
Supplementary information

**Dairying, diseases and the evolution of
lactase persistence in Europe**

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Supplementary Information

Dairying, diseases and the evolution of lactase persistence in Europe

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Lipid residue analyses

Table SI1. Results of unpublished lipid residue analyses from 187 sites and 313 phases used in this study. Key: ALP: Alföld Linear Pottery; BA: Bronze Age; EBA: Early Bronze Age; EN: Early Neolithic; EPC: Epicardial; IA: Iron Age; LBA: Late Bronze Age; LBK: Linearbandkeramik; LBPC: Late Linear Pottery Culture; LN: Late Neolithic; Meso: Mesolithic; MN: Middle Neolithic; N/A: unknown; Neo: Neolithic; OLB: Oberlauterbach; SBK: Stichbandkeramik; ROS: Rössen; TRB: Funnelbeaker culture; VSG: Villeneuve-Saint-Germain. Dates are obtained as described in the Methods section.

Name of site	Country	Latitude	Longitude	Culture	Start BCE	End BCE	Number of animal fats with	
							$\Delta^{13}\text{C} \leq -3.1$ ‰	$\Delta^{13}\text{C} > -3.1$ ‰
Aglionby sand pit	UK	54.9	-2.864	BA	1686	1194	0	1
Aktopraklik	Turkey	40.174	28.771	LN	5900	5700	0	2
Altscherbitz	Germany	51.392	12.233	LBK	5500	5000	2	22
Altscherbitz	Germany	51.392	12.233	SBK	5000	4500	0	1
Amesbury Archer	UK	51.17	-1.76	EBA	2380	2290	1	0
Apc-Berekalja I	Hungary	47.792	19.703	LBK	5470	4950	6	6
Apc-Berekalja I	Hungary	47.792	19.703	LBK	5470	4950	0	8
Apc-Berekalja I	Hungary	47.792	19.703	LBK	5470	4950	2	9
Apc-Berekalja I	Hungary	47.792	19.703	LBK	5470	4950	1	0
Armadales	UK	57.065	-5.9	BA	2340	1667	1	0
Atxoste	Spain	42.754	-2.477	Meso/EN	6154	4828	0	1
Aughertree Fell	UK	54.733	-3.149	BA	1686	1194	1	2
Baabe 2	Germany	54.36	13.705	Ertebølle	4375	4086	1	0
Baabe 2	Germany	54.36	13.705	TRB/Ertebølle	4253	3786	4	10
Baabe 2	Germany	54.36	13.705	TRB/Ertebølle	4250	3797	10	19
Baabe 2	Germany	54.36	13.705	TRB	3991	3668	2	12
Balatonszárszó	Hungary	46.811	17.845	LBK	5404	4915	0	10
Balatonszárszó	Hungary	46.811	17.845	LBK	5404	4915	3	9
Balatonszárszó	Hungary	46.811	17.845	LBK	5404	4915	0	22
Balbirnie	UK	56.215	-3.155	N/A	2000	1500	2	0
Balhungie, Monikie	UK	56.5	-2.791	EBA	2030	1880	1	0
Ballowall	UK	50.122	-5.701	EBA	2500	801	1	0
Belkaragai	Kazakhstan	53.2	63.6	LN/EBA	3600	3100	0	9
Ben Lawers, Perth&Kinross	UK	56.515	-4.165	Beaker	2350	2020	1	0
Bestamak	Kazakhstan	49.2	78.4	LN	4600	3600	0	13
Bodzia	Poland	52.703	18.888	LBK	5300	5200	9	13
Bodzia	Poland	52.703	18.888	LBK	4330	3940	0	36
Bodzia	Poland	52.703	18.888	LBK	5300	5200	1	0

Name of site	Country	Latitude	Longitude	Culture	Start BCE	End BCE	Number of animal fats with	
							$\Delta^{13}\text{C} \leq -3.1$ ‰	$\Delta^{13}\text{C} > -3.1$ ‰
Bordușani-Popină	Romania	44.5	27.923	Gumelnița	4506	4266	2	9
Boscombe	UK	51.164	-1.766	Beaker	2452	2081	9	6
Bosiliack	UK	50.152	-5.598	N/A	1690	1500	1	0
Bowsden West Farm	UK	55.672	-2.011	EBA	2570	2300	2	0
Bożejewice	Poland	52.689	18.243	LBK	5300	5200	5	23
Broomend of Crichtie	UK	57.267	-2.368	EBA	2340	2130	1	0
Broughton Barn	UK	52.056	-0.677	EBA	1890	1740	2	0
Broxburn	UK	55.934	-3.428	Beaker	2350	2020	2	0
Brunn 17	Denmark	53.671	13.371	TRB	4068	3408	1	0
Brunn am Gebirge	Austria	48.117	16.297	LBK	5670	5410	0	3
Brunn am Gebirge	Austria	48.117	16.297	LBK	5410	5350	2	4
Brzezin 7	Poland	53.183	14.9	LBK	5300	5000	3	4
Buckskin	UK	51.257	1.136	EBA	2280	1690	1	1
Bucy-le-Long	France	49.389	3.385	VSG	5305	4444	1	2
Bucy-le-Long	France	49.389	3.385	VSG	5305	4444	6	3
Bulford	UK	51.187	-1.75	n/a	2300	1900	0	1
Carneddau	UK	52.586	-3.492	n/a	1904	1524	1	0
Cataclews	UK	50.546	-5.007	Neo	2014	1660	2	1
Chabsko 24	Poland	52.633	17.933	LBK	5100	4800	2	2
Chapel Carn Brea	UK	50.095	-5.657	EBA	1880	1520	1	0
Chatton Sandyford	UK	55.534	-1.843	Beaker	2350	2020	3	0
Cliff End Farm	UK	51.33	1.37	LBA	770	723	1	1
Cliff End Farm	UK	51.33	1.37	LBA	910	770	1	0
Cliff End Farm	UK	51.33	1.37	LBA	928	910	0	2
Cliff End Farm	UK	51.33	1.37	LBA	938	928	0	1
Cliff End Farm	UK	51.33	1.37	LBA	1088	963	0	3
Cliff End Farm	UK	51.33	1.37	LBA	1030	975	0	2
Cliff End Farm	UK	51.33	1.37	LBA	1075	985	0	1

Name of site	Country	Latitude	Longitude	Culture	Start BCE	End BCE	Number of animal fats with	
							$\Delta^{13}\text{C} \leq -3.1$ ‰	$\Delta^{13}\text{C} > -3.1$ ‰
Corbiewells	UK	57.674	-3.157	EBA	2400	2130	1	0
Cossington	UK	52.714	-1.112	EBA	2100	1520	5	1
Crawstane, Barflat Rhynie	UK	57.325	-2.836	Beaker	2350	2020	2	0
Crean	UK	50.065	-5.644	EBA	1880	1520	1	0
Cross Farm, Stanbury	UK	53.83	-1.986	EBA	1960	1780	1	0
Cuckoo Stone	UK	51.189	-1.793	N/A	2246	1754	0	2
Cueva de los Postes	Spain	38.026	-6.496	N/A	2996	1864	1	5
Cueva de los Postes	Spain	38.026	-6.496	BA	3000	2500	0	1
Cueva de los Postes	Spain	38.026	-6.496	LN	3000	2500	1	1
Cueva de los Postes	Spain	38.026	-6.496	LN	3776	2914	0	1
Cueva de los Postes	Spain	38.026	-6.496	LN	4354	2936	1	0
Cuiry-lès-Chaudardes	France	49.384	3.764	LBK	5132	4773	13	6
Cuiry-lès-Chaudardes	France	49.384	3.764	LBK	5135	4869	10	4
Cuiry-lès-Chaudardes	France	49.384	3.764	LBK	5137	4964	25	16
Cuiry-lès-Chaudardes	France	49.384	3.764	VSG	5305	4444	4	4
Cuiry-lès-Chaudardes	France	49.384	3.764	Michelsberg	3912	3692	10	5
Culduthel	UK	57.451	-4.224	Beaker	2560	2290	0	1
Culduthel	UK	57.451	-4.224	MN	3400	2800	3	0
Davidstow Moor	UK	50.633	-4.617	EBA	2500	801	1	0
Davidstow Moor	UK	50.633	-4.617	EBA	2500	801	0	1
Davidstow Moor	UK	50.633	-4.617	EBA	2500	801	1	0
Dillingen-Steinheim	Germany	48.019	10.155	LBK	5250	5100	1	9
Douglstown	UK	56.616	-2.95	EBA	2120	1900	1	0
Droßdorf	Germany	51.008	12.123	Michelsberg	4300	3800	3	4
Droßdorf	Germany	51.008	12.123	Baalberger	3800	3500	12	5
Droßdorf	Germany	50.447	12.216	Baalberger	3800	3500	1	4
Easter Colfield	UK	57.658	-3.475	Beaker	2350	2020	0	3
Ely Recycling Centre	UK	52.387	0.225	LN/EBA	1910	1430	1	1

