

Comparison of current pedigree and proposed for production test day model

28. June 2022, Ulrik Sander Nielsen

In the current test day model for production there are several hundred phantom parent groups. These groups cannot directly be used in the SS model for production. RDC will not converge. It was proposed that the simpler way of building the pedigree used for type trait estimation also could be used for production. These two ways of building the pedigree entering the traditional test day model for production were tested on May 2022 data by FABA. The two methods are compared in this document. All cows born after 1990 with minimum 6 test day records were included. Cows were divided by:

- Year of birth
- Year of birth and country of origin
- Genotyped cows. These cows were selected because a large part will have special interest.

Yearly means and correlations between indexes from the two pedigrees were calculated. The used abbreviations are:

- M_mlk: Mean of current milk index
- M_fat: Mean of current fat index
- M_prt: Mean of current protein index
- M_mlk_red: Mean of milk index with proposed pedigree
- M_fat_red: Mean of fat index with proposed pedigree
- M_prt_red: Mean of protein index with proposed pedigree
- Cor_mlk: Correlation between the milk indexes
- Cor_fat: Correlation between the fat indexes.

Results:

- Overall correlations within birth year were 0.99 or higher for nearly all years for HOL, RDC, and JER. Means within years were nearly the same.
- Within country-of-origin correlations of indexes were lower for small populations in the oldest year batches and the means varies a little bit more. For the newest year batches differences in means are very small and correlations are high. For countries, where the breeds have a large population, the correlations are above 0.99.
- The correlations within genotyped cows are above 0.99. Also means are the same.

My recommendation would be to use the simpler method to form the traditional pedigree file for singlestep production evaluation. Partly it will be simpler to use and partly it is then possible to use the same principle in the development of singlestep for other traits. In addition, it will be easier to hand over the calculation to other people.

HOL:

Overall statistics:

Obs	year	n_cow	m_mlk	m_fat	m_prt	m_mlk_ red	m_fat_ red	m_prt_ red	cor_mlk	cor_fat	cor_prt
1	1991	36432	73.935	79.570	66.724	74.685	80.411	67.717	0.99868	0.99912	0.99649
2	1992	48737	73.505	78.433	66.529	74.146	79.156	67.400	0.99853	0.99889	0.99578
3	1993	67297	73.453	76.588	66.190	73.981	77.201	66.933	0.99761	0.99816	0.99300
4	1994	91951	73.640	77.766	66.760	74.124	78.304	67.440	0.99716	0.99770	0.99185
5	1995	111532	74.614	78.148	67.282	75.207	78.758	68.072	0.99710	0.99792	0.99283
6	1996	127762	75.941	78.312	68.060	76.460	78.880	68.773	0.99702	0.99787	0.99370
7	1997	156066	77.869	77.435	69.494	78.196	77.884	70.022	0.99743	0.99806	0.99541
8	1998	171773	79.112	78.138	70.865	79.305	78.500	71.257	0.99732	0.99825	0.99578
9	1999	182306	80.151	79.840	72.340	80.331	80.202	72.714	0.99768	0.99853	0.99641
10	2000	188719	81.335	80.630	73.736	81.649	81.104	74.257	0.99784	0.99845	0.99664
11	2001	191566	82.722	81.646	75.056	82.991	82.083	75.527	0.99882	0.99906	0.99820
12	2002	194332	84.133	82.740	76.618	84.292	83.071	76.953	0.99865	0.99892	0.99797
13	2003	195761	85.536	83.615	78.347	85.623	83.867	78.589	0.99838	0.99868	0.99747
14	2004	195676	86.977	85.148	80.154	87.022	85.360	80.347	0.99840	0.99873	0.99768
15	2005	193972	87.660	86.383	81.503	87.815	86.685	81.834	0.99900	0.99916	0.99856
16	2006	201112	89.726	87.812	83.735	89.848	88.087	84.016	0.99921	0.99926	0.99891
17	2007	196244	91.011	88.662	85.350	91.099	88.893	85.567	0.99917	0.99920	0.99884
18	2008	201169	92.126	89.635	86.702	92.154	89.817	86.842	0.99892	0.99897	0.99851
19	2009	203900	93.822	90.718	88.802	93.796	90.858	88.873	0.99885	0.99895	0.99833
20	2010	199574	95.205	92.341	90.560	95.283	92.560	90.757	0.99941	0.99954	0.99920
21	2011	196657	95.919	92.740	91.828	95.972	92.943	91.990	0.99945	0.99961	0.99935
22	2012	197365	97.017	93.857	93.621	97.032	94.021	93.723	0.99947	0.99960	0.99940
23	2013	193763	97.316	94.237	94.345	97.324	94.379	94.415	0.99954	0.99965	0.99943
24	2014	192216	97.647	95.345	95.715	97.634	95.474	95.752	0.99955	0.99964	0.99940
25	2015	187930	99.148	96.502	97.506	99.176	96.687	97.605	0.99957	0.99969	0.99949
26	2016	184961	99.348	97.922	98.523	99.389	98.096	98.621	0.99956	0.99965	0.99945
27	2017	174265	100.353	99.804	100.029	100.371	99.894	100.069	0.99955	0.99967	0.99940
28	2018	168531	100.009	99.901	100.120	100.020	99.888	100.118	0.99949	0.99957	0.99926
29	2019	73012	102.413	103.024	102.957	102.344	102.908	102.875	0.99890	0.99864	0.99850
30	2020	23	106.695	103.967	104.833	106.674	103.929	104.830	0.99975	0.99976	0.99971

Statistics within country of origin:

