File S1

Supplementary Methods and Results for the paper "Bayesian modeling of haplotype effects in multiparent populations"
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- Table 1 shows the 50 simulated effect vectors used in the simulation study, with each row being a single effect vector for eight founders. For CC population, the effects to the founders from A to H are assigned to 129S1/SvlmJ (129S1), A/J (AJ), C57BL/6J (B6), NOD/ShiLtJ (NOD), NZO/HILtJ (NZO), CAST/EiJ (CAST), PWK/PhJ (PWK), and WSB/EiJ (WSB), respectively. And For HS population, the effects are assigned to to A/J (AJ), AKR/J (AKR), BALBc/J (BALB), CBA/J (CBA), C3H/HeJ (C3H), C57BL/6J (B6), DBA/2J (DBA) and LP/J (LP), respectively.
- Table 2 and 3 show the simulation result based on Pre-CC population with mean values of two metrics and their 95% confident intervals. The data of the tables is used for generating Figure 3 and 4 in the main manuscript.
- Table 4 and 5 show the simulation result based on HS population with mean values of two metrics and their 95% confident intervals. The data of the tables is used for generating Figure 5 and 6 in the main manuscript.

Strain	A	B	C	D	E	F	G	H
	2	1	1	1	1	1	1	1
	1	2	1	1	1	1	1	1
	1	1	2	1	1	1	1	1
	1	1	1	2	1	1	1	1
	1	1	1	1	2	1	1	1
	1	1	1	1	1	2	1	1
	1	1	1	1	1	1	2	1
	1	1	1	1	1	1	1	2
	2	2	1	1	1	1	1	1
	1	2	2	1	1	1	1	1
	1	1	2	2	1	1	1	1
	1	1	1	2	2	1	1	1
	1	1	1	1	2	2	1	1
	1	1	1	1	1	2	2	1
	2	1	1	1	1	1	1	2
	1	1	1	1	2	2	2	1
	2	1	1	1	1	2	2	1
	2	2	1	1	1	1	2	1
	1	1	1	2	2	1	2	1
	1	2	2	1	1	1	1	2
	2	2	2	2	1	1	1	1
	1	2	2	2	2	1	1	1
	1	1	2	2	2	2	1	1
	1	1	1	2	2	2	2	1
	2	2	2	1	1	1	1	2
	1.78	0.72	-1.54	0.74	-0.68	-0.17	-1.08	1.28
	-1.505	0.059	1.868	1.156	0.206	-0.514	-0.049	-0.909
	-1.31	-1.26	0.66	-0.52	-1.56	-0.79	-0.72	0.09
	-0.739	-1.915	0.081	1.060	-0.380	0.361	0.348	0.153
	2.70	0.29	0.60	-0.72	-1.06	-1.21	1.32	-0.19
	0.88	-0.21	0.85	2.08	-3.52	-0.34	-0.55	-0.57
	0.781	-1.886	0.099	0.687	0.539	0.755	-0.752	-1.159
	0.428	-1.052	0.459	0.049	-0.731	0.406	-0.601	-0.972
	-2.40	0.13	0.94	0.85	0.34	-0.23	1.60	0.29
	0.237	0.022	0.428	-0.390	0.103	-0.551	-0.835	-0.113
	-0.67	-1.76	1.05	0.29	0.50	-0.59	-0.54	-1.27
	-1.22	-1.97	1.81	-0.26	-0.18	-0.64	-0.72	-0.84
	-0.048	0.974	1.048	0.536	-1.349	-0.290	0.307	0.522
	1.090	-0.552	-0.731	0.067	-0.693	-0.459	-0.629	-0.012
	0.064	-0.678	1.154	1.477	-0.118	-0.947	0.954	0.778
	-0.700	0.023	-1.199	-1.168	-0.637	-0.515	0.059	1.332
	-0.287	-0.092	-1.238	0.388	-0.980	-0.605	-0.608	0.832
	-0.133	-0.907	-0.342	0.024	1.542	-0.013	2.274	2.435
	-2.211	-1.598	-0.617	-0.738	0.774	-1.006	-0.073	-0.467
	0.073	0.331	-0.027	-0.136	-0.863	0.105	1.065	-0.088
	0.235	-0.637	-0.326	1.200	0.024	-1.819	1.384	-0.759
	0.44028	-0.46124	1.24133	-0.57630	0.74145	0.00036	-1.55446	0.37339
	0.62	1.58	1.07	-0.25	0.44	-0.16	-0.56	0.68
	-0.71	0.86	1.73	-1.02	-0.24	-1.78	-1.11	-0.32
	-1.139	0.442	-1.779	-0.739	0.545	-1.192	0.023	1.230

Table 1: A table of all effect vectors used in the simulation study.