Name of site	Country	Latitude	Longitude	Culture	Start BCE	End BCE	Number of animal fats with	
							$\Delta^{13}\text{C} \leq -3.1$ ‰	$\Delta^{13}\text{C} > -3.1$ ‰
Erkelenz-Kückhoven	Germany	51.061	6.348	LBK	5200	5100	1	2
Erkelenz-Kückhoven	Germany	51.061	6.348	LBK	5090	5057	0	6
Ewanrigg	UK	54.703	-3.501	EBA	2460	1520	1	0
Eythra	Germany	51.236	12.294	LBK	5300	5200	0	3
Eythra	Germany	51.236	12.294	LBK	5200	5000	0	5
Eythra	Germany	51.236	12.294	SBK	5000	4500	0	3
Eythra	Germany	51.236	12.294	Corded ware	2500	2200	2	2
Eythra	Germany	51.236	12.294	LN/EBA	2500	2000	0	1
Eythra	Germany	51.236	12.294	EBA	2200	1600	2	1
Felsovadász-Várdomb	Hungary	48.37	20.92	ALP	5246	4754	2	8
Fishacre-Choakford	UK	50.402	-3.829	Beaker	2500	2000	0	1
Font Juvénal	France	43.297	2.343	Pericardial	5610	4960	0	1
Font Juvénal	France	43.297	2.343	EPC	5210	4400	4	1
Font Juvénal	France	43.297	2.343	Chasséen	4900	4070	2	0
Font Juvénal	France	43.297	2.343	Chasséen	4780	3970	4	0
Font Juvénal	France	43.297	2.343	N/A	5610	3040	1	0
Franks' Sandpit, Betchworth	UK	51.241	-0.267	Grooved Ware	2674	2360	3	0
Friedrichsruhe 7/8	Germany	53.527	11.749	TRB	4092	3202	11	5
Friedrichsruhe 7/8	Germany	53.527	11.749	TRB	3769	3418	3	3
Füzesabony-Gubakút	Hungary	47.731	20.413	ALP	5432	5255	7	22
Gädebehn 10	Germany	53.618	13.091	TRB	4068	3408	2	0
Garadna	Hungary	48.418	21.173	ALP	5288	5030	4	14
Gayhurst Barrow	UK	52.094	-0.756	N/A	2100	1900	1	0
Geleen-Janskamperveld	Netherlands	50.985	5.814	LBK	5220	5210	10	10
Geleen-Janskamperveld	Netherlands	50.985	5.814	LBK	5210	5200	8	13
Geleen-Janskamperveld	Netherlands	50.985	5.814	LBK	5200	5190	1	0
Geleen-Janskamperveld	Netherlands	50.985	5.814	LBK	5190	5180	0	2
Geleen-Janskamperveld	Netherlands	50.985	5.814	LBK	5180	5170	1	4

Name of site	Country	Latitude	Longitude	Culture	Start BCE	End BCE	Number of animal fats with	
							$\Delta^{13}\text{C} \leq -3.1$ ‰	$\Delta^{13}\text{C} > -3.1$ ‰
Goxhill	UK	53.678	-0.33	N/A	-250	-300	3	13
Goxhill	UK	53.678	-0.33	N/A	-275	-400	0	2
Goxhill	UK	53.678	-0.33	N/A	-400	-700	1	1
Goxhill	UK	53.678	-0.33	N/A	-200	-300	0	4
Goxhill	UK	53.678	-0.33	N/A	-150	-200	0	1
Goxhill	UK	53.678	-0.33	N/A	-50	-125	3	6
Goxhill	UK	53.678	-0.33	IA	400	50	3	0
Harford P&R	UK	52.589	1.27	N/A	2460	1980	3	1
Harlyn Bay	UK	50.54	-4.998	EBA	2500	801	1	0
Hattersheim	Germany	50.07	8.487	Michelsberg	4360	3535	2	2
Hejökürt-Lidl	Hungary	47.868	21.011	MN	5251	4846	0	1
Herxheim	Germany	49.137	8.213	LBK	5300	4950	0	1
Holm Mains Farm	UK	57.443	-4.241	EBA	2400	2130	3	0
Howick Heugh	UK	55.445	-1.628	BA	1686	1194	1	0
Howl's Nest	UK	54.509	-1.256	BA	1686	1194	1	0
Ilchester-Barrington	UK	50.964	-2.871	Neo	3446	2954	1	1
Immingham	UK	53.624	-0.215	N/A	-250	-400	1	0
Immingham	UK	53.624	-0.215	N/A	-200	-400	2	5
Immingham	UK	53.624	-0.215	N/A	-375	-400	0	1
Immingham	UK	53.624	-0.215	N/A	-275	-400	1	4
Immingham	UK	53.624	-0.215	N/A	-250	-300	1	0
Immingham	UK	53.624	-0.215	N/A	-50	-150	0	6
Immingham	UK	53.624	-0.215	N/A	-150	-300	0	1
Immingham	UK	53.624	-0.215	N/A	-375	-425	3	14
Immingham	UK	53.624	-0.215	N/A	-300	-400	0	1
Immingham	UK	53.624	-0.215	IA	400	50	1	2
Immingham	UK	53.624	-0.215	Roman	-200	-400	0	1
Immingham	UK	53.624	-0.215	N/A	-100	-200	0	3

Name of site	Country	Latitude	Longitude	Culture	Start BCE	End BCE	Number of animal fats with	
							$\Delta^{13}\text{C} \leq -3.1$ ‰	$\Delta^{13}\text{C} > -3.1$ ‰
Immingham	UK	53.624	-0.215	IA	400	50	0	4
Immingham	UK	53.624	-0.215	IA	400	50	1	5
Immingham	UK	53.624	-0.215	N/A	-75	-200	0	1
Ingham Quarry	UK	52.29	0.701	EBA	2040	1870	0	2
Jatznick 39	Germany	53.578	13.941	TRB	4000	3300	7	7
Kamyane-Zavallia	Ukraine	48.185	29.962	LBK	5258	4976	0	11
Kapellenberg	Germany	51.564	8.552	Michelsberg	4200	3600	1	0
Karsdorf	Germany	51.28	11.673	LBK	5500	4900	0	15
Karwowo 1	Poland	53.683	15.533	LBK	5100	4800	9	14
Kennel Hall Knowe	UK	55.205	-2.526	Beaker	2350	2020	1	0
Kilianstädten	Germany	50.205	8.843	LBK	5207	4849	1	10
Knappach Toll	UK	57.054	-2.435	N/A	2400	2000	1	0
Kobaederra	Spain	43.343	-2.618	EN	5860	3580	0	1
Kobaederra	Spain	43.343	-2.618	EN	4759	3929	2	2
Kobern, Gondorf	Germany	49.969	6.619	Michelsberg	4446	3954	7	2
Komorniki 42	Poland	52.345	16.781	TRB	3579	2878	9	5
Königshoven 14 (FR 5)	Germany	51.004	6.537	LBK	5346	4854	4	5
Königshoven 14 (FR 5)	Germany	51.004	6.537	LBK	5346	4854	7	12
Konoplyanka	Russia	52.9	60.2	Sintashta	2100	1800	5	5
Kopydłowo	Poland	52.455	18.182	LBPC	4350	4150	2	15
Kopydłowo	Poland	52.455	18.182	LBK	5200	5000	3	8
Kopydłowo	Poland	52.455	18.182	LBK	5250	4800	3	17
Kopydłowo	Poland	52.455	18.182	TRB	3650	3300	29	14
Kruszyn 13	Poland	52.567	19	LBK	5200	5000	4	11
Kuczkowo	Poland	52.733	18.617	TRB	2219	1683	6	1
Kuczkowo	Poland	52.733	18.617	LBK	5100	4800	8	4
Kumkeshu	Kazakhstan	50.1	64.8	LN/EBA	3700	2900	1	21
Künzing-Unternberg	Germany	48.676	13.045	SBK/ROS	4846	4354	0	16

Name of site	Country	Latitude	Longitude	Culture	Start BCE	End BCE	Number of animal fats with	
							$\Delta^{13}\text{C} \leq -3.1$ ‰	$\Delta^{13}\text{C} > -3.1$ ‰
Laigh Braehead	UK	55.772	-4.246	LBA	2000	1550	1	0
Langenreichen am Burgholz	Germany	48.551	10.797	LBK	5050	4950	0	5
Langweiler 8	Germany	49.783	7.187	LBK	5496	5004	5	3
Langweiler 8	Germany	49.783	7.187	LBK	5246	4754	0	2
Lanton Quarry	UK	55.574	-2.074	Neo	3725	3600	28	4
Lesmurdie	UK	57.658	-3.303	N/A	1900	1600	3	0
Lesmurdie	UK	57.658	-3.303	Neo	4046	3554	0	1
Loanleven	UK	56.415	-3.534	EBA	2140	1530	1	0
Lockington	UK	52.858	-1.301	EBA	2100	1520	2	1
Lopness, Orkney	UK	59.281	-2.426	N/A	1950	1730	1	0
Los Cascajos	Spain	42.6	-2.2	EN	5310	3760	3	2
Low Moralee Farm	UK	55.08	-2.24	EBA	2130	1700	1	0
Lundin Farm	UK	56.634	-3.827	EBA	2210	1890	0	1
Maastricht-Cannerberg	Netherlands	50.825	5.668	LBK	5175	5156	0	1
Maastricht-Cannerberg	Netherlands	50.825	5.668	LBK	5137	5118	0	1
Maastricht-Cannerberg	Netherlands	50.825	5.668	LBK	5118	5100	0	3
Maastricht-Cannerberg	Netherlands	50.825	5.668	LBK	5100	5081	2	0
Maastricht-Cannerberg	Netherlands	50.825	5.668	LBK	5081	5062	0	1
Maastricht-Cannerberg	Netherlands	50.825	5.668	LBK	5062	5043	0	5
Maastricht-Cannerberg	Netherlands	50.825	5.668	LBK	5043	5025	0	2
Maastricht-Cannerberg	Netherlands	50.825	5.668	LBK	5006	4987	0	2
Maastricht-Klinkers	Netherlands	50.872	5.671	LBK	5118	5100	0	2
Maastricht-Klinkers	Netherlands	50.872	5.671	LBK	5100	5081	5	8
Maastricht-Klinkers	Netherlands	50.872	5.671	LBK	5062	5043	0	2
Maastricht-Klinkers	Netherlands	50.872	5.671	LBK	5006	4987	0	1
Maastricht-Klinkers	Netherlands	50.872	5.671	LBK	5325	4950	0	1
Mains of Airlie	UK	56.643	-3.141	EBA	2030	1880	1	0
Mains of Craichie	UK	56.615	-2.81	N/A	2200	1880	0	1