Obs	cont	year	n_cow	m_mlk	m_fat	m_prt	m_mlk_ red	m_fat_ red	m_prt_ red	cor_mlk	cor_fat	cor
1	DNK	1991	34362	73.958	80.217	66.846	74.682	81.033	67.811	0.99887	0.99915	0.9
2	DNK	1992	41385	73.326	79.567	66.731	73.914	80.235	67.539	0.99890	0.99904	0.9
3	DNK	1993	45935	72.678	77.935	66.403	73.058	78.398	66.974	0.99826	0.99853	0.9
4	DNK	1994	62587	72.828	79.531	66.949	73.138	79.886	67.423	0.99767	0.99788	0.9
5	DNK	1995	78844	73.992	80.111	67.541	74.454	80.574	68.173	0.99758	0.99805	0.9
6	DNK	1996	85833	75.476	79.929	68.130	75.869	80.355	68.687	0.99753	0.99791	0.9
7	DNK	1997	102214	77.574	78.773	69.721	77.742	79.061	70.066	0.99796	0.99826	0.9
8	DNK	1998	111932	78.981	79.722	71.244	79.004	79.931	71.450	0.99783	0.99845	0.9
9	DNK	1999	117093	79.969	81.816	72.793	80.010	82.056	73.013	0.99847	0.99888	0.9
10	DNK	2000	120081	81.391	82.220	74.200	81.575	82.575	74.571	0.99878	0.99899	0.9
11	DNK	2001	118818	82.668	83.286	75.450	82.812	83.599	75.773	0.99931	0.99942	0.9
12	DNK	2002	119811	83.863	84.396	76.547	83.913	84.619	76.757	0.99947	0.99951	0.9
13	DNK	2003	120666	85.455	85.294	78.581	85.421	85.443	78.692	0.99944	0.99948	0.9
14	DNK	2004	119962	87.145	86.919	80.620	87.079	87.037	80.698	0.99930	0.99936	0.9
15	DNK	2005	119074	87.583	88.040	81.998	87.656	88.274	82.247	0.99947	0.99957	0.9
16	DNK	2006	125217	90.001	89.381	84.520	90.046	89.589	84.718	0.99968	0.99972	0.9
17	DNK	2007	121357	91.319	89.928	86.214	91.322	90.089	86.332	0.99976	0.99978	0.9
18	DNK	2008	123718	92.434	90.752	87.556	92.383	90.875	87.612	0.99974	0.99977	0.9
19	DNK	2009	126051	94.173	91.778	89.795	94.065	91.859	89.781	0.99938	0.99954	0.9
20	DNK	2010	120708	95.625	93.594	91.643	95.611	93.750	91.746	0.99975	0.99980	0.9
21	DNK	2011	115999	96.266	93.867	92.821	96.242	94.022	92.908	0.99978	0.99982	0.9
22	DNK	2012	117238	97.381	94.933	94.636	97.321	95.043	94.667	0.99973	0.99979	0.9
23	DNK	2013	116371	97.675	95.094	95.355	97.627	95.190	95.366	0.99978	0.99981	0.9
24	DNK	2014	115695	97.996	96.246	96.783	97.923	96.330	96.753	0.99976	0.99979	0.9
25	DNK	2015	113155	99.468	97.198	98.536	99.418	97.332	98.559	0.99981	0.99983	0.9
26	DNK	2016	111578	99.436	98.743	99.503	99.409	98.869	99.531	0.99974	0.99975	0.9
27	DNK	2017	103945	100.350	100.428	100.915	100.307	100.464	100.882	0.99976	0.99981	0.9
28	DNK	2018	100389	99.198	100.108	100.357	99.170	100.048	100.299	0.99970	0.99980	0.9
29	DNK	2019	45067	102.080	103.736	103.690	101.941	103.553	103.522	0.99885	0.99858	0.9
30	DNK	2020	3	93.370	97.420	96.170	93.263	97.263	96.023	1.00000	1.00000	1.0
31	FIN	1991	2056	73.571	68.788	64.714	74.748	70.057	66.175	0.99871	0.99942	0.9
32	FIN	1992	2829	73.709	67.883	64.947	74.883	69.146	66.405	0.99902	0.99916	0.9
33	FIN	1993	4031	73.623	68.501	64.993	74.755	69.719	66.403	0.99897	0.99939	0.9
34	FIN	1994	5694	73.837	68.914	65.634	74.870	70.073	66.948	0.99782	0.99928	0.9
35	FIN	1995	6794	74.608	68.476	65.885	75.649	69.630	67.213	0.99908	0.99943	0.9
36	FIN	1996	9366	74.898	68.767	66.789	75.869	69.869	68.042	0.99900	0.99938	0.9

37	FIN	1997	13321	75.794	69.602	68.056	76.712	70.673	69.252	0.99925	0.99949	0.9
38	FIN	1998	15986	77.284	70.148	69.061	78.153	71.165	70.198	0.99928	0.99956	0.9
39	FIN	1999	18458	78.304	71.274	70.330	79.085	72.225	71.370	0.99906	0.99965	0.9
40	FIN	2000	19707	78.947	72.838	71.703	79.723	73.777	72.738	0.99936	0.99929	0.9
41	FIN	2001	22810	81.063	74.845	74.025	81.754	75.714	74.955	0.99962	0.99945	0.9
42	FIN	2002	23695	82.947	76.021	75.976	83.489	76.740	76.739	0.99906	0.99934	0.9
43	FIN	2003	23896	85.025	77.991	77.897	85.499	78.650	78.573	0.99903	0.99956	0.9
44	FIN	2004	24375	86.372	79.557	79.557	86.785	80.160	80.169	0.99864	0.99945	0.9
45	FIN	2005	24740	87.278	81.203	80.526	87.691	81.793	81.140	0.99954	0.99970	0.9
46	FIN	2006	25578	89.189	83.203	82.595	89.559	83.748	83.156	0.99944	0.99961	0.9
47	FIN	2007	25902	91.278	85.161	84.681	91.588	85.650	85.172	0.99929	0.99963	0.9
48	FIN	2008	26899	91.971	86.705	85.680	92.212	87.126	86.085	0.99840	0.99906	0.9
49	FIN	2009	28111	93.555	88.216	87.106	93.787	88.617	87.494	0.99914	0.99943	0.9
50	FIN	2010	29706	94.911	89.408	88.823	95.142	89.809	89.206	0.99961	0.99962	0.9
51	FIN	2011	31450	95.823	90.576	90.863	95.985	90.908	91.158	0.99931	0.99962	0.9
52	FIN	2012	31917	96.520	91.792	92.216	96.658	92.087	92.467	0.99940	0.99956	0.9
53	FIN	2013	31479	96.607	92.150	92.532	96.722	92.422	92.745	0.99951	0.99973	0.9
54	FIN	2014	31937	97.351	93.964	94.504	97.451	94.202	94.683	0.99965	0.99965	0.9
55	FIN	2015	31513	98.848	95.108	96.039	98.958	95.360	96.232	0.99978	0.99981	0.9
56	FIN	2016	31797	99.034	96.041	96.695	99.138	96.279	96.873	0.99979	0.99984	0.9
57	FIN	2017	31807	100.302	98.668	98.690	100.388	98.851	98.828	0.99978	0.99982	0.9
58	FIN	2018	31609	101.609	99.293	99.883	101.654	99.377	99.956	0.99959	0.99964	0.9
59	FIN	2019	15100	103.384	101.843	101.980	103.415	101.866	102.022	0.99966	0.99959	0.9
60	FIN	2020	19	108.853	105.650	106.745	108.835	105.632	106.749	0.99954	0.99973	0.9
61	NOR	1998	1	93.340	88.820	87.090	76.870	74.430	67.440	.	.	.
62	NOR	1999	4	84.233	89.830	80.383	68.618	76.125	61.485	0.99890	0.99973	0.9
63	NOR	2000	9	91.439	88.546	86.026	80.352	78.568	73.004	0.77525	0.86629	0.7
64	NOR	2001	16	91.669	88.772	86.929	78.142	76.182	70.864	0.80227	0.69512	0.6
65	NOR	2002	48	92.726	91.304	88.936	83.200	82.606	77.577	0.90728	0.84667	0.8
66	NOR	2003	159	92.874	92.652	89.872	82.928	83.496	77.992	0.91201	0.86559	0.8
67	NOR	2004	229	90.769	91.711	88.034	82.913	84.548	78.609	0.96674	0.95869	0.9
68	NOR	2005	352	92.233	91.566	89.084	87.436	86.688	83.346	0.98045	0.97962	0.9
69	NOR	2006	419	93.658	92.742	90.165	89.124	88.067	84.680	0.98550	0.97941	0.9
70	NOR	2007	501	94.487	93.203	91.689	90.455	88.962	86.755	0.98724	0.97814	0.9
71	NOR	2008	646	94.821	93.603	91.631	90.768	89.420	86.742	0.98154	0.96759	0.9
72	NOR	2009	755	95.959	94.154	93.320	92.424	90.489	89.028	0.98221	0.97355	0.9
73	NOR	2010	860	96.738	94.834	93.384	95.591	93.700	91.893	0.98847	0.98409	0.9
74	NOR	2011	970	97.542	94.884	94.094	96.644	93.978	92.887	0.99053	0.98401	0.9
75	NOR	2012	1050	97.893	95.334	94.709	97.190	94.632	93.764	0.99177	0.98804	0.9
76	NOR	2013	1229	98.781	95.830	95.399	98.283	95.338	94.686	0.99349	0.99170	0.9

