

APPENDIX II. Number of common bulls

BSW

common bulls below diagonal
common three quarter sib group above diagonal
CAN DEA FRA USA

CAN	0	54	32	58
DEA	44	0	147	136
FRA	28	106	0	60
USA	52	97	42	0

BSW

common bulls below diagonal
common three quarter sib group above diagonal
CAN CHE DEA NLD NZL USA GBR FRA ITA

CAN	0	75	72	28	14	83	38	48	63
CHE	57	0	470	61	16	210	44	118	293
DEA	61	371	0	101	21	176	44	150	389
NLD	23	56	94	0	14	37	27	56	80
NZL	13	14	16	8	0	13	11	14	16
USA	80	179	135	35	11	0	46	74	120
GBR	36	33	33	23	8	46	0	34	42
FRA	41	82	107	42	10	46	28	0	122
ITA	55	233	251	60	12	79	32	87	0

BSW

common bulls below diagonal

common three quarter sib group above diagonal

CAN CHE DEA NLD USA GBR FRA

CAN 0 75 72 27 83 38 55
CHE 57 0 469 60 210 45 128
DEA 61 369 0 98 176 46 164
NLD 22 55 92 0 37 26 62
USA 80 179 135 35 0 47 82
GBR 36 34 34 22 47 0 37
FRA 48 92 123 50 56 32 0

BSW

common bulls below diagonal

common three quarter sib group above diagonal

CAN CHE DEA NLD NZL USA GBR FRA ITA

CAN 0 68 68 27 13 89 38 52 60
CHE 51 0 459 61 16 271 44 128 293
DEA 56 365 0 100 21 275 43 163 382
NLD 22 56 94 0 14 60 27 62 80
NZL 12 14 16 8 0 21 11 15 16
USA 81 249 244 51 19 0 56 103 166
GBR 34 33 33 23 8 56 0 36 42
FRA 44 92 123 50 11 70 31 0 135
ITA 50 233 249 60 12 110 32 99 0

BSW

common bulls below diagonal

common three quarter sib group above diagonal

CAN DEA NLD NZL USA GBR ITA

CAN 0 68 27 13 88 38 60
DEA 56 0 101 21 274 43 418
NLD 23 95 0 14 60 27 81
NZL 12 16 8 0 21 11 16
USA 81 243 53 19 0 56 173
GBR 34 33 23 8 56 0 43
ITA 50 264 60 12 113 32 0

GUE

GUE

common bulls below diagonal
common three quarter sib group above diagonal
CAN GBR NZL USA AUS

CAN 0 13 1 25 17
GBR 10 0 13 35 28
NZL 0 11 0 8 23
USA 24 32 6 0 18
AUS 12 22 22 15 0

GUE

common bulls below diagonal
common three quarter sib group above diagonal
CAN GBR USA

CAN 0 13 25
GBR 10 0 35
USA 24 32 0

GUE

common bulls below diagonal
common three quarter sib group above diagonal
CAN GBR NZL USA ZAF AUS

CAN 0 9 0 26 1 15
GBR 5 0 13 66 5 28
NZL 0 11 0 27 3 23
USA 23 67 29 0 10 49
ZAF 1 4 1 6 0 5
AUS 10 22 22 45 4 0

GUE

common bulls below diagonal

common three quarter sib group above diagonal

CAN GBR NZL USA ZAF AUS

CAN 0 9 0 26 1 15
GBR 5 0 13 66 5 28
NZL 0 11 0 27 3 23
USA 23 67 29 0 10 49
ZAF 1 4 1 6 0 5
AUS 10 22 22 45 4 0

HOL

common bulls below diagonal

common three quarter sib group above diagonal

CAN CZE DEU DFS FRA USA POL FRR

CAN 0 698 1437 743 802 1567 530 0
CZE 447 0 1329 789 852 925 562 8
DEU 731 839 0 1960 1805 1797 930 65
DFS 547 399 905 0 1193 961 565 12
FRA 510 436 773 509 0 1142 674 2
USA 1466 628 891 636 524 0 767 3
POL 351 349 508 316 267 578 0 23
FRR 0 3 44 2 0 0 22 0