Name of site	Country	Latitude	Longitude	Culture	Start BCE	End BCE	Number of animal fats with	
							$\Delta^{13}\text{C} \leq -3.1$ ‰	$\Delta^{13}\text{C} > -3.1$ ‰
Maizy "les Grands Aisements"	France	49.376	3.735	Michelsberg	3912	3692	15	6
March, Hundred Road, Highways Depot	UK	52.566	0.075	BA	1000	800	1	0
Mockbeggar Lane	UK	50.882	-1.787	EBA	2450	1700	0	2
Modlnica 5	Poland	50.119	19.869	LBK	5100	5000	5	25
Mold	Austria	48.644	15.7	LBK	5300	5040	0	10
Mold	Austria	48.644	15.7	LBK	5300	5040	0	6
Moncrieffe Circle	UK	56.358	-3.405	EBA	2140	1530	0	1
Monkton Up Wimbourne	UK	50.92	-1.978	MN	3400	2800	1	0
Murton	UK	56.65	-2.828	EBA	2120	1900	1	0
Netherton	UK	56.71	-2.74	EBA	2140	1950	1	0
Norton Fitzwarren	UK	51.026	-3.146	EBA	1870	1600	1	0
Nustrow 8	Germany	54.015	12.598	TRB	3956	3776	2	0
Öcsöd-Kováshalom	Hungary	46.9	20.392	late Szakálhát-early Tisza	5511	5088	2	10
Öcsöd-Kováshalom	Hungary	46.9	20.392	late Szakálhát-early Tisza	5041	4941	3	6
Old Sarum	UK	51.101	-1.788	BA	1942	688	2	2
Olteni	Romania	44.179	25.297	LBK	5200	5100	2	13
Over	UK	52.347	0.032	Beaker	1900	1600	9	2
Over	UK	52.347	0.032	BA	2200	1970	2	2
Pastitz/Forst 53	Germany	54.366	13.454	TRB	3898	3398	8	4
Pencraig Hill	UK	55.978	-2.694	Neo	4046	3554	1	0
Plate 3/14	Germany	53.552	11.508	TRB	3600	3500	3	4
Plate 3/14	Germany	53.552	11.508	TRB	3600	3500	2	1
Płonia 2	Poland	53.356	14.737	LBK	5300	4800	3	7
Polgár-Csőszhalom	Hungary	47.6	21.05	LN	4882	4487	0	15
Polgár-Csőszhalom	Hungary	47.6	21.05	LN	4882	4487	9	42
Polgár-Ferenci-hát	Hungary	47.873	21.142	ALP	5467	5344	3	12
Polgár-Ferenci-hát	Hungary	47.873	21.142	ALP	5450	5050	0	10
Portalón	Spain	42.349	-3.519	Neo	5434	3806	1	4

Name of site	Country	Latitude	Longitude	Culture	Start BCE	End BCE	Number of animal fats with	
							$\Delta^{13}\text{C} \leq -3.1$ ‰	$\Delta^{13}\text{C} > -3.1$ ‰
Portalón	Spain	42.349	-3.519	Chalcolithic	3240	2823	11	7
Portalón	Spain	42.349	-3.519	Chalcolithic	3029	2125	12	3
Portalón	Spain	42.349	-3.519	BA	2082	1700	11	3
Radojewice	Poland	52.75	18.417	LBK	5300	5200	1	0
Radojewice	Poland	52.75	18.417	LBK	5200	5000	8	12
Radojewice	Poland	52.75	18.417	LBK	5100	4800	1	0
Ranstadt, Dauerheim	Germany	50.357	8.983	Michelsberg	3700	3500	15	2
Reswallie Mains	UK	56.65	-2.824	EBA	2210	1980	1	0
Rosecliston	UK	50.393	-5.078	EBA	2500	801	1	0
Rosenburg	Austria	48.629	15.641	LBK	5350	5175	0	1
Rosenburg	Austria	48.629	15.641	LBK	5350	5175	0	10
Rosenburg	Austria	48.629	15.641	LBK	5350	5175	0	2
Rothbury, Ward's Hill	UK	55.309	-1.914	BA	1686	1194	1	0
Rothenmoor 1	Germany	53.661	12.615	TRB	3800	3600	4	0
Rożniaty 2	Poland	52.706	18.295	LBK	5300	5200	2	13
Rożniaty 2	Poland	52.706	18.295	LBK	5200	5000	0	1
Rożniaty 2	Poland	52.706	18.295	LBK	5300	5000	0	2
Saiser 1	Germany	54.481	13.526	Ertebølle	4450	4100	2	8
Saiser 1	Germany	54.481	13.526	Ertebølle	4450	4100	1	3
Saiser 1	Germany	54.481	13.526	Ertebølle	4450	4100	0	3
Scarcewater	UK	50.356	-4.929	N/A	1540	1390	0	1
Schwanfeld	Germany	49.915	10.134	LBK	5698	5180	0	1
Schwanfeld	Germany	49.915	10.134	LBK	5370	5300	0	2
Schwanfeld	Germany	49.915	10.134	LBK	5370	5300	0	1
Schwanfeld	Germany	49.915	10.134	LBK	5370	5300	0	4
Schwanfeld	Germany	49.915	10.134	LBK	5370	5300	0	3
Schwerin 81	Germany	53.635	11.402	TRB	3300	2900	2	2
Sea Meads, Praa Sands	UK	50.1	-5.38	BA	1562	1254	1	0

Name of site	Country	Latitude	Longitude	Culture	Start BCE	End BCE	Number of animal fats with	
							$\Delta^{13}\text{C} \leq -3.1$ ‰	$\Delta^{13}\text{C} > -3.1$ ‰
Sennen	UK	50.075	-5.702	Beaker	2470	2130	1	0
Shaw Cairn	UK	53.382	-2.022	N/A	2140	1940	1	0
Sheriffston	UK	56.436	-3.453	B/A	2250	1950	1	0
Shrubsoles Hill	UK	51.41	0.829	EBA	1412	1021	3	1
Siniarzewo 1	Poland	52.733	18.683	LBK	5300	5200	0	7
Siniarzewo 1	Poland	52.733	18.683	LBK	5200	5000	4	9
Siniarzewo 1	Poland	52.733	18.683	LBK	5100	4800	0	2
Siniarzewo 1	Poland	52.733	18.683	LBK	5300	4800	0	9
Stannon Down	UK	50.593	-4.64	N/A	1680	1430	0	2
Stannon Down	UK	50.593	-4.64	N/A	1561	1357	1	0
Stein-Heidekampweg	Netherlands	50.981	5.776	LBK	5564	5064	0	1
Stephansposching	Germany	48.815	12.804	LBK	5200	5130	0	5
Stephansposching	Germany	48.815	12.804	LBK	5130	5060	0	9
Stephansposching	Germany	48.815	12.804	LBK	5060	4950	1	6
Stephansposching	Germany	48.815	12.804	OLB	4750	4450	0	8
Stoneyhill	UK	57.46	-1.874	NA	2500	2100	2	1
Stralsund 225 / Mischwasserspeicher	Germany	54.309	13.077	TRB	4650	3290	1	2
Street House Farm	UK	54.566	-0.862	Grooved Ware	3480	3393	3	1
Street House Wossit	UK	54.56	-0.859	NA	2285	1948	4	1
Strögen	Austria	48.671	15.607	LBK	5475	5275	2	6
Strögen	Austria	48.671	15.607	LBK	5475	5275	0	2
Strzelce	Poland	52.675	18.099	LBK	5300	5200	0	1
Štúrovo	Slovakia	47.796	18.717	LBK	5404	4915	6	13
Štúrovo	Slovakia	47.796	18.717	LBK	4878	4781	3	0
Sutton Community Dig	UK	52.415	0.064	N/A	1880	1670	0	1
Szederkény-Kukorica-dűlő	Hungary	46	18.45	Vinča	5383	5066	1	9
Szederkény-Kukorica-dűlő	Hungary	46	18.45	Vinča	5383	5066	0	2
Szederkény-Kukorica-dűlő	Hungary	46	18.45	Vinča	5383	5066	1	15

Name of site	Country	Latitude	Longitude	Culture	Start BCE	End BCE	Number of animal fats with	
							$\Delta^{13}\text{C} \leq -3.1$ ‰	$\Delta^{13}\text{C} > -3.1$ ‰
Tentsmuir	UK	56.414	-2.844	BA	1686	1194	1	0
Tešetice-Sutny	Czech Republic	48.886	16.157	LBK	5300	5040	1	0
Tešetice-Sutny	Czech Republic	48.886	16.157	LBK	5300	5040	0	5
Thanet Earth	UK	51.353	1.286	LN/EBA	2300	1800	0	2
The Meads	UK	51.348	0.718	EBA	1412	1021	2	1
Thorney, Brigg's Farm	UK	52.59	-0.156	EBA	2040	1870	1	1
Tiszaszőlös-Domaháza-pusztá	Hungary	47.552	20.72	ALP	5620	5470	1	10
Tolna-Mözs-Községi-Csádés-földek	Hungary	46.425	18.754	LBK	5404	4915	1	7
Tolna-Mözs-Községi-Csádés-földek	Hungary	46.425	18.754	LBK	5404	4915	5	12
Treligga	UK	50.633	-4.769	BA	1562	1254	1	0
Try, Gulval Menhir	UK	50.167	-5.555	N/A	1880	1600	1	1
Uivar	Romania	45.658	20.906	Vinča	4840	4755	0	1
Uivar	Romania	45.658	20.906	Vinča	4943	4897	0	1
Uivar	Romania	45.658	20.906	Vinča	5018	4972	0	2
Uivar	Romania	45.658	20.906	Vinča	5065	5027	1	0
Upper Largie	UK	56.149	-5.496	Beaker	2560	2290	3	0
Upton	UK	52.233	-0.967	NA	1980	1750	1	0
Vaihingen	Germany	48.952	8.949	LBK	5500	5075	0	5
Vinča Belo Brdo	Serbia	44.76	20.62	Vinča Pločnik	5000	4600	1	7
Vogelsang 10	Germany	53.742	12.406	TRB	3650	3300	15	13
Wang	Germany	48.497	11.931	LBK	5324	4926	0	4
West Heselton	UK	54.179	-0.598	LN/EBA	1910	1430	8	1
West Lilburn	UK	55.516	-1.969	BA	1686	1194	2	0
Willington	UK	52.863	-1.554	LN/EBA	1910	1430	3	0
Wilton Moor barrow	UK	54.557	-1.109	N/A	2080	1880	1	1
Windmill Fields	UK	54.506	-1.313	N/A	2210	1980	2	0
Żalęcino	Poland	53.198	15.083	LBK	5300	5000	1	0
Żegotki	Poland	52.667	18.209	LBK	5200	5000	3	15

