-0.67	-0.66	-0.93	-0.91	-0.91	0.98	1.00	1	-0.47	-0.40	-0.40	-0.93	-0.88	-0.88	0.93	0.92	0.92
CORR	oooSBd2	0.60	0.61	0.60	0.45	0.42	0.42	-0.47	-0.47	-0.47	1	0.95	0.95	0.57	0.53	0.53	-0.51	-0.52	-0.52
CORR	nnnSBd2	0.57	0.57	0.56	0.42	0.40	0.40	-0.40	-0.40	-0.40	0.95	1	1.00	0.50	0.46	0.46	-0.43	-0.44	-0.44
CORR	nnhSBd2	0.57	0.57	0.56	0.42	0.40	0.40	-0.40	-0.40	-0.40	0.95	1.00	1	0.50	0.46	0.46	-0.43	-0.43	-0.43
CORR	oooCEd2	0.66	0.63	0.62	0.96	0.93	0.93	-0.96	-0.93	-0.93	0.57	0.50	0.50	1	0.97	0.97	-0.93	-0.90	-0.90
CORR	nnnCEd2	0.61	0.58	0.57	0.92	0.91	0.91	-0.91	-0.88	-0.88	0.53	0.46	0.46	0.97	1	1.00	-0.88	-0.86	-0.86
CORR	nnhCEd2	0.61	0.58	0.57	0.92	0.91	0.91	-0.91	-0.88	-0.88	0.53	0.46	0.46	0.97	1.00	1	-0.88	-0.86	-0.86
CORR	oooCSd2	-0.63	-0.62	-0.61	-0.92	-0.88	-0.88	0.95	0.93	0.93	-0.51	-0.43	-0.43	-0.93	-0.88	-0.88	1	0.99	0.99
CORR	nnnCSd2	-0.63	-0.63	-0.62	-0.89	-0.86	-0.86	0.93	0.92	0.92	-0.52	-0.44	-0.43	-0.90	-0.86	-0.86	0.99	1	1.00
CORR	nnhCSd2	-0.63	-0.63	-0.62	-0.89	-0.86	-0.86	0.93	0.92	0.92	-0.52	-0.44	-0.43	-0.90	-0.86	-0.86	0.99	1.00	1

Maternal traits

TYPE	_NAME_	oooSBm1	nnnSBm1	nnhSBm1	oooCEm1	nnnCEm1	nnhCEm1	oooCSm1	nnnCSm1	nnhCSm1	oooSBm2	nnnSBm2	nnhSBm2	oooCEm2	nnnCEm2	nnhCEm2	oooCSm2	nnnCSm2	nnhCSm2
MEAN		0.023957	0.03215	0.019634	0.154413	0.181849	0.171287	-0.06971	0.00411	-0.00158	0.009512	-0.01828	-0.02454	0.086751	0.085999	0.086521	-0.06453	-0.04108	-0.06529
STD		0.019448	0.04148	0.041816	0.088345	0.112851	0.112994	0.105127	0.115609	0.115484	0.010025	0.026392	0.026519	0.042802	0.05383	0.053945	0.084176	0.097074	0.098204
N		353	353	353	353	353	353	353	353	353	353	353	353	353	353	353	353	353	353
CORR	oooSBm1	1	0.96	0.96	0.69	0.64	0.65	-0.17	-0.05	-0.04	0.62	0.57	0.57	0.48	0.38	0.39	0.04	0.02	0.03
CORR	nnnSBm1	0.96	1	0.99	0.60	0.56	0.56	-0.19	-0.11	-0.11	0.64	0.57	0.57	0.43	0.35	0.36	-0.05	-0.08	-0.08
CORR	nnhSBm1	0.96	0.99	1	0.59	0.55	0.56	-0.18	-0.10	-0.09	0.63	0.57	0.58	0.43	0.35	0.36	-0.04	-0.07	-0.06
CORR	oooCEm1	0.69	0.60	0.59	1	0.96	0.96	-0.57	-0.37	-0.37	0.63	0.48	0.47	0.83	0.73	0.73	-0.33	-0.31	-0.31
CORR	nnnCEm1	0.64	0.56	0.55	0.96	1	1.00	-0.50	-0.30	-0.30	0.59	0.46	0.45	0.82	0.75	0.75	-0.30	-0.29	-0.29
CORR	nnhCEm1	0.65	0.56	0.56	0.96	1.00	1	-0.49	-0.29	-0.29	0.60	0.46	0.46	0.82	0.75	0.76	-0.30	-0.28	-0.28
CORR	oooCSm1	-0.17	-0.19	-0.18	-0.57	-0.50	-0.49	1	0.95	0.95	-0.46	-0.27	-0.26	-0.46	-0.40	-0.40	0.81	0.76	0.76
CORR	nnnCSm1	-0.05	-0.11	-0.10	-0.37	-0.30	-0.29	0.95	1	1.00	-0.33	-0.20	-0.19	-0.28	-0.26	-0.26	0.77	0.74	0.74
CORR	nnhCSm1	-0.04	-0.11	-0.09	-0.37	-0.30	-0.29	0.95	1.00	1	-0.33	-0.20	-0.19	-0.28	-0.27	-0.27	0.77	0.74	0.74
CORR	oooSBm2	0.62	0.64	0.63	0.63	0.59	0.60	-0.46	-0.33	-0.33	1	0.83	0.82	0.77	0.64	0.64	-0.55	-0.47	-0.46
CORR	nnnSBm2	0.57	0.57	0.57	0.48	0.46	0.46	-0.27	-0.20	-0.20	0.83	1	1.00	0.55	0.52	0.52	-0.26	-0.15	-0.15
CORR	nnhSBm2	0.57	0.57	0.58	0.47	0.45	0.46	-0.26	-0.19	-0.19	0.82	1.00	1	0.55	0.52	0.52	-0.25	-0.14	-0.13
CORR	oooCEm2	0.48	0.43	0.43	0.83	0.82	0.82	-0.46	-0.28	-0.28	0.77	0.55	0.55	1	0.90	0.90	-0.48	-0.40	-0.40
CORR	nnnCEm2	0.38	0.35	0.35	0.73	0.75	0.75	-0.40	-0.26	-0.27	0.64	0.52	0.52	0.90	1	1.00	-0.40	-0.31	-0.31
CORR	nnhCEm2	0.39	0.36	0.36	0.73	0.75	0.76	-0.40	-0.26	-0.27	0.64	0.52	0.52	0.90	1.00	1	-0.39	-0.31	-0.30
CORR	oooCSm2	0.04	-0.05	-0.04	-0.33	-0.30	-0.30	0.81	0.77	0.77	-0.55	-0.26	-0.25	-0.48	-0.40	-0.39	1	0.96	0.95
CORR	nnnCSm2	0.02	-0.08	-0.07	-0.31	-0.29	-0.28	0.76	0.74	0.74	-0.47	-0.15	-0.14	-0.40	-0.31	-0.31	0.96	1	1.00
CORR	nnhCSm2	0.03	-0.08	-0.06	-0.31	-0.29	-0.28	0.76	0.74	0.74	-0.46	-0.15	-0.13	-0.40	-0.31	-0.30	0.95	1.00	1