HOL

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BEL CAN CHE CHR DEU DFS ESP GBR IRL ITA NLD NZL USA POL FRA FRR AUS

BEL 0 336 219 165 588 401 319 429 276 412 632 271 355 151 468 9 384
CAN 288 0 359 234 1522 793 766 983 353 1146 844 466 1757 444 834 2 755
CHE 197 251 0 251 463 310 274 342 214 318 347 209 350 88 301 3 276
CHR 154 194 265 0 407 179 148 192 121 218 329 121 260 67 166 10 176
DEU 489 796 351 331 0 2069 1016 1559 677 2058 2477 750 2051 801 1902 73 1200
DFS 304 562 243 145 912 0 673 1085 561 1210 1392 609 1084 496 1223 12 878
ESP 286 444 225 119 595 433 0 738 363 839 729 387 844 330 740 2 573
GBR 362 933 301 170 946 653 570 0 697 1183 1271 688 1210 419 1163 4 968
IRL 243 330 209 107 545 400 335 680 0 512 672 527 430 161 570 2 533
ITA 302 735 247 178 1030 660 579 753 403 0 1343 606 1611 552 1469 1 895
NLD 645 707 314 303 1853 907 606 964 590 887 0 799 1297 583 1450 34 1045
NZL 196 424 176 100 513 368 279 558 424 405 693 0 554 196 620 0 931
USA 284 1645 264 234 1026 663 475 959 381 865 924 458 0 667 1287 3 877
POL 91 278 43 49 401 261 144 200 85 278 353 115 437 0 579 20 303
FRA 407 506 264 152 760 462 485 613 412 602 702 320 543 204 0 2 915
FRR 7 1 2 4 50 3 0 1 1 1 10 0 0 21 0 0 3
AUS 287 622 223 144 701 464 384 737 425 514 799 885 704 139 519 1 0

HOL

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	CAN	CHE	CHR	CZE	DEU	DFS	FRA	GBR	ISR	ITA	NLD	USA	POL	FRR
CAN	0	361	235	719	1503	796	840	1034	62	1155	843	1786	468	2
CHE	253	0	251	202	462	310	303	345	22	318	346	351	97	3
CHR	195	265	0	137	405	179	173	196	10	218	326	260	79	10
CZE	467	117	96	0	1305	773	827	693	63	875	969	996	520	9
DEU	743	343	325	837	0	2040	1876	1598	96	2028	2434	2014	851	73
DFS	562	243	145	387	863	0	1219	1107	83	1205	1381	1080	522	12
FRA	521	269	157	417	747	471	0	1190	83	1469	1452	1276	596	2
GBR	978	301	168	372	909	661	626	0	84	1224	1293	1261	449	4
ISR	44	15	6	49	75	61	44	57	0	89	97	80	42	0
ITA	739	247	178	491	971	656	622	766	63	0	1334	1611	580	1
NLD	698	314	302	733	1760	897	711	981	81	877	0	1286	625	34
USA	1690	265	234	657	959	658	551	1002	63	864	910	0	696	3
POL	301	48	59	318	453	289	222	219	25	310	403	465	0	20
FRR	1	2	4	3	50	3	0	1	0	1	10	0	21	0

HOL

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	BEL	CAN	CHE	CHR	CZE	DEU	DFS	ESP	FRA	GBR	IRL	ISR	ITA	NLD	NZL	USA	POL	ZAF	FRR	AUS
BEL	0	328	220	165	269	573	401	319	473	429	277	35	412	632	271	465	148	197	9	391
CAN	282	0	356	227	687	1412	769	759	805	961	346	58	1079	814	451	1874	422	340	2	769
CHE	198	249	0	251	203	460	311	274	303	342	214	22	315	347	209	407	86	167	3	284
CHR	154	190	265	0	138	401	179	148	173	192	121	10	215	330	121	332	65	97	10	182
CZE	169	430	117	96	0	1292	777	503	830	677	309	63	863	976	397	1128	477	245	9	559
DEU	468	687	339	321	829	0	2025	1004	1856	1529	667	97	1969	2381	737	2672	770	460	72	1215
DFS	304	532	244	145	388	853	0	676	1227	1086	561	85	1198	1395	611	1461	481	407	12	903
ESP	286	438	225	119	301	575	433	0	751	741	363	64	837	733	388	1034	326	343	2	583
FRA	411	503	269	157	417	744	474	494	0	1168	576	85	1460	1458	626	1975	572	387	2	941
GBR	362	912	301	170	367	887	654	570	625	0	697	84	1177	1273	688	1580	408	404	4	995
IRL	243	318	209	107	194	522	400	335	421	680	0	62	509	673	527	590	158	263	2	538
ISR	20	43	15	6	49	75	61	44	44	57	51	0	87	98	71	103	40	47	0	67
ITA	302	690	247	177	483	939	648	579	615	748	399	60	0	1326	599	2058	535	412	1	912
NLD	645	664	314	303	736	1664	911	607	717	965	590	81	861	0	802	1846	566	399	34	1078
NZL	196	408	176	100	238	492	369	279	328	558	424	60	400	695	0	836	191	298	0	948
USA	335	1679	302	301	717	1264	770	610	860	1200	478	80	997	1333	748	0	683	517	7	1348
POL	88	259	43	47	277	374	248	142	197	193	84	21	266	336	113	423	0	121	20	306
ZAF	154	314	143	79	152	330	282	302	252	343	228	33	296	330	236	477	66	0	2	377
FRR	7	1	2	4	3	50	3	0	0	1	1	0	1	10	0	1	21	1	0	3
AUS	292	629	229	148	292	693	488	389	545	762	432	48	531	831	912	1140	148	314	1	0