Name of site	Country	Latitude	Longitude	Culture	Start BCE	End BCE	Number of animal fats with	
							$\Delta^{13}\text{C} \leq -3.1$ ‰	$\Delta^{13}\text{C} > -3.1$ ‰
Żegotki	Poland	52.667	18.209	LBK	5100	4800	3	6
Zuków	Poland	53.155	15.113	LBK	5300	5000	1	0
Zwenkau	Germany	51.236	12.342	LBK	5400	5300	0	8
Zwenkau	Germany	51.236	12.342	LBA	1200	1000	1	8
Zwenkau	Germany	51.236	12.342	IA	800	450	3	9

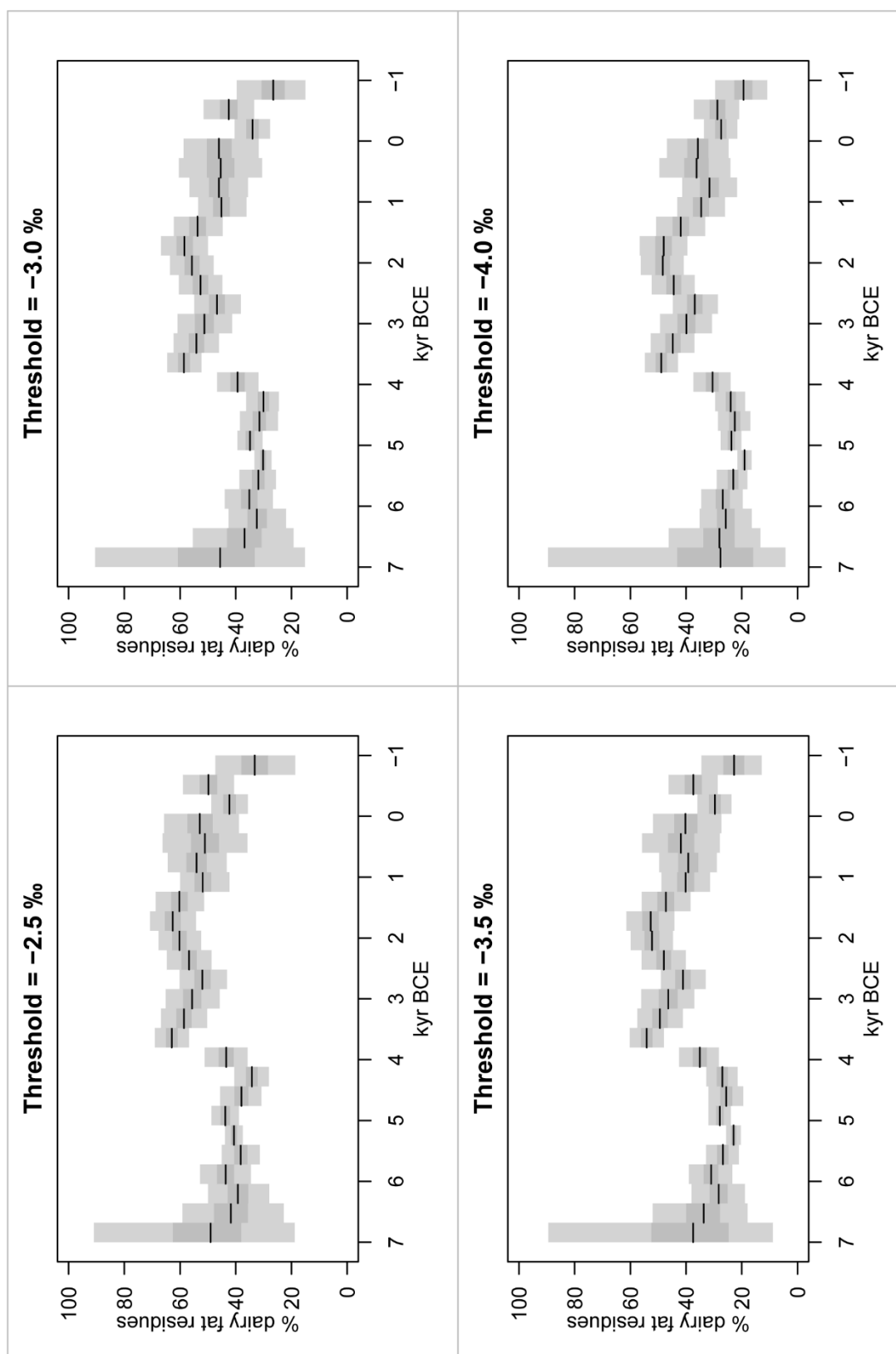


Figure SI1. Percentage of dairy fat residues through time. Replication of Figure 1 tile C, using different thresholds for defining sherds as containing dairy fats. Correlation coefficients between all 6 comparisons vary from 0.712 to 0.982.

Ancient DNA analyses

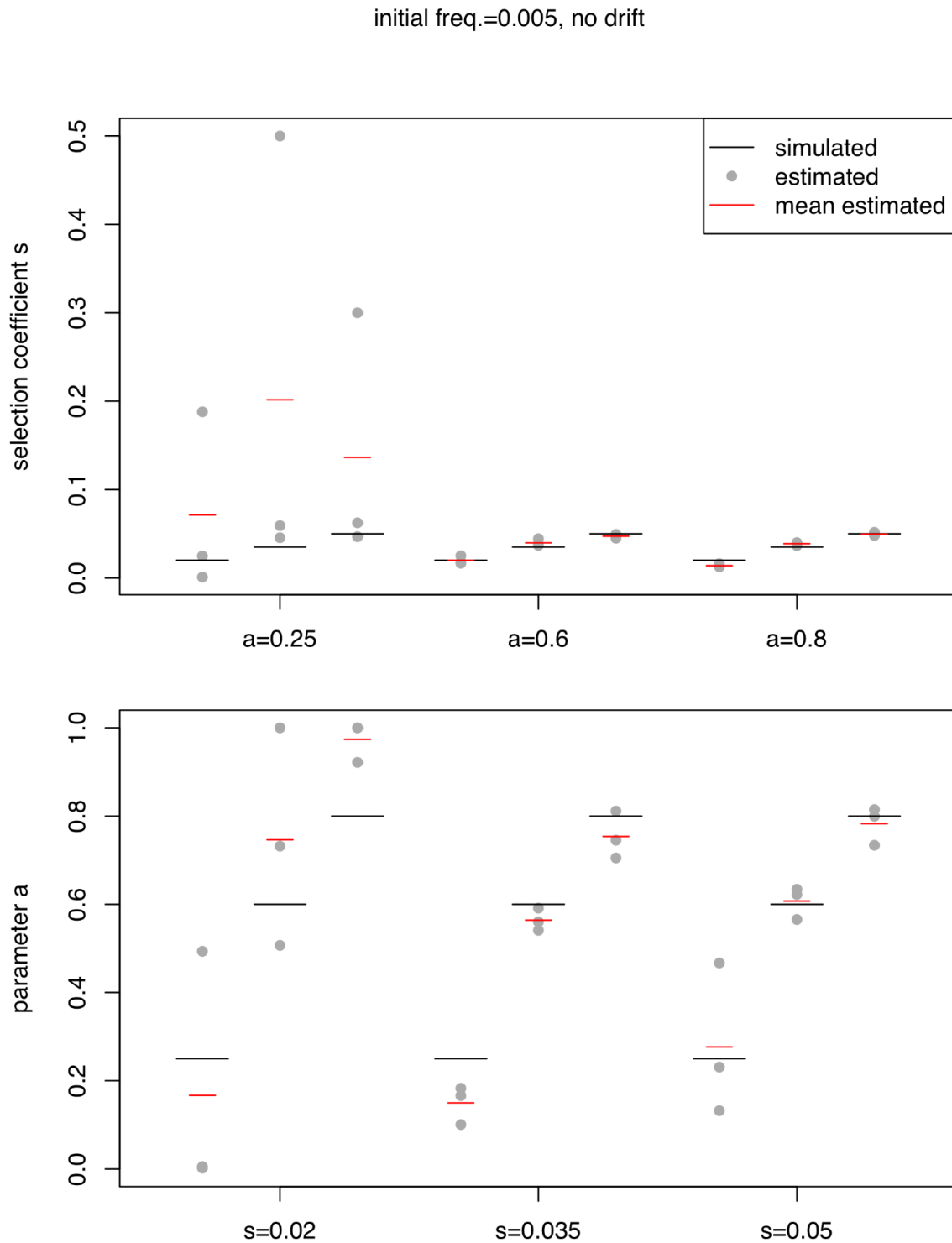


Figure SI2. Parameter estimation accuracy without drift. True and inferred parameters s and a for three replicates of each of nine parameter combinations, simulated based on the milk exploitation ecological proxy and with initial allele frequency $y_0 = 0.005$. *Abbreviations:* frequency (freq.).