Simulated Effects	Metric	Model	QTL effect size		
			2.5%	5%	10%
Additive	Effect MSE	`partial.lm`	2.174 (0.042)	1.096 (0.021)	0.557 (0.011)
		`ridge.add`	0.748 (0.010)	0.551 (0.009)	0.340 (0.006)
		`ridge.dom`	0.756 (0.008)	0.677 (0.009)	0.537 (0.009)
		`DF.MCMC.pseudo`	0.678 (0.011)	0.467 (0.007)	0.337 (0.006)
		`DF.MCMC`	0.712 (0.014)	0.472 (0.008)	0.305 (0.005)
		`DF.IS.noweight`	0.706 (0.014)	0.471 (0.008)	0.362 (0.006)
		`DF.IS`	0.703 (0.014)	0.469 (0.008)	0.333 (0.006)
	Effect Rank Accuracy	`partial.lm`	0.537 (0.009)	0.656 (0.007)	0.741 (0.005)
		`ridge.add`	0.537 (0.009)	0.656 (0.007)	0.742 (0.005)
		`ridge.dom`	0.535 (0.009)	0.652 (0.007)	0.738 (0.005)
		`DF.MCMC.pseudo`	0.519 (0.010)	0.638 (0.008)	0.722 (0.006)
		`DF.MCMC`	0.531 (0.010)	0.653 (0.007)	0.741 (0.005)
		`DF.IS.noweight`	0.531 (0.009)	0.654 (0.007)	0.740 (0.005)
		`DF.IS`	0.534 (0.010)	0.654 (0.007)	0.739 (0.006)
Additive + Dominant	Effect MSE	`partial.lm`	2.242 (0.048)	1.170 (0.025)	0.635 (0.014)
		`ridge.add`	0.775 (0.012)	0.578 (0.010)	0.376 (0.008)
		`ridge.dom`	0.762 (0.007)	0.685 (0.008)	0.561 (0.008)
		`DF.MCMC.pseudo`	0.701 (0.013)	0.493 (0.008)	0.388 (0.007)
		`DF.MCMC`	0.740 (0.016)	0.498 (0.009)	0.335 (0.006)
		`DF.IS.noweight`	0.729 (0.015)	0.494 (0.009)	0.384 (0.006)
		`DF.IS`	0.728 (0.016)	0.492 (0.009)	0.360 (0.006)
	Effect Rank Accuracy	`partial.lm`	0.535 (0.010)	0.646 (0.008)	0.727 (0.006)
		`ridge.add`	0.535 (0.010)	0.647 (0.007)	0.731 (0.006)
		`ridge.dom`	0.535 (0.010)	0.645 (0.007)	0.729 (0.006)
		`DF.MCMC.pseudo`	0.514 (0.010)	0.624 (0.008)	0.700 (0.006)
		`DF.MCMC`	0.527 (0.010)	0.643 (0.008)	0.729 (0.006)
		`DF.IS.noweight`	0.531 (0.010)	0.645 (0.007)	0.729 (0.006)
		`DF.IS`	0.530 (0.010)	0.643 (0.008)	0.728 (0.006)

Table 2: Performance of the methods applied on CC population with simulated phenotypes. The table shows the mean values of either prediction error or rank accuracy with halved 95% confidence interval size in parentheses.