Obs	cont	year	n_cow	m_mlk	m_fat	m_mlk_ m_prt	m_fat_ red	m_prt_ red	cor_mlk	cor_fat	cor_prt	
77	NOR	2014	1404	97.002	95.385	94.426	96.769	95.086	93.954	0.99465	0.99251	0.99132
78	NOR	2015	1487	97.354	96.816	95.669	97.715	97.117	96.157	0.99303	0.99277	0.98817
79	NOR	2016	1459	98.938	98.452	97.652	99.407	98.906	98.320	0.99330	0.99204	0.98928
80	NOR	2017	1511	99.816	99.654	98.413	100.439	100.168	99.209	0.99347	0.99164	0.99027
81	NOR	2018	1580	98.591	99.729	98.294	99.334	100.299	99.282	0.99466	0.99297	0.98943
82	NOR	2019	641	100.508	101.149	99.582	101.308	101.783	100.642	0.99269	0.98940	0.98226
83	NOR	2020	1	105.660	91.620	94.510	105.850	91.570	94.790	.	.	.
84	OTH	1991	1	71.550	77.050	67.840	50.520	58.680	43.810	.	.	.
85	OTH	1992	4	80.938	82.585	73.133	74.738	77.140	66.113	0.02891	-0.06467	-0.22314
86	OTH	1993	5	87.562	91.252	80.222	73.648	79.096	64.644	0.67277	0.61026	0.24829
87	OTH	1994	8	83.209	90.101	78.889	73.748	81.921	68.370	0.57828	0.40752	0.16601
88	OTH	1995	20	83.137	84.701	76.013	75.957	78.330	68.112	0.49354	0.60603	0.30134
89	OTH	1996	44	83.784	83.913	77.713	75.017	76.088	67.963	0.73667	0.49474	0.52362
90	OTH	1997	83	82.264	84.303	76.168	75.557	78.242	68.634	0.85731	0.87871	0.74581
91	OTH	1998	92	81.968	83.677	77.407	76.193	78.557	71.002	0.88923	0.88115	0.83859
92	OTH	1999	84	82.490	88.716	79.973	74.949	82.154	71.801	0.85186	0.85785	0.73979
93	OTH	2000	73	85.286	89.528	83.351	71.565	77.434	68.554	0.73882	0.84078	0.68922
94	OTH	2001	55	86.291	88.040	81.665	80.462	82.989	75.375	0.87221	0.90660	0.84735
95	OTH	2002	73	87.447	86.940	82.755	77.121	77.927	71.273	0.87294	0.88862	0.87074
96	OTH	2003	43	90.180	89.673	83.385	81.756	82.330	74.083	0.91067	0.90348	0.88238
97	OTH	2004	27	95.331	96.317	91.232	89.443	91.112	84.914	0.89929	0.66806	0.79193
98	OTH	2005	34	97.513	93.069	90.512	94.481	90.364	87.255	0.92251	0.92347	0.90854
99	OTH	2006	15	100.440	92.953	93.649	97.390	90.409	90.456	0.91471	0.94404	0.89452
100	OTH	2007	40	92.613	90.918	86.903	86.021	85.046	79.781	0.87827	0.92128	0.81257
101	OTH	2008	72	94.882	89.630	87.367	89.220	84.632	81.310	0.90142	0.91137	0.88779
102	OTH	2009	22	95.892	92.844	89.775	92.117	89.569	85.708	0.90943	0.94348	0.91406
103	OTH	2010	24	100.754	95.872	95.247	99.671	94.960	94.303	0.99253	0.98406	0.98970
104	OTH	2011	12	101.141	97.802	98.705	98.768	95.732	96.134	0.92420	0.85591	0.90069
105	OTH	2012	22	98.465	95.023	95.670	97.561	94.287	94.870	0.99348	0.99296	0.99295
106	OTH	2013	23	103.937	99.168	97.680	103.214	98.614	96.897	0.99375	0.99426	0.99144
107	OTH	2014	19	101.121	100.050	98.881	99.308	98.502	96.892	0.94292	0.92629	0.92668
108	OTH	2015	28	104.406	99.864	100.639	103.089	98.761	99.260	0.97907	0.97153	0.97537
109	OTH	2016	33	101.554	96.424	97.679	100.959	95.938	97.039	0.99609	0.99613	0.99616
110	OTH	2017	39	101.660	99.970	97.128	100.162	98.446	95.451	0.98241	0.98103	0.98156
111	OTH	2018	25	102.723	98.571	96.600	100.474	96.211	94.144	0.98760	0.96840	0.98362
112	OTH	2019	4	103.388	99.398	94.768	102.238	98.170	93.525	0.99738	0.98884	0.99496
113	SWE	1991	13	72.468	74.302	64.010	73.515	75.356	65.294	0.99481	0.99775	0.98118
114	SWE	1992	4519	75.010	74.653	65.664	75.818	75.537	66.743	0.99691	0.99786	0.99289
115	SWE	1993	17326	75.464	74.892	65.899	76.249	75.766	66.949	0.99749	0.99811	0.99432
116	SWE	1994	23662	75.737	75.222	66.528	76.554	76.100	67.603	0.99774	0.99823	0.99519
117	SWE	1995	25874	76.503	74.704	66.854	77.385	75.621	67.992	0.99698	0.99789	0.99371
118	SWE	1996	32519	77.461	76.784	68.229	78.192	77.584	69.209	0.99781	0.99866	0.99637
119	SWE	1997	40448	79.291	76.621	69.379	79.836	77.283	70.168	0.99846	0.99893	0.99754
120	SWE	1998	43762	80.107	76.992	70.542	80.501	77.519	71.152	0.99846	0.99891	0.99774
121	SWE	1999	46667	81.334	78.255	71.982	81.640	78.701	72.497	0.99800	0.99870	0.99717
122	SWE	2000	48849	82.154	79.850	73.398	82.624	80.449	74.106	0.99846	0.99892	0.99766
123	SWE	2001	49867	83.601	80.843	74.578	83.989	81.385	75.205	0.99906	0.99922	0.99864
124	SWE	2002	50705	85.312	81.953	77.065	85.574	82.377	77.524	0.99921	0.99932	0.99906
125	SWE	2003	50997	85.940	82.245	77.964	86.170	82.587	78.357	0.99936	0.99944	0.99920
126	SWE	2004	51083	86.850	83.624	79.303	87.019	83.903	79.613	0.99911	0.99921	0.99879
127	SWE	2005	49772	87.996	84.951	80.745	88.254	85.313	81.174	0.99936	0.99949	0.99921
128	SWE	2006	49883	89.277	86.192	82.291	89.504	86.541	82.688	0.99952	0.99956	0.99941
129	SWE	2007	48444	90.058	87.312	83.475	90.291	87.632	83.853	0.99956	0.99961	0.99946
130	SWE	2008	49834	91.408	88.394	85.068	91.575	88.654	85.349	0.99954	0.99960	0.99946
131	SWE	2009	48961	93.035	89.373	87.150	93.130	89.573	87.328	0.99927	0.99945	0.99900
132	SWE	2010	48276	94.304	90.965	88.868	94.542	91.256	89.215	0.99919	0.99948	0.99901
133	SWE	2011	48226	95.113	91.394	90.021	95.300	91.653	90.304	0.99937	0.99959	0.99930
134	SWE	2012	47138	96.430	92.543	92.022	96.563	92.775	92.226	0.99936	0.99959	0.99931
135	SWE	2013	44661	96.838	93.428	92.961	96.930	93.617	93.106	0.99930	0.99957	0.99921
136	SWE	2014	43161	96.949	93.951	93.787	97.021	94.131	93.916	0.99924	0.99951	0.99913
137	SWE	2015	41747	98.569	95.654	95.882	98.733	95.921	96.105	0.99931	0.99950	0.99920
138	SWE	2016	40094	99.367	97.108	97.275	99.530	97.358	97.489	0.99938	0.99952	0.99920
139	SWE	2017	36963	100.425	99.032	98.760	100.534	99.177	98.889	0.99934	0.99955	0.99911
140	SWE	2018	34928	100.955	99.864	99.739	101.012	99.874	99.787	0.99924	0.99923	0.99875
141	SWE	2019	12200	102.545	101.951	101.640	102.563	101.872	101.662	0.99915	0.99871	0.99876