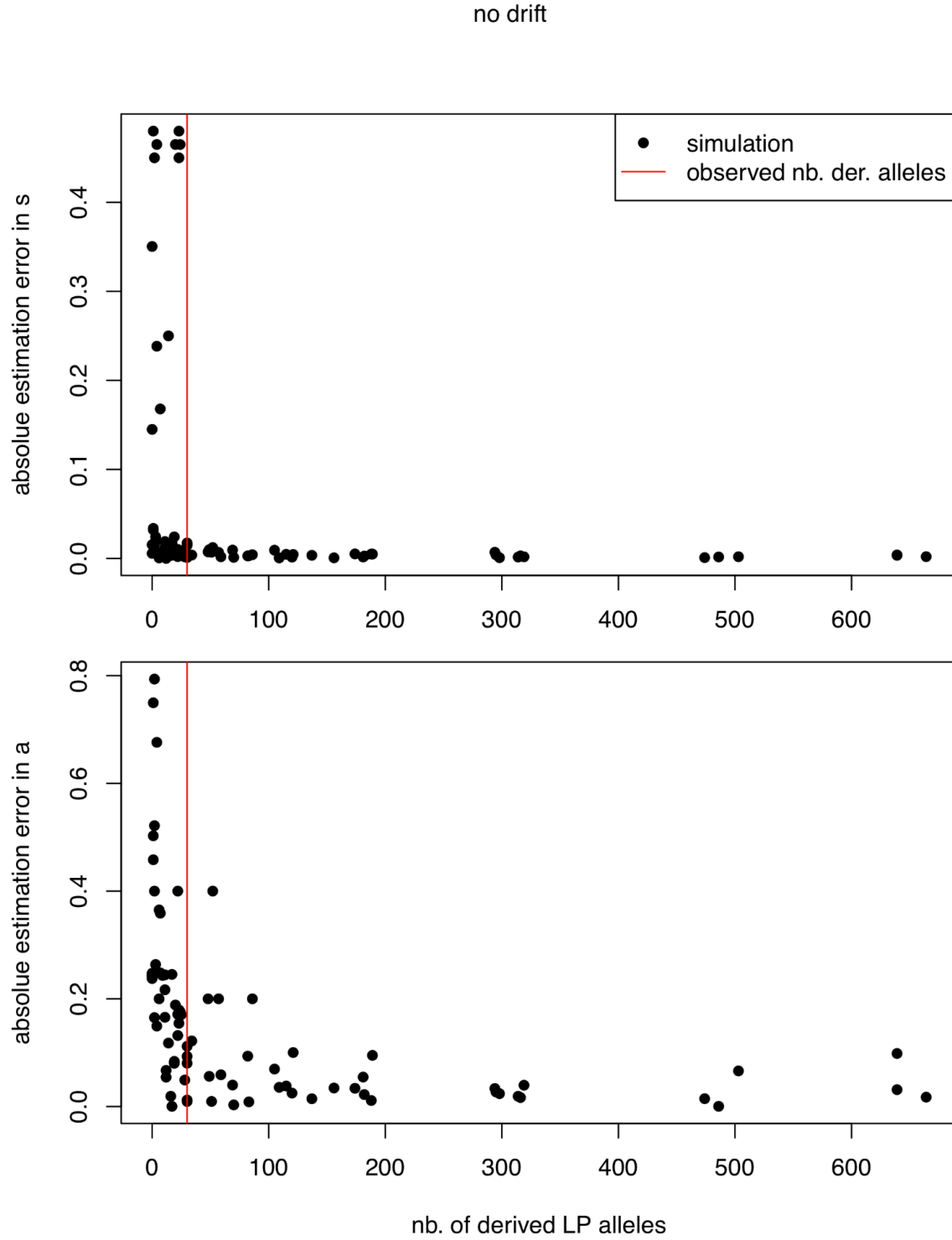


Figure SI3. Parameter estimation accuracy in relation to the number of derived alleles simulated without drift. The simulations shown in Figure SI1 were repeated with altered initial allele frequencies $y_0 \in \{0.0005, 0.01\}$, and the entire set including $y_0 = 0.005$ plotted as a function of the number of simulated derived alleles. The vertical line indicates the 30 derived alleles present in our aDNA dataset. *Abbreviations:* number (nb.), derived (der.).

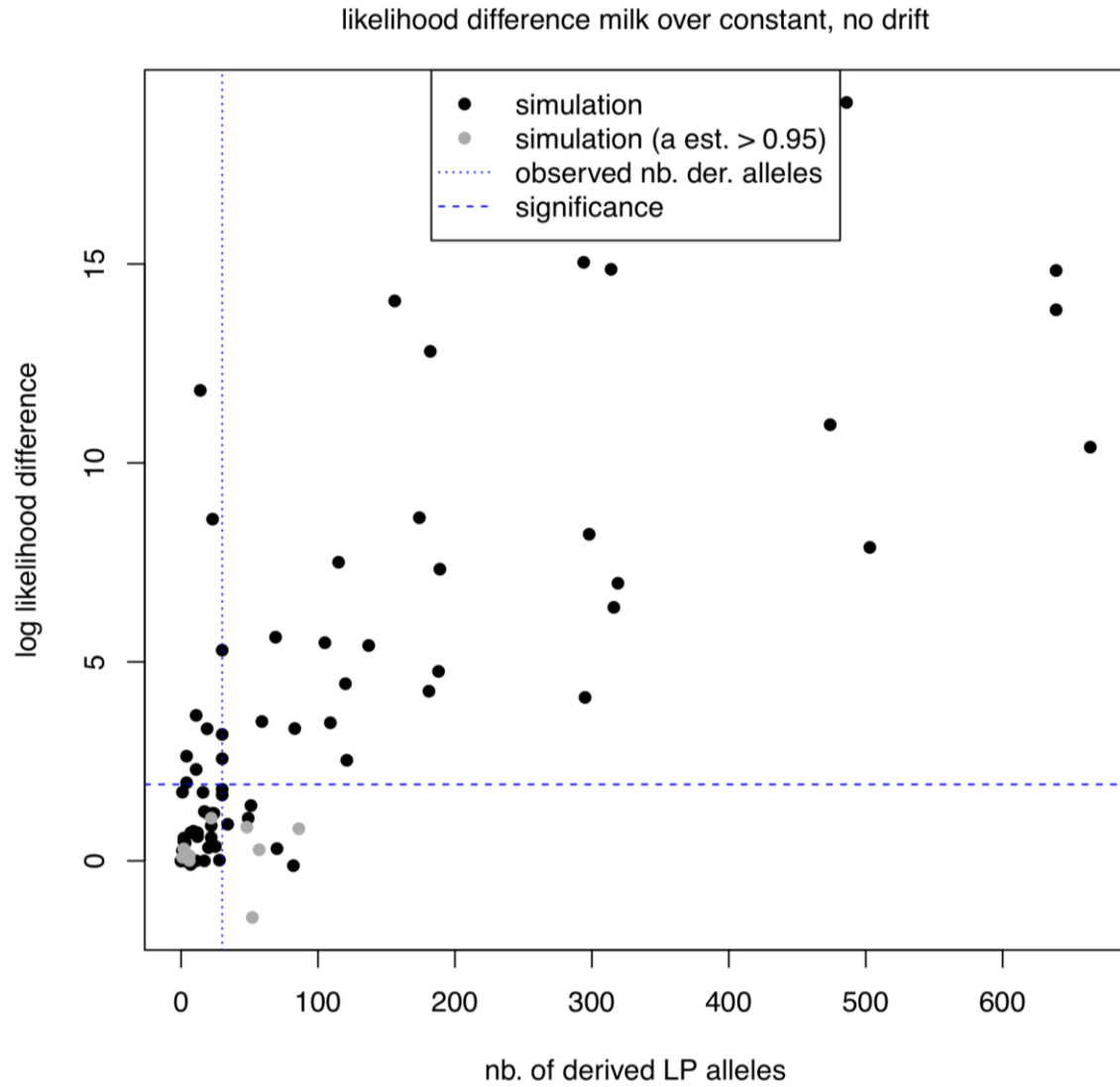


Figure SI4. Likelihood differences between constant and fluctuating selection model driven by milk exploitation in relation to the number of derived alleles simulated without drift. Same simulations as in Figure SI2. Note that parameter optimisation on simulated data was not initialised with the parameters found for the constant model, which can lead to likelihoods of the milk model to fall below the one of the former. *Abbreviations:* number (nb.), estimate (est.), derived (der.).

milk noise 50% (avg. abs. deviation=0.091, max.=0.32), initial freq.=0.005, no drift