Simulated Effects	Metric	Model	QTL effect size		
			20%	30%	40%
Additive	Effect MSE	`partial.lm`	0.288 (0.006)	0.199 (0.005)	0.154 (0.005)
		`ridge.add`	0.174 (0.003)	0.109 (0.002)	0.076 (0.001)
		`ridge.dom`	0.348 (0.007)	0.254 (0.006)	0.196 (0.005)
		`DF.MCMC.pseudo`	0.192 (0.004)	0.134 (0.003)	0.100 (0.002)
		`DF.MCMC`	0.166 (0.003)	0.102 (0.002)	0.068 (0.001)
		`DF.IS.noweight`	0.237 (0.005)	0.169 (0.004)	0.130 (0.003)
		`DF.IS`	0.188 (0.004)	0.120 (0.003)	0.086 (0.002)
	Effect Rank Accuracy	`partial.lm`	0.793 (0.005)	0.813 (0.005)	0.825 (0.005)
		`ridge.add`	0.797 (0.005)	0.818 (0.005)	0.831 (0.005)
		`ridge.dom`	0.791 (0.005)	0.814 (0.005)	0.826 (0.005)
		`DF.MCMC.pseudo`	0.784 (0.005)	0.807 (0.005)	0.821 (0.005)
		`DF.MCMC`	0.797 (0.005)	0.818 (0.005)	0.830 (0.005)
		`DF.IS.noweight`	0.793 (0.005)	0.814 (0.005)	0.825 (0.005)
		`DF.IS`	0.796 (0.005)	0.815 (0.005)	0.828 (0.005)
Additive + Dominant	Effect MSE	`partial.lm`	0.369 (0.009)	0.281 (0.008)	0.237 (0.007)
		`ridge.add`	0.219 (0.005)	0.158 (0.004)	0.127 (0.003)
		`ridge.dom`	0.399 (0.008)	0.321 (0.007)	0.273 (0.006)
		`DF.MCMC.pseudo`	0.246 (0.005)	0.184 (0.004)	0.152 (0.003)
		`DF.MCMC`	0.203 (0.004)	0.140 (0.004)	0.105 (0.004)
		`DF.IS.noweight`	0.274 (0.005)	0.213 (0.005)	0.175 (0.004)
		`DF.IS`	0.227 (0.005)	0.163 (0.004)	0.123 (0.003)
	Effect Rank Accuracy	`partial.lm`	0.777 (0.005)	0.797 (0.005)	0.806 (0.005)
		`ridge.add`	0.782 (0.005)	0.802 (0.005)	0.812 (0.005)
		`ridge.dom`	0.784 (0.005)	0.805 (0.005)	0.817 (0.005)
		`DF.MCMC.pseudo`	0.762 (0.005)	0.788 (0.005)	0.797 (0.005)
		`DF.MCMC`	0.784 (0.005)	0.805 (0.005)	0.817 (0.006)
		`DF.IS.noweight`	0.780 (0.005)	0.800 (0.005)	0.810 (0.005)
		`DF.IS`	0.782 (0.005)	0.801 (0.005)	0.811 (0.005)

Table 3: Performance of the methods applied on CC population with simulated phenotypes. The table shows the mean values of either prediction error or rank accuracy with halved 95% confidence interval size in parentheses.

Simulated Effects	Metric	Model	QTL effect size		
			2.5%	5%	10%
Additive	Effect MSE	`partial.lm`	32.678 (1.697)	19.145 (1.085)	12.427 (0.763)
		`ridge.add`	41.639 (3.217)	19.961 (1.556)	9.692 (0.715)
		`ridge.dom`	2293 (603)	1156 (289)	599 (156.9)
		`DF.IS.noweight`	0.850 (0.007)	0.814 (0.007)	0.803 (0.006)
		`DF.IS.kinship`	1.136 (0.020)	0.902 (0.015)	0.797 (0.013)
		`DF.IS`	0.915 (0.031)	0.813 (0.010)	0.764 (0.008)
	Effect Rank Accuracy	`partial.lm`	0.186 (0.014)	0.245 (0.013)	0.310 (0.012)
		`ridge.add`	0.178 (0.014)	0.241 (0.014)	0.311 (0.013)
		`ridge.dom`	0.095 (0.010)	0.126 (0.010)	0.160 (0.010)
		`DF.IS.noweight`	0.318 (0.012)	0.393 (0.011)	0.457 (0.009)
		`DF.IS.kinship`	0.246 (0.013)	0.325 (0.015)	0.398 (0.015)
		`DF.IS`	0.296 (0.030)	0.364 (0.012)	0.442 (0.010)
Additive + Dominant	Effect MSE	`partial.lm`	16.954 (0.909)	10.486 (0.602)	7.111 (0.444)
		`ridge.add`	18.434 (1.222)	10.580 (0.666)	5.805 (0.343)
		`ridge.dom`	1085 (256)	557 (142)	275 (68.40)
		`DF.IS.noweight`	0.910 (0.004)	0.892 (0.003)	0.887 (0.003)
		`DF.IS.kinship`	1.051 (0.011)	0.936 (0.007)	0.887 (0.006)
		`DF.IS`	0.946 (0.008)	0.893 (0.006)	0.867 (0.004)
	Effect Rank Accuracy	`partial.lm`	0.146 (0.010)	0.176 (0.010)	0.218 (0.009)
		`ridge.add`	0.122 (0.011)	0.160 (0.010)	0.205 (0.010)
		`ridge.dom`	0.073 (0.009)	0.101 (0.008)	0.137 (0.009)
		`DF.IS.noweight`	0.229 (0.009)	0.276 (0.008)	0.313 (0.008)
		`DF.IS.kinship`	0.180 (0.010)	0.229 (0.010)	0.270 (0.011)
		`DF.IS`	0.220 (0.010)	0.258 (0.009)	0.309 (0.008)