Statistics for genotyped cows:

Obs	year	n_cow	m_mlk	m_fat	m_prt	m_mlk_red	m_fat_red	m_prt_red	cor_mlk	cor_fat	cor_prt
1	1997	1	73.520	69.470	65.110	74.130	70.070	65.980	.	.	.
2	1999	6	88.292	100.647	93.472	88.378	100.945	93.728	0.99962	0.99989	0.99973
3	2000	2	98.035	93.105	97.645	98.295	93.550	98.090	1.00000	1.00000	1.00000
4	2001	5	92.948	95.982	92.166	92.960	96.194	92.354	1.00000	1.00000	1.00000
5	2002	7	99.224	93.144	90.403	99.356	93.491	90.734	0.99981	0.99992	0.99982
6	2003	26	95.147	95.676	91.664	95.156	95.867	91.829	0.99963	0.99985	0.99970
7	2004	122	99.311	97.684	97.173	99.295	97.858	97.301	0.99969	0.99978	0.99964
8	2005	208	99.511	99.538	97.880	99.470	99.686	97.983	0.99944	0.99957	0.99937
9	2006	343	99.063	97.117	94.918	99.070	97.303	95.063	0.99957	0.99951	0.99930
10	2007	443	97.730	95.172	93.892	97.734	95.350	94.023	0.99932	0.99950	0.99929
11	2008	739	99.150	96.071	95.549	99.145	96.237	95.658	0.99899	0.99910	0.99877
12	2009	1083	100.088	96.034	96.053	100.089	96.204	96.160	0.99918	0.99923	0.99893
13	2010	1508	100.459	97.050	97.415	100.484	97.237	97.548	0.99945	0.99954	0.99929
14	2011	2946	99.929	95.865	96.788	99.974	96.066	96.934	0.99953	0.99964	0.99943
15	2012	4584	100.481	96.861	97.964	100.516	97.048	98.087	0.99982	0.99985	0.99979
16	2013	7375	99.736	96.629	97.717	99.761	96.795	97.812	0.99983	0.99986	0.99976
17	2014	8560	100.770	98.346	99.895	100.784	98.499	99.966	0.99987	0.99986	0.99980
18	2015	10399	101.503	99.231	100.953	101.530	99.404	101.043	0.99982	0.99987	0.99978
19	2016	15751	101.162	99.914	101.359	101.198	100.073	101.445	0.99978	0.99985	0.99971
20	2017	22708	101.405	101.537	102.109	101.432	101.630	102.156	0.99974	0.99979	0.99964
21	2018	31007	100.758	101.116	101.956	100.764	101.117	101.953	0.99973	0.99978	0.99962
22	2019	16461	102.803	104.115	104.447	102.778	104.058	104.406	0.99972	0.99978	0.99963
23	2020	8	109.974	105.710	107.788	109.913	105.598	107.718	0.99941	0.99981	0.99959

RDC:

Overall statics:

Obs	year	n_cow	m_mlk	m_fat	m_prt	m_mlk_red	m_fat_red	m_prt_red	cor_mlk	cor_fat	cor_prt
1	1991	40282	75.456	76.682	66.438	74.446	75.663	65.109	0.99341	0.99781	0.98974
2	1992	59709	76.133	76.411	67.039	75.226	75.419	65.795	0.99399	0.99784	0.99131
3	1993	92650	77.190	76.734	67.577	76.361	75.769	66.400	0.99473	0.99786	0.99276
4	1994	104823	77.173	76.560	68.183	76.348	75.591	66.999	0.99507	0.99794	0.99380
5	1995	113570	78.046	77.210	69.121	77.268	76.279	67.995	0.99522	0.99808	0.99452
6	1996	119762	78.641	77.835	70.111	77.829	76.861	68.937	0.99618	0.99870	0.99610
7	1997	123076	79.926	78.546	71.360	79.055	77.533	70.119	0.99663	0.99884	0.99667
8	1998	125416	81.335	79.840	73.145	80.414	78.788	71.844	0.99719	0.99893	0.99731
9	1999	125337	82.252	81.114	74.383	81.294	80.022	73.034	0.99721	0.99887	0.99738
10	2000	122279	84.101	82.556	76.469	83.153	81.497	75.141	0.99651	0.99879	0.99678
11	2001	124709	85.269	83.348	77.834	84.290	82.242	76.456	0.99757	0.99920	0.99780
12	2002	118875	87.309	84.808	79.976	86.300	83.676	78.552	0.99804	0.99920	0.99806
13	2003	116110	88.262	86.110	81.773	87.236	84.961	80.322	0.99798	0.99911	0.99803
14	2004	110628	89.810	87.069	83.405	88.776	85.925	81.950	0.99797	0.99899	0.99788
15	2005	104817	90.853	88.530	84.840	89.918	87.490	83.506	0.99785	0.99896	0.99781
16	2006	102752	91.512	89.467	85.973	90.575	88.428	84.641	0.99841	0.99938	0.99845
17	2007	98260	92.425	90.386	87.208	91.504	89.354	85.891	0.99879	0.99948	0.99882
18	2008	96177	93.687	91.366	88.738	92.765	90.343	87.426	0.99894	0.99947	0.99890
19	2009	92722	95.037	92.340	90.200	94.173	91.369	88.957	0.99898	0.99940	0.99890
20	2010	87288	95.997	92.928	91.520	95.240	92.065	90.417	0.99896	0.99931	0.99880
21	2011	86780	96.777	94.156	93.018	96.054	93.341	91.963	0.99920	0.99952	0.99915
22	2012	79561	97.984	95.582	94.624	97.300	94.806	93.615	0.99924	0.99955	0.99925
23	2013	74229	98.281	97.213	95.894	97.644	96.498	94.953	0.99917	0.99953	0.99921
24	2014	68246	99.194	97.722	97.015	98.668	97.112	96.223	0.99915	0.99943	0.99911
25	2015	62438	99.945	98.457	98.145	99.565	98.009	97.569	0.99872	0.99888	0.99840
26	2016	57753	99.667	98.531	98.579	99.434	98.244	98.218	0.99874	0.99884	0.99834
27	2017	52710	100.059	99.547	99.457	99.955	99.424	99.300	0.99845	0.99853	0.99794
28	2018	47202	100.696	100.580	101.002	100.715	100.600	101.032	0.99812	0.99826	0.99747
29	2019	17289	100.346	101.684	101.122	100.393	101.764	101.211	0.99779	0.99820	0.99734
30	2020	4	98.203	102.100	100.518	98.303	102.175	100.660	0.99817	0.99981	0.99797