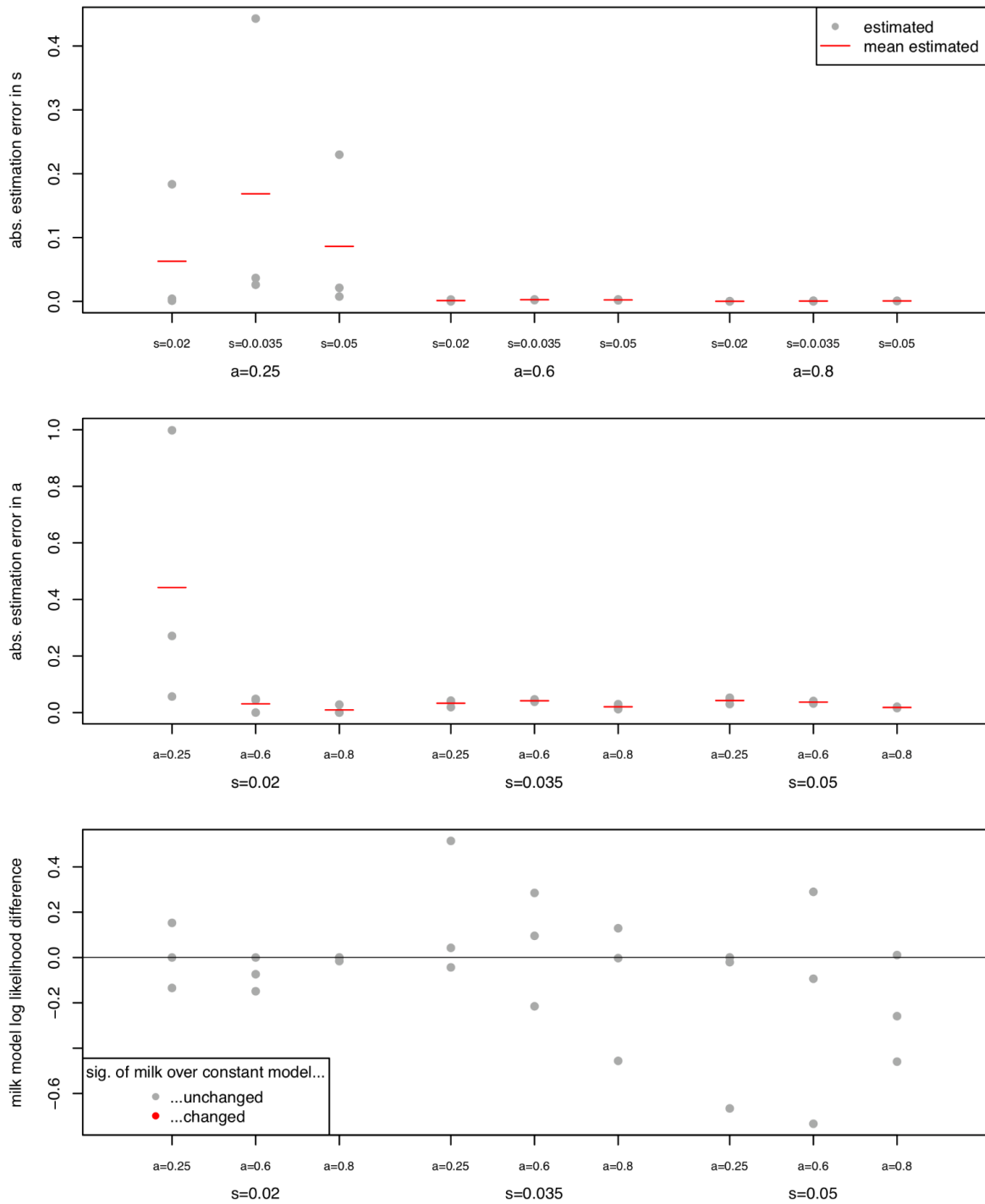
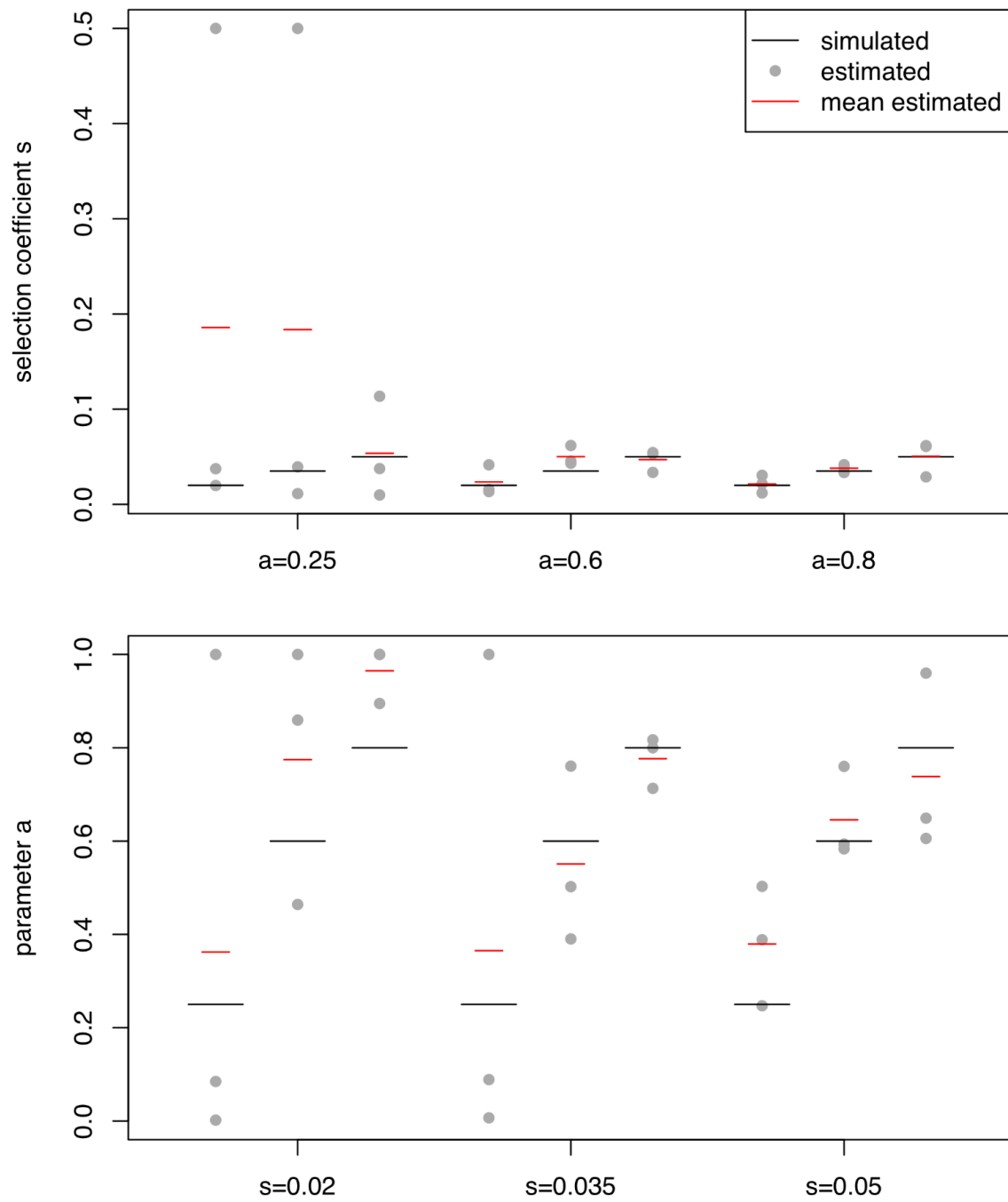


Figure SI5. Effect of noise in milk exploitation ecological proxy on parameter estimates and likelihood differences. For each simulation presented in Figure SI1, optimisation was repeated with a noisy version of the milk exploitation variable (see Method section on aDNA analysis, subsection ‘Power analysis’ for details on how noise was simulated), and the effect on parameter estimates and likelihood differences quantified. *Abbreviations:* average (avg.), absolute (abs.), maximum (max.), frequency (freq.), significance (sig.).

Ainitial freq.=0.005, $N_e=10000$ 

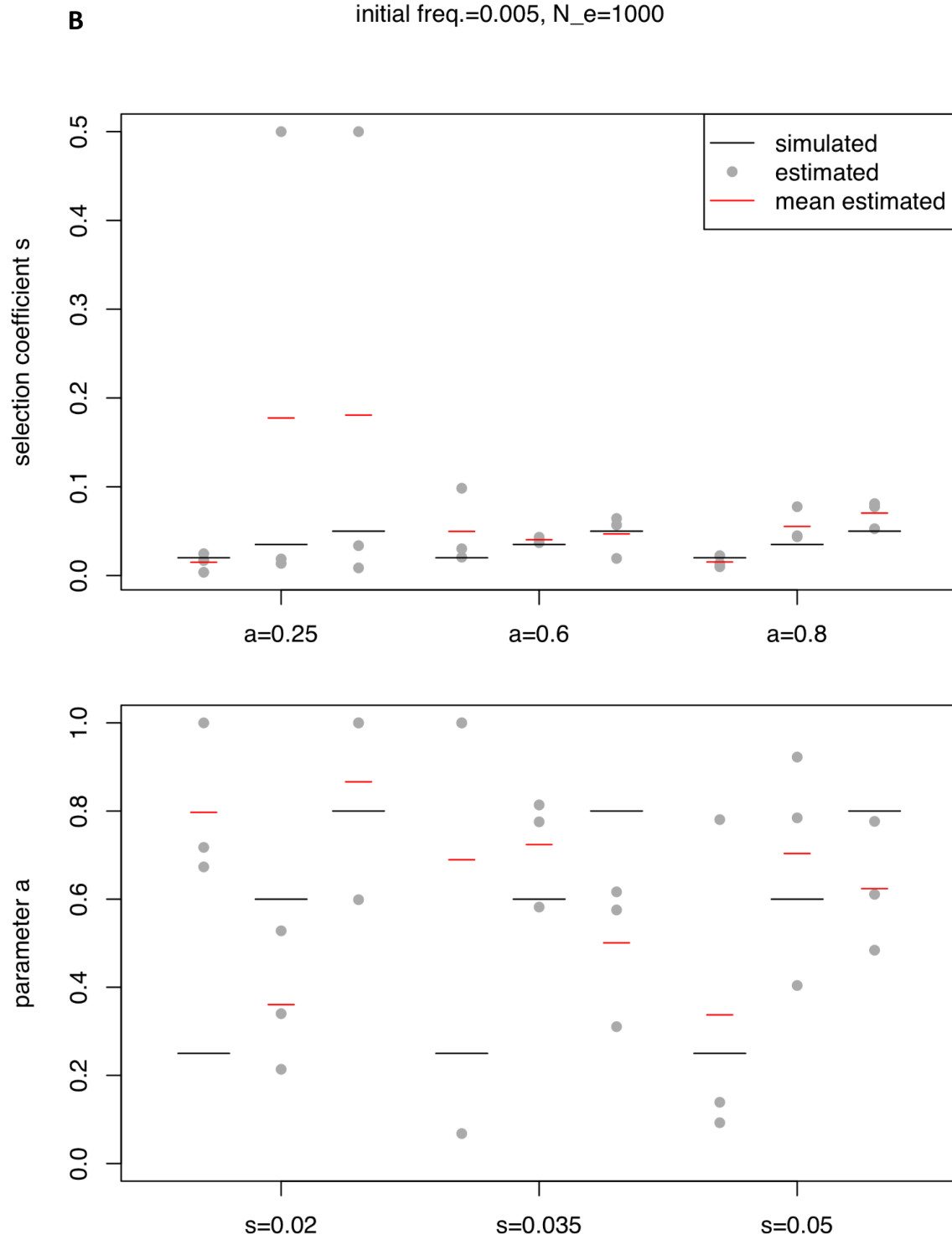
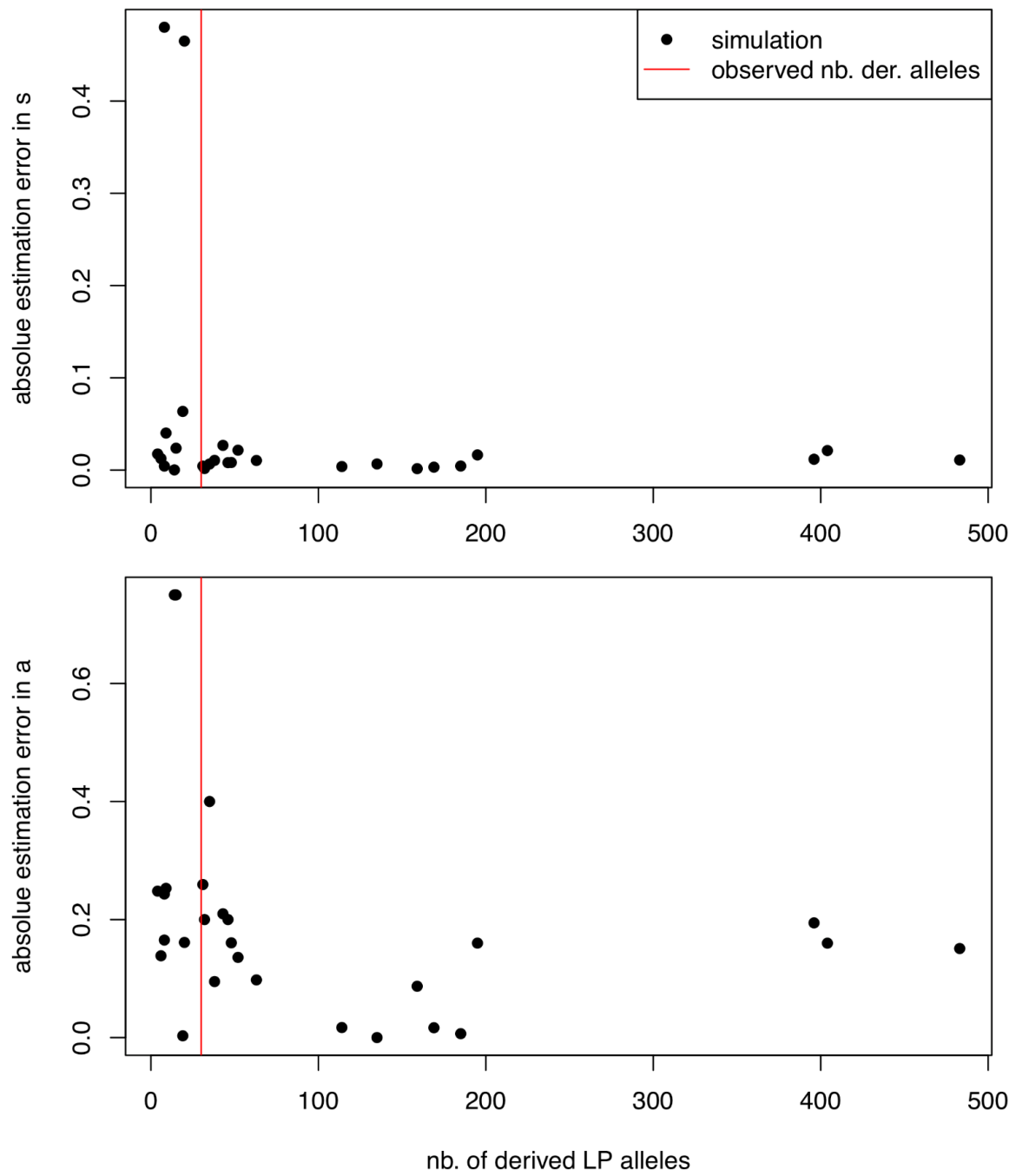