Table 4: Performance of the methods applied on HS population with simulated phenotypes. The table shows the mean values of either prediction error or rank accuracy with halved 95% confidence interval size in parentheses.

Simulated Effects	Metric	Model	QTL effect size		
			20%	30%	40%
Additive	Effect MSE	`partial.lm`	9.103 (0.590)	8.008 (0.529)	7.467 (0.498)
		`ridge.add`	4.566 (0.296)	2.959 (0.171)	2.293 (0.146)
		`ridge.dom`	270 (74.24)	164 (46.05)	111 (29.70)
		`DF.IS.noweight`	0.785 (0.006)	0.775 (0.007)	0.768 (0.007)
		`DF.IS.kinship`	0.744 (0.012)	0.702 (0.013)	0.709 (0.011)
		`DF.IS`	0.733 (0.008)	0.721 (0.008)	0.714 (0.008)
	Effect Rank Accuracy	`partial.lm`	0.371 (0.011)	0.399 (0.011)	0.416 (0.010)
		`ridge.add`	0.394 (0.012)	0.447 (0.012)	0.483 (0.011)
		`ridge.dom`	0.202 (0.010)	0.233 (0.010)	0.254 (0.010)
		`DF.IS.noweight`	0.502 (0.008)	0.516 (0.008)	0.526 (0.008)
		`DF.IS.kinship`	0.460 (0.014)	0.489 (0.013)	0.505 (0.012)
		`DF.IS`	0.488 (0.009)	0.501 (0.009)	0.516 (0.009)
Additive + Dominant	Effect MSE	`partial.lm`	5.414 (0.354)	4.845 (0.320)	4.558 (0.301)
		`ridge.add`	3.249 (0.164)	2.471 (0.115)	2.116 (0.110)
		`ridge.dom`	124 (30.90)	78 (19.99)	55 (13.51)
		`DF.IS.noweight`	0.879 (0.003)	0.874 (0.003)	0.870 (0.003)
		`DF.IS.kinship`	0.859 (0.006)	0.837 (0.007)	0.840 (0.005)
		`DF.IS`	0.854 (0.004)	0.849 (0.004)	0.844 (0.004)
	Effect Rank Accuracy	`partial.lm`	0.260 (0.009)	0.280 (0.008)	0.292 (0.008)
		`ridge.add`	0.261 (0.010)	0.293 (0.009)	0.316 (0.009)
		`ridge.dom`	0.179 (0.009)	0.208 (0.009)	0.229 (0.009)
		`DF.IS.noweight`	0.346 (0.007)	0.357 (0.007)	0.366 (0.006)
		`DF.IS.kinship`	0.309 (0.010)	0.340 (0.010)	0.348 (0.009)
		`DF.IS`	0.336 (0.008)	0.345 (0.008)	0.357 (0.007)

Table 5: Performance of the methods applied on HS population with simulated phenotypes. The table shows the mean values of either prediction error or rank accuracy with halved 95% confidence interval size in parentheses.

Simulated Effects	2.5% QTL	5% QTL	10% QTL	20% QTL	30% QTL	40% QTL
Additive	0.0010 (0.0001)	0.0014 (0.0001)	0.0025 (0.0001)	0.0051 (0.0001)	0.0083 (0.0002)	0.0125 (0.0003)
Additive + Dominant	0.0013 (0.0001)	0.0017 (0.0001)	0.0032 (0.0001)	0.0066 (0.0001)	0.0108 (0.0002)	0.0163 (0.0003)

Table 6: The table shows the mean values of TDI with halved 95% confidence interval size in parentheses.