Statistics within country of origin:

Obs	cont	year	n_cow	m_mlk	m_fat	m_prt	m_mlk_red	m_fat_red	m_prt_red	cor_mlk	cor_fat	cor_prt
1	DNK	1991	10897	71.673	75.114	66.582	69.322	73.618	64.242	0.99680	0.99615	0.99316
2	DNK	1992	12289	71.971	74.704	67.078	69.542	73.105	64.632	0.99802	0.99721	0.99583
3	DNK	1993	13420	73.061	76.733	67.352	70.569	75.071	64.823	0.99794	0.99801	0.99636
4	DNK	1994	13587	73.587	75.980	67.724	71.143	74.309	65.204	0.99814	0.99816	0.99680
5	DNK	1995	15723	75.036	76.592	69.223	72.810	75.048	66.926	0.99663	0.99824	0.99480
6	DNK	1996	16618	75.631	75.129	70.015	73.453	73.635	67.737	0.99735	0.99794	0.99614
7	DNK	1997	17104	76.801	75.983	71.501	74.535	74.422	69.121	0.99805	0.99819	0.99733
8	DNK	1998	16257	78.084	78.173	73.292	75.880	76.638	70.941	0.99787	0.99806	0.99733
9	DNK	1999	15767	79.876	80.583	74.851	77.715	79.023	72.508	0.99717	0.99804	0.99689
10	DNK	2000	16318	84.378	83.368	78.858	82.130	81.794	76.409	0.99826	0.99881	0.99792
11	DNK	2001	15409	85.977	85.351	80.650	83.841	83.787	78.252	0.99828	0.99896	0.99815
12	DNK	2002	14255	87.746	86.841	82.431	85.657	85.305	80.061	0.99811	0.99880	0.99787
13	DNK	2003	14120	89.272	87.878	84.114	87.203	86.330	81.733	0.99832	0.99880	0.99795
14	DNK	2004	13932	89.431	88.061	84.161	87.419	86.543	81.825	0.99841	0.99883	0.99804
15	DNK	2005	13307	90.504	91.327	86.556	88.609	89.913	84.350	0.99871	0.99889	0.99868
16	DNK	2006	13315	92.624	91.869	87.803	90.806	90.508	85.678	0.99904	0.99897	0.99887
17	DNK	2007	13008	93.681	92.763	89.347	92.007	91.489	87.359	0.99894	0.99897	0.99878
18	DNK	2008	12738	96.210	95.043	92.106	94.597	93.821	90.186	0.99909	0.99892	0.99887
19	DNK	2009	12813	96.742	96.002	92.946	95.244	94.838	91.143	0.99906	0.99899	0.99882
20	DNK	2010	11600	96.829	95.809	93.960	95.508	94.756	92.348	0.99885	0.99887	0.99862
21	DNK	2011	11461	98.404	98.403	96.560	97.199	97.435	95.077	0.99914	0.99916	0.99899
22	DNK	2012	10824	99.261	99.825	97.953	98.186	98.939	96.610	0.99885	0.99909	0.99883
23	DNK	2013	10217	99.768	101.969	99.576	98.776	101.169	98.342	0.99882	0.99905	0.99848
24	DNK	2014	9456	100.091	101.942	100.169	99.237	101.250	99.105	0.99902	0.99923	0.99870
25	DNK	2015	9040	101.008	102.736	101.797	100.345	102.207	100.977	0.99924	0.99906	0.99870
26	DNK	2016	8595	99.709	101.726	101.014	99.273	101.401	100.494	0.99924	0.99919	0.99879
27	DNK	2017	8109	100.376	102.187	101.761	100.151	102.116	101.566	0.99850	0.99750	0.99695
28	DNK	2018	7336	101.129	103.441	103.762	101.058	103.518	103.784	0.99817	0.99741	0.99625
29	DNK	2019	2910	100.240	104.264	103.455	100.214	104.410	103.555	0.99816	0.99775	0.99665
30	FIN	1991	29355	76.862	77.266	66.387	76.349	76.424	65.432	0.99936	0.99950	0.99857
31	FIN	1992	36800	77.395	77.124	66.980	76.866	76.262	66.008	0.99946	0.99952	0.99889
32	FIN	1993	42910	79.022	77.768	67.893	78.468	76.886	66.898	0.99946	0.99937	0.99890
33	FIN	1994	47923	78.684	77.375	68.500	78.111	76.470	67.485	0.99930	0.99921	0.99865
34	FIN	1995	52153	79.555	78.196	69.426	78.969	77.275	68.403	0.99954	0.99953	0.99926
35	FIN	1996	56262	80.228	78.911	70.885	79.631	77.974	69.851	0.99964	0.99966	0.99946
36	FIN	1997	58002	81.206	79.232	71.795	80.586	78.281	70.731	0.99968	0.99970	0.99952
37	FIN	1998	59377	82.811	80.463	73.819	82.153	79.499	72.716	0.99960	0.99966	0.99947
38	FIN	1999	59791	83.390	81.269	74.966	82.692	80.269	73.819	0.99949	0.99956	0.99932
39	FIN	2000	56066	84.478	82.458	76.494	83.795	81.476	75.373	0.99934	0.99953	0.99908
40	FIN	2001	59681	85.988	83.449	77.989	85.260	82.420	76.820	0.99966	0.99976	0.99956
41	FIN	2002	56575	88.981	85.130	80.829	88.193	84.069	79.592	0.99975	0.99974	0.99964
42	FIN	2003	54321	89.576	86.554	82.364	88.750	85.468	81.087	0.99963	0.99958	0.99952
43	FIN	2004	51338	91.438	87.762	84.401	90.608	86.688	83.129	0.99952	0.99949	0.99940
44	FIN	2005	48934	92.338	88.711	85.409	91.588	87.724	84.233	0.99910	0.99925	0.99884
45	FIN	2006	47876	92.778	89.459	86.501	92.046	88.484	85.352	0.99947	0.99970	0.99935
46	FIN	2007	46042	93.772	90.414	87.708	93.020	89.431	86.543	0.99977	0.99984	0.99972
47	FIN	2008	44505	95.080	91.410	89.184	94.331	90.452	88.032	0.99981	0.99985	0.99974
48	FIN	2009	43345	96.347	91.779	90.405	95.652	90.875	89.323	0.99974	0.99978	0.99970
49	FIN	2010	41134	97.427	92.879	91.674	96.778	92.037	90.663	0.99951	0.99945	0.99929
50	FIN	2011	40854	97.643	93.435	92.773	96.997	92.618	91.776	0.99979	0.99985	0.99974
51	FIN	2012	37107	98.503	94.835	94.302	97.888	94.061	93.348	0.99972	0.99979	0.99969
52	FIN	2013	34506	98.784	96.215	95.470	98.189	95.482	94.552	0.99971	0.99981	0.99971
53	FIN	2014	31723	99.842	96.948	96.611	99.336	96.302	95.814	0.99967	0.99976	0.99965
54	FIN	2015	28752	100.271	97.597	97.474	99.870	97.078	96.837	0.99949	0.99958	0.99945
55	FIN	2016	26226	100.070	97.792	97.968	99.794	97.417	97.520	0.99953	0.99963	0.99949
56	FIN	2017	23535	100.422	98.974	99.002	100.258	98.745	98.731	0.99939	0.99956	0.99939
57	FIN	2018	20944	100.873	99.897	100.337	100.817	99.802	100.233	0.99918	0.99943	0.99920
58	FIN	2019	8580	100.525	100.973	100.408	100.516	100.962	100.392	0.99884	0.99928	0.99902
59	FIN	2020	4	98.203	102.100	100.518	98.303	102.175	100.660	0.99817	0.99981	0.99797
60	SWE	1991	30	73.985	74.951	64.529	73.567	74.281	63.805	0.99717	0.99739	0.99486
61	SWE	1992	10620	76.576	75.917	67.199	76.120	75.177	66.404	0.99824	0.99790	0.99688
62	SWE	1993	36320	76.552	75.514	67.286	76.012	74.708	66.395	0.99812	0.99803	0.99678
63	SWE	1994	43313	76.625	75.840	67.977	76.030	75.021	67.025	0.99818	0.99824	0.99713
64	SWE	1995	45694	77.358	76.296	68.739	76.861	75.566	67.897	0.99753	0.99779	0.99636
65	SWE	1996	46882	77.804	77.503	69.216	77.217	76.670	68.265	0.99860	0.99885	0.99798
66	SWE	1997	47970	79.492	78.632	70.785	78.816	77.739	69.735	0.99909	0.99912	0.99871
67	SWE	1998	49782	80.636	79.642	72.292	79.821	78.641	71.099	0.99895	0.99902	0.99862
68	SWE	1999	49779	81.639	81.096	73.534	80.748	80.041	72.258	0.99882	0.99898	0.99851
69	SWE	2000	49895	83.586	82.400	75.660	82.765	81.423	74.466	0.99831	0.99874	0.99781
70	SWE	2001	49619	84.183	82.605	76.775	83.263	81.549	75.460	0.99888	0.99916	0.99861
71	SWE	2002	48045	85.209	83.825	78.242	84.262	82.731	76.880	0.99882	0.99914	0.99856