Figure SI6A-B. Parameter estimation accuracy with drift. Same experiment as presented in Figure SI1, but with drift at two levels ($N_e \in \{1,000, 10,000\}$) affecting the simulated allele frequency trajectories. *Abbreviations:* average (avg.), absolute (abs.), frequency (freq.), significance (sig.).

$N_e = 10000$

A



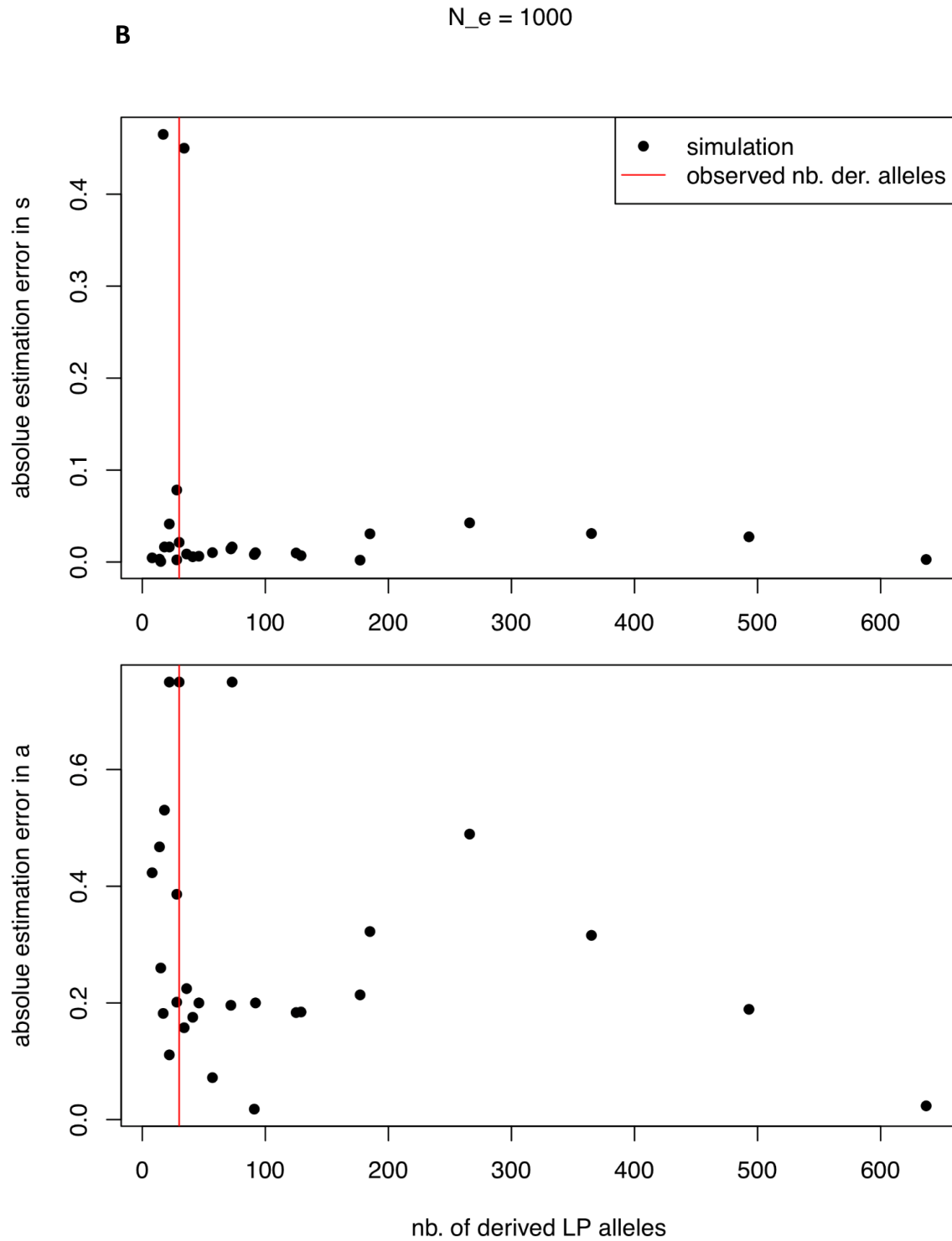
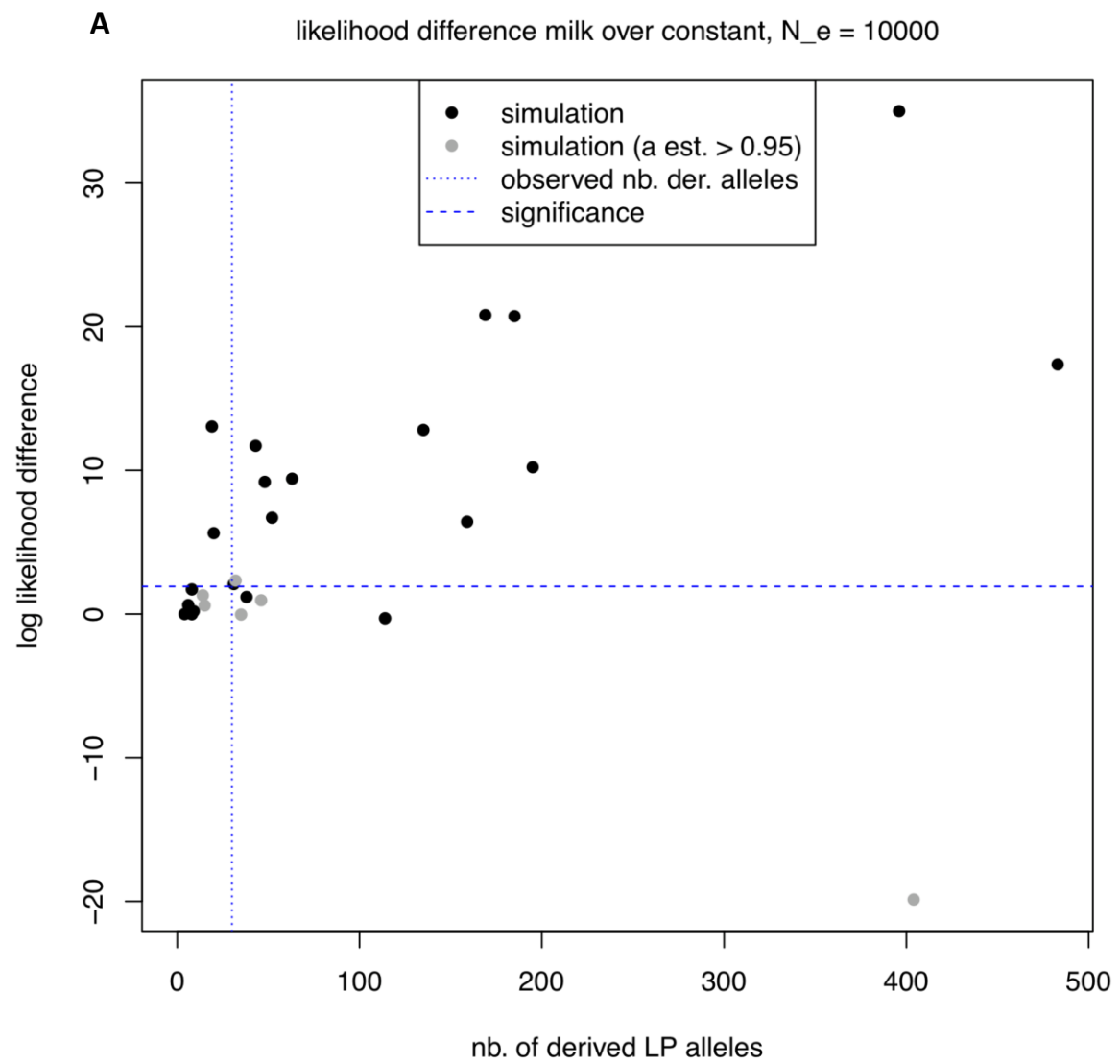


Figure SI7A-B. Parameter estimation accuracy in relation to the number of derived alleles simulated with drift. Replotting of data from Figure SI5 as a function of the number of simulated derived alleles. *Abbreviations:* average (avg.), absolute (abs.), frequency (freq.), significance (sig.).