72	SWE	2003	47669	86.464	85.080	80.406	85.519	83.976	79.033	0.99875	0.99907	0.99850
73	SWE	2004	45358	88.083	85.980	82.045	87.119	84.872	80.653	0.99861	0.99886	0.99824
74	SWE	2005	42576	89.255	87.449	83.651	88.408	86.464	82.406	0.99872	0.99900	0.99852
75	SWE	2006	41561	89.697	88.708	84.779	88.808	87.697	83.490	0.99924	0.99942	0.99912
76	SWE	2007	39210	90.428	89.565	85.912	89.557	88.555	84.639	0.99931	0.99940	0.99916
77	SWE	2008	38934	91.269	90.111	87.127	90.376	89.081	85.829	0.99923	0.99927	0.99907
78	SWE	2009	36564	92.886	91.721	88.996	92.046	90.740	87.759	0.99925	0.99920	0.99899
79	SWE	2010	34554	94.014	92.019	90.517	93.318	91.194	89.476	0.99919	0.99936	0.99902
80	SWE	2011	34465	95.211	93.599	92.130	94.555	92.837	91.149	0.99915	0.99928	0.99897
81	SWE	2012	31630	96.939	95.007	93.862	96.306	94.265	92.902	0.99926	0.99939	0.99913
82	SWE	2013	29506	97.178	96.734	95.114	96.616	96.069	94.248	0.99905	0.99929	0.99894
83	SWE	2014	27067	98.120	97.154	96.388	97.686	96.616	95.695	0.99888	0.99905	0.99867
84	SWE	2015	24646	99.175	97.891	97.590	98.923	97.554	97.172	0.99781	0.99786	0.99690
85	SWE	2016	22932	99.191	98.179	98.364	99.081	98.007	98.162	0.99776	0.99765	0.99670
86	SWE	2017	21066	99.532	99.170	99.078	99.540	99.146	99.063	0.99737	0.99761	0.99635
87	SWE	2018	18922	100.332	100.228	100.669	100.471	100.351	100.849	0.99696	0.99711	0.99565
88	SWE	2019	5799	100.135	101.442	101.007	100.302	101.622	101.246	0.99599	0.99654	0.99434

Genotyped cows:

Obs	year	n_cow	m_mlk	m_fat	m_prt	m_mlk_ red	m_fat_ red	m_prt_ red	cor_mlk	cor_fat	cor_prt
1	2001	1	104.660	107.080	103.820	102.910	105.900	101.850	.	.	.
2	2002	2	109.525	96.190	100.500	108.700	95.135	99.235	1.00000	1.00000	1.00000
3	2003	3	97.693	103.740	93.250	96.623	102.690	91.807	1.00000	1.00000	0.99998
4	2004	15	96.041	98.087	95.587	95.013	97.028	94.177	0.99857	0.99974	0.99841
5	2005	51	100.471	100.417	98.612	99.441	99.395	97.221	0.99855	0.99994	0.99910
6	2006	84	100.573	100.037	97.740	99.621	99.015	96.415	0.99850	0.99971	0.99847
7	2007	144	101.829	100.361	98.825	100.895	99.361	97.517	0.99884	0.99972	0.99870
8	2008	254	102.626	99.315	98.678	101.737	98.361	97.432	0.99916	0.99980	0.99912
9	2009	500	101.504	98.394	97.824	100.712	97.495	96.680	0.99944	0.99976	0.99943
10	2010	3538	97.957	94.796	94.105	97.193	93.933	92.997	0.99952	0.99984	0.99954
11	2011	5725	98.877	95.792	95.308	98.148	94.971	94.248	0.99954	0.99983	0.99956
12	2012	6019	99.984	97.428	96.906	99.288	96.647	95.892	0.99959	0.99986	0.99962
13	2013	5972	100.177	99.475	98.725	99.512	98.747	97.762	0.99958	0.99988	0.99963
14	2014	6398	101.282	100.297	100.047	100.739	99.680	99.245	0.99962	0.99984	0.99960
15	2015	8234	102.053	100.946	101.344	101.638	100.467	100.727	0.99969	0.99980	0.99962
16	2016	11266	101.272	100.755	101.175	101.008	100.438	100.777	0.99974	0.99979	0.99967
17	2017	12965	101.817	101.763	102.105	101.662	101.591	101.886	0.99974	0.99981	0.99968
18	2018	14349	101.850	102.374	103.054	101.816	102.341	103.019	0.99971	0.99975	0.99958
19	2019	6417	101.195	103.268	102.747	101.195	103.304	102.782	0.99962	0.99968	0.99948
20	2020	2	99.265	107.265	103.195	99.225	107.230	103.185	1.00000	1.00000	1.00000

JER:

Overall statistics:

Obs	year	n_cow	m_mlk	m_fat	m_prt	m_mlk_ red	m_fat_ red	m_prt_ red	cor_mlk	cor_fat	cor_prt
1	1991	8673	75.754	70.361	65.032	76.432	70.927	65.728	0.99532	0.99731	0.98818
2	1992	9091	76.401	70.237	65.518	76.988	70.693	66.108	0.99653	0.99740	0.99178
3	1993	12075	78.117	71.224	66.545	78.622	71.669	67.077	0.99327	0.99597	0.98553
4	1994	16025	77.747	72.238	67.367	78.256	72.715	67.885	0.99548	0.99702	0.99059
5	1995	18253	78.924	71.693	67.845	79.588	72.361	68.562	0.99561	0.99692	0.99127
6	1996	19300	78.903	72.780	68.584	79.513	73.332	69.218	0.99563	0.99804	0.99303
7	1997	19773	79.932	73.067	69.383	80.501	73.541	69.962	0.99463	0.99765	0.99207
8	1998	20145	83.099	75.279	71.647	83.509	75.644	72.115	0.99554	0.99750	0.99469
9	1999	21166	85.285	78.072	74.934	85.636	78.459	75.348	0.99549	0.99808	0.99576
10	2000	20237	85.983	78.384	75.351	86.501	78.961	75.973	0.99443	0.99706	0.99463
11	2001	19175	87.253	79.285	77.071	87.713	79.795	77.639	0.99459	0.99716	0.99422
12	2002	19812	87.316	80.646	77.538	87.734	81.087	78.049	0.99622	0.99730	0.99619
13	2003	20187	87.513	81.266	78.343	87.832	81.568	78.722	0.99621	0.99671	0.99572
14	2004	20541	89.867	83.506	80.972	90.108	83.749	81.258	0.99669	0.99677	0.99625
15	2005	20669	90.950	84.779	83.018	91.273	85.145	83.432	0.99639	0.99683	0.99658
16	2006	21931	91.749	86.227	84.133	92.012	86.544	84.479	0.99735	0.99723	0.99713
17	2007	21752	92.252	87.664	85.576	92.485	87.912	85.881	0.99744	0.99757	0.99720
18	2008	22765	92.994	88.835	86.702	93.148	89.004	86.907	0.99782	0.99775	0.99753
19	2009	24597	93.878	89.941	88.028	94.051	90.093	88.239	0.99822	0.99799	0.99793
20	2010	23182	95.508	91.180	89.790	95.716	91.390	90.068	0.99784	0.99741	0.99713
21	2011	23969	96.559	92.763	91.193	96.705	92.905	91.388	0.99767	0.99765	0.99705
22	2012	24006	95.989	93.714	92.087	96.105	93.820	92.240	0.99797	0.99769	0.99705
23	2013	21812	96.146	94.200	92.396	96.250	94.268	92.530	0.99650	0.99699	0.99571
24	2014	22990	96.398	95.778	93.500	96.498	95.840	93.630	0.99683	0.99746	0.99645
25	2015	23271	98.315	96.985	96.146	98.441	97.116	96.334	0.99521	0.99575	0.99442
26	2016	22743	98.921	98.928	97.257	98.979	98.968	97.374	0.99374	0.99426	0.99202
27	2017	23107	99.260	99.050	98.876	99.320	99.105	98.951	0.99529	0.99563	0.99418
28	2018	24312	100.587	101.011	100.863	100.558	100.985	100.831	0.99548	0.99574	0.99373
29	2019	12640	102.643	102.629	103.347	102.693	102.684	103.395	0.99702	0.99706	0.99618
30	2020	4	105.465	105.288	108.048	105.958	105.818	108.535	0.99856	0.99603	0.99815

Statistics within country of origin:

Obs	cont	year	n_cow	m_mlk	m_fat	m_prt	m_mlk_ red	m_fat_ red	m_prt_ red	cor_mlk	cor_fat	cor_prt
1	DNK	1991	8533	75.767	70.332	65.020	76.413	70.898	65.684	0.99711	0.99752	0.99187
2	DNK	1992	8952	76.397	70.251	65.519	76.948	70.712	66.076	0.99811	0.99849	0.99522
3	DNK	1993	11763	78.066	71.348	66.544	78.512	71.781	67.015	0.99604	0.99718	0.99054
4	DNK	1994	15590	77.649	72.406	67.360	78.103	72.871	67.823	0.99796	0.99861	0.99524
5	DNK	1995	17651	78.857	71.844	67.848	79.453	72.491	68.495	0.99803	0.99761	0.99559
6	DNK	1996	18615	78.832	72.956	68.603	79.371	73.490	69.168	0.99850	0.99889	0.99725
7	DNK	1997	18937	79.885	73.221	69.413	80.366	73.666	69.905	0.99828	0.99869	0.99693
8	DNK	1998	19124	83.119	75.508	71.707	83.447	75.851	72.100	0.99835	0.99842	0.99769
9	DNK	1999	19954	85.403	78.385	75.104	85.691	78.778	75.472	0.99773	0.99880	0.99757
10	DNK	2000	18928	86.085	78.605	75.446	86.489	79.140	75.967	0.99882	0.99857	0.99826
11	DNK	2001	17678	87.424	79.521	77.302	87.801	80.019	77.791	0.99873	0.99886	0.99831
12	DNK	2002	18145	87.427	80.932	77.684	87.790	81.405	78.159	0.99859	0.99850	0.99810
13	DNK	2003	18332	87.666	81.582	78.551	87.956	81.926	78.917	0.99870	0.99891	0.99835
14	DNK	2004	18657	90.183	84.000	81.356	90.399	84.274	81.629	0.99891	0.99889	0.99853
15	DNK	2005	18809	91.183	85.134	83.341	91.438	85.488	83.697	0.99898	0.99885	0.99872
16	DNK	2006	19953	91.862	86.540	84.339	92.085	86.860	84.650	0.99896	0.99895	0.99882
17	DNK	2007	19833	92.411	88.042	85.858	92.605	88.306	86.130	0.99914	0.99922	0.99898
18	DNK	2008	20769	93.117	89.200	86.931	93.259	89.406	87.138	0.99903	0.99925	0.99887
19	DNK	2009	22539	94.021	90.339	88.317	94.181	90.527	88.524	0.99944	0.99955	0.99930
20	DNK	2010	20998	95.647	91.658	90.132	95.849	91.900	90.410	0.99913	0.99877	0.99855
21	DNK	2011	21654	96.748	93.263	91.601	96.897	93.448	91.809	0.99935	0.99938	0.99912
22	DNK	2012	21516	96.155	94.311	92.542	96.279	94.465	92.715	0.99947	0.99939	0.99919
23	DNK	2013	19155	96.345	94.826	92.858	96.458	94.940	93.011	0.99946	0.99944	0.99922
24	DNK	2014	19933	96.611	96.520	94.038	96.739	96.656	94.214	0.99950	0.99937	0.99924
25	DNK	2015	19726	98.642	97.829	96.882	98.785	98.001	97.098	0.99939	0.99884	0.99877
26	DNK	2016	18851	99.226	100.133	98.098	99.321	100.252	98.261	0.99954	0.99953	0.99934
27	DNK	2017	18877	99.585	100.178	99.901	99.679	100.291	100.028	0.99933	0.99887	0.99901
28	DNK	2018	20149	101.052	102.352	101.914	101.100	102.420	101.981	0.99962	0.99909	0.99936
29	DNK	2019	11476	102.973	103.331	103.987	103.046	103.399	104.061	0.99948	0.99908	0.99922
30	DNK	2020	4	105.465	105.288	108.048	105.958	105.818	108.535	0.99856	0.99603	0.99815
31	FIN	2005	4	96.555	90.205	91.190	98.725	91.775	93.623	0.99327	0.99741	0.99811
32	FIN	2006	6	92.092	83.015	85.733	93.655	83.975	87.440	0.96401	0.97161	0.86363
33	FIN	2007	3	102.857	88.383	92.460	98.573	86.697	88.753	0.92143	0.98979	0.78745
34	FIN	2008	16	96.776	80.340	87.306	94.248	79.041	85.024	0.90726	0.97996	0.92533

111	OTH	2011	8	96.430	86.6838	90.350	97.525	87.323	91.100	0.99859	0.99528	0.99623
112	OTH	2012	11	90.321	84.1809	84.991	91.529	85.107	85.858	0.99832	0.98941	0.99646
113	OTH	2013	15	92.114	83.2760	85.159	93.482	84.335	86.351	0.88203	0.86838	0.85668
114	OTH	2014	12	91.589	79.2800	82.624	91.878	79.181	82.771	0.98367	0.99082	0.98417
115	OTH	2015	32	94.329	87.7906	88.101	99.377	93.735	94.357	0.81779	0.75081	0.74550
116	OTH	2016	78	92.884	82.4483	84.587	97.510	88.360	90.418	0.80935	0.71602	0.66598
117	OTH	2017	68	93.714	87.9671	89.348	95.756	90.386	91.793	0.89039	0.91364	0.87339
118	OTH	2018	75	96.578	90.6515	93.106	98.741	92.905	95.728	0.89317	0.89454	0.82989
119	OTH	2019	24	96.768	92.0346	92.603	98.064	93.424	94.150	0.97352	0.95547	0.89285
120	SWE	1992	37	81.821	63.4541	65.210	85.748	65.178	69.117	0.97579	0.91933	0.76272
121	SWE	1993	185	82.094	63.4667	66.581	85.151	65.212	69.816	0.92253	0.96230	0.88311
122	SWE	1994	281	83.716	63.9575	68.392	86.748	65.912	71.660	0.94536	0.96850	0.93389
123	SWE	1995	348	83.455	65.0320	68.201	86.339	67.077	71.390	0.95902	0.98342	0.93426
124	SWE	1996	371	83.994	66.3692	69.112	86.815	68.225	72.178	0.95526	0.97869	0.93164
125	SWE	1997	449	83.007	69.1793	69.480	85.590	70.751	72.262	0.95580	0.97715	0.93294
126	SWE	1998	466	84.837	71.6369	71.885	86.905	72.884	74.169	0.96163	0.98390	0.94398
127	SWE	1999	508	86.543	74.5894	74.059	88.096	75.601	75.798	0.96531	0.98591	0.96082
128	SWE	2000	511	87.488	76.6145	76.060	88.884	77.566	77.664	0.95522	0.98437	0.95346
129	SWE	2001	601	88.927	78.5474	77.357	89.909	79.156	78.482	0.94849	0.97281	0.94194
130	SWE	2002	605	89.342	79.0981	78.634	89.943	79.504	79.389	0.96159	0.97890	0.95728
131	SWE	2003	631	88.617	79.6381	78.757	89.014	79.792	79.249	0.96145	0.97554	0.95485
132	SWE	2004	636	89.774	81.0218	80.231	90.045	81.098	80.592	0.96730	0.98190	0.96697
133	SWE	2005	589	91.898	83.4741	82.653	92.101	83.553	82.966	0.97261	0.97997	0.96931
134	SWE	2006	643	93.702	85.5246	85.035	93.783	85.462	85.189	0.97504	0.98026	0.97678
135	SWE	2007	611	92.730	86.6104	85.528	92.791	86.535	85.664	0.98098	0.98593	0.98136
136	SWE	2008	618	93.043	87.4332	86.316	93.081	87.188	86.362	0.98181	0.98092	0.98166
137	SWE	2009	597	94.455	88.4958	87.969	94.517	88.235	88.008	0.98011	0.98270	0.97975
138	SWE	2010	577	95.949	89.6620	89.451	95.958	89.667	89.561	0.98341	0.98977	0.98482
139	SWE	2011	612	97.368	91.7200	90.761	97.277	91.652	90.756	0.98291	0.99018	0.98390
140	SWE	2012	629	96.239	92.1338	91.211	96.203	92.118	91.244	0.98713	0.99191	0.98634
141	SWE	2013	606	96.641	92.9589	92.031	96.571	92.892	92.027	0.98235	0.99058	0.97912
142	SWE	2014	581	97.549	94.8224	93.291	97.531	94.826	93.351	0.98431	0.99149	0.98233
143	SWE	2015	619	99.264	96.3354	96.055	99.094	96.169	95.911	0.98876	0.99311	0.98831
144	SWE	2016	546	99.261	96.5005	96.168	99.041	96.237	95.967	0.98610	0.98983	0.98510
145	SWE	2017	593	100.103	97.3851	98.114	99.940	97.128	97.889	0.98651	0.99086	0.98658
146	SWE	2018	551	101.444	98.1215	99.838	101.127	97.769	99.493	0.98373	0.98870	0.98335
147	SWE	2019	149	102.146	99.6270	101.169	101.958	99.438	100.981	0.98561	0.99372	0.98739

Genotyped cows:

Obs	year	n_cow	m_mlk	m_fat	m_prt	red	m_mlk_ red	m_fat_ red	m_prt_ cor_mlk	cor_fat	cor_prt
1	2000	2	99.445	109.525	101.000	100.135	110.165	101.835	1.00000	1.00000	1.00000
2	2002	2	88.070	90.635	85.895	88.375	91.015	86.300	1.00000	1.00000	1.00000
3	2003	9	93.328	97.797	92.498	93.774	98.070	92.973	0.99988	0.99997	0.99994
4	2004	24	99.744	98.738	98.931	100.145	99.112	99.394	0.99950	0.99960	0.99931
5	2005	29	97.687	95.491	94.110	97.996	95.793	94.488	0.99959	0.99985	0.99966
6	2006	49	98.522	101.976	98.537	98.796	102.253	98.870	0.99965	0.99979	0.99949
7	2007	89	97.319	97.887	94.884	97.566	98.122	95.182	0.99990	0.99997	0.99988
8	2008	123	97.210	97.349	94.433	97.415	97.556	94.685	0.99992	0.99995	0.99990
9	2009	200	98.390	95.668	94.538	98.585	95.841	94.773	0.99989	0.99992	0.99987
10	2010	2271	97.253	93.269	92.052	97.466	93.482	92.324	0.99937	0.99927	0.99901
11	2011	3649	97.729	94.261	92.748	97.920	94.448	92.991	0.99907	0.99910	0.99860
12	2012	3752	96.707	95.280	93.558	96.867	95.433	93.765	0.99890	0.99890	0.99826
13	2013	2861	96.914	95.810	93.947	97.071	95.937	94.141	0.99916	0.99934	0.99890
14	2014	3484	97.056	97.537	94.973	97.205	97.664	95.162	0.99882	0.99940	0.99883
15	2015	3584	99.145	98.544	97.784	99.279	98.664	97.964	0.99900	0.99943	0.99903
16	2016	4009	99.561	100.652	98.709	99.650	100.736	98.848	0.99836	0.99928	0.99836
17	2017	5469	99.641	100.346	100.275	99.707	100.400	100.361	0.99862	0.99865	0.99828
18	2018	6742	100.516	102.001	101.609	100.546	102.014	101.641	0.99905	0.99890	0.99872
19	2019	4187	102.927	103.134	104.024	102.964	103.155	104.054	0.99860	0.99918	0.99855
20	2020	2	109.975	107.005	111.490	110.065	107.040	111.555	1.00000	1.00000	1.00000