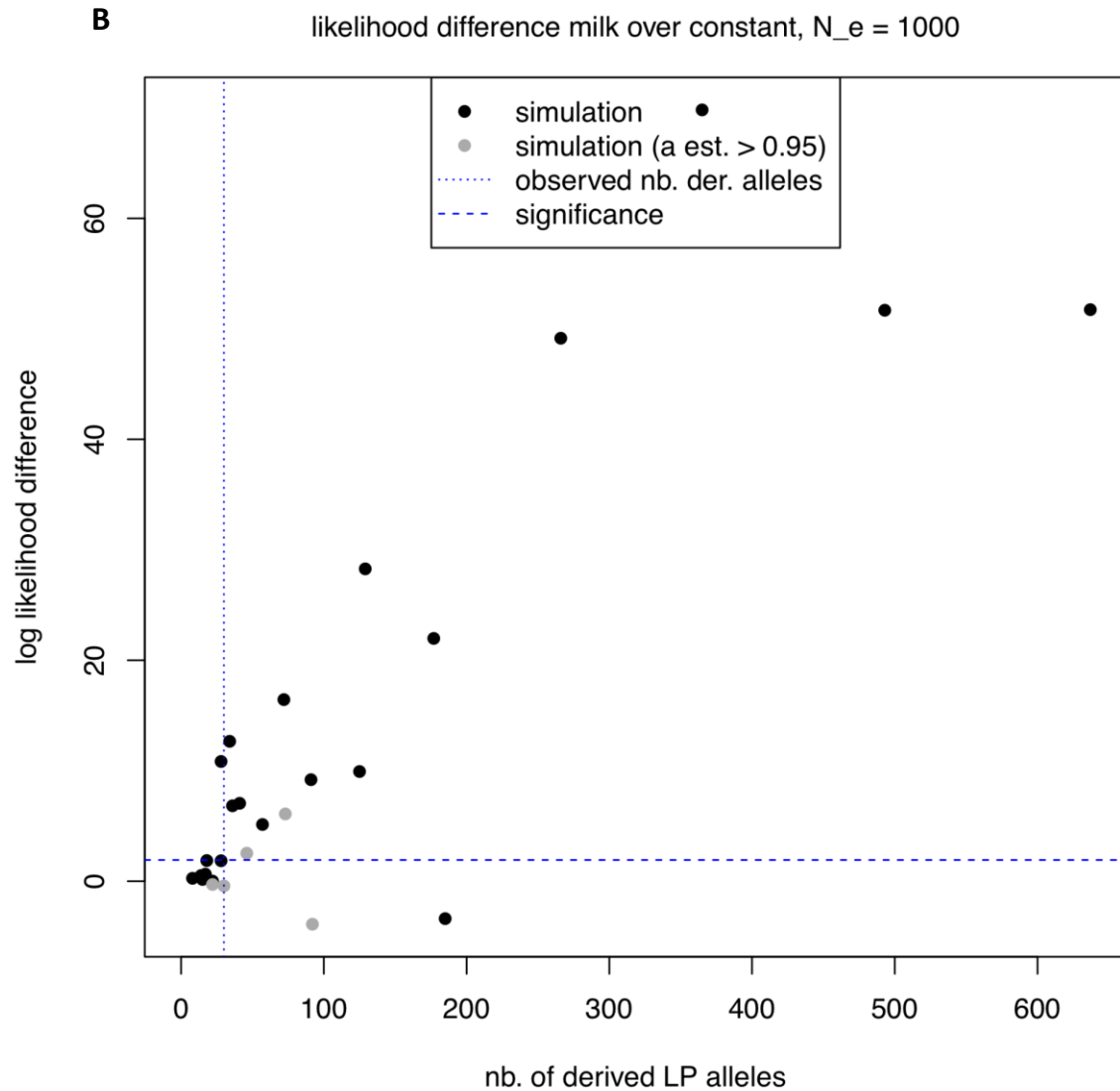


Figure SI8A-B. Likelihood differences between constant and fluctuating selection model driven by milk exploitation in relation to the number of derived alleles simulated with drift. Same simulations as in Figures SI5-6. Note that parameter optimisation on simulated data was not initialised with the parameters found for the constant model, which can lead to likelihoods of the milk model to fall below the one of the former. *Abbreviations:* average (avg.), absolute (abs.), frequency (freq.), significance (sig.).

Time-series plots and interpolation maps

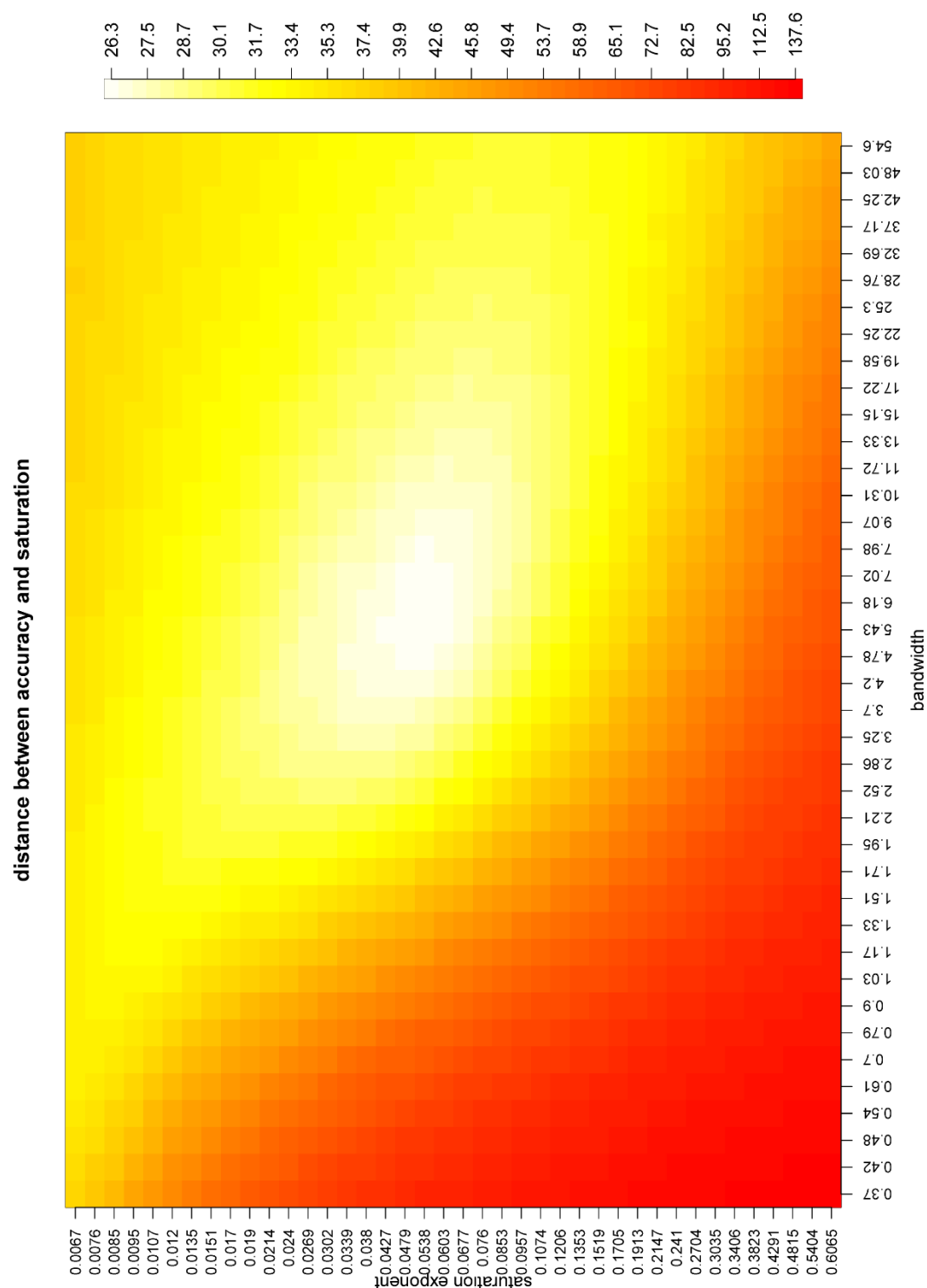


Figure SI9. Cross-validation for choice of interpolation parameters. Bandwidth and saturation exponent parameters for interpolation plots were selected using a cross validation grid search, partitioning the observed data into an 80% training set and 20% test set. 1,000 random partitions were performed for each parameter pair, to generate a reliable summary statistic (distance between accuracy and saturation). Best estimates selected were bandwidth = 6.18 and the saturation exponent = 0.0538.