HOL

common bulls below diagonal

common three quarter sib group above diagonal

	BEL	CAN	DEU	DFS	ESP	GBR	IRL	ITA	NLD	NZL	USA	POL	ZAF	AUS
BEL	0	328	570	398	317	426	275	408	627	269	461	146	195	389
CAN	282	0	1428	770	757	961	345	1079	814	451	1874	420	339	768
DEU	473	728	0	2043	1010	1541	671	1987	2405	742	2697	770	463	1223
DFS	305	534	891	0	673	1087	559	1198	1399	612	1465	476	405	901
ESP	286	438	593	433	0	738	359	833	729	386	1029	321	341	580
GBR	362	912	930	654	570	0	694	1175	1274	688	1579	404	402	994
IRL	243	318	540	400	335	679	0	506	670	526	587	153	263	537
ITA	302	690	984	648	579	747	398	0	1325	599	2056	528	411	911
NLD	647	669	1733	919	611	968	589	865	0	801	1847	554	397	1076
NZL	196	408	501	370	279	558	424	400	696	0	836	191	297	947
USA	335	1679	1315	771	610	1200	478	997	1338	748	0	678	515	1345
POL	88	259	385	248	140	193	84	266	333	113	423	0	120	303
ZAF	154	314	335	282	302	343	228	296	331	236	477	66	0	375
AUS	292	629	714	487	389	762	432	531	833	912	1140	148	314	0

JER

common bulls below diagonal

common three quarter sib group above diagonal

CAN DFS USA

CAN 0 40 157
DFS 30 0 75
USA 142 55 0

JER

common bulls below diagonal

common three quarter sib group above diagonal

CAN DFS GBR NLD NZL USA AUS IRL

CAN 0 46 89 20 100 181 118 4
DFS 33 0 104 56 108 89 94 22
GBR 90 94 0 51 145 128 139 32
NLD 15 48 47 0 52 45 47 14
NZL 107 73 146 44 0 184 322 61
USA 182 66 141 47 206 0 231 22
AUS 115 54 145 42 345 239 0 32
IRL 3 18 32 14 65 23 29 0

JER

common bulls below diagonal

common three quarter sib group above diagonal

CAN DFS GBR NLD USA

CAN 0 46 90 20 184
DFS 33 0 108 56 88
GBR 90 97 0 51 132
NLD 15 48 47 0 45
USA 185 66 144 47 0

JER

common bulls below diagonal

common three quarter sib group above diagonal

CAN DFS GBR NLD NZL USA ZAF AUS IRL

CAN 0 45 87 20 95 186 81 123 4
DFS 33 0 104 56 108 138 103 98 22
GBR 87 94 0 51 146 155 121 147 32
NLD 15 48 47 0 53 58 53 49 14
NZL 101 73 146 45 0 283 162 337 61
USA 187 102 174 62 353 0 225 365 27
ZAF 79 75 124 49 168 238 0 181 25
AUS 118 58 152 43 362 393 170 0 33
IRL 3 18 32 14 65 28 25 30 0

JER

common bulls below diagonal

common three quarter sib group above diagonal

CAN DFS GBR NLD NZL USA ZAF AUS IRL

CAN 0 45 87 21 95 186 81 123 4
DFS 33 0 104 58 108 138 103 98 22
GBR 87 94 0 55 146 155 121 147 32
NLD 17 51 51 0 55 62 55 51 15
NZL 101 73 146 48 0 283 162 337 61
USA 187 103 174 67 353 0 225 365 27
ZAF 79 75 124 52 168 238 0 181 25
AUS 118 58 152 45 362 393 170 0 33
IRL 3 18 32 14 65 28 25 30 0

RDC

common bulls below diagonal

common three quarter sib group above diagonal

CAN DEU DFS NOR USA

CAN 0 8 88 4 68
DEU 7 0 36 10 8
DFS 82 27 0 96 89
NOR 4 9 75 0 27
USA 64 8 84 26 0

RDC

common bulls below diagonal

common three quarter sib group above diagonal

CAN DEU DFS GBR NOR NZL USA NLD AUS IRL

CAN 0 8 82 45 4 46 90 3 54 2
DEU 7 0 38 3 9 9 6 9 20 2
DFS 75 30 0 38 86 131 94 29 139 8
GBR 46 3 37 0 11 39 42 9 36 5
NOR 4 9 67 12 0 30 30 20 34 38
NZL 46 9 126 38 29 0 51 7 104 5
USA 85 6 90 40 29 52 0 17 48 7
NLD 3 8 29 9 20 7 17 0 12 6
AUS 53 19 118 35 29 105 47 10 0 6
IRL 2 2 6 5 38 5 7 6 5 0

RDC

common bulls below diagonal

common three quarter sib group above diagonal

CAN DEU DFS GBR NOR NLD USA

CAN 0 8 82 47 4 3 90
DEU 7 0 38 3 10 7 6
DFS 75 30 0 39 89 27 94
GBR 48 3 38 0 11 9 43
NOR 4 9 70 12 0 20 31
NLD 3 7 27 9 20 0 16
USA 86 6 90 41 30 16 0

RDC

common bulls below diagonal

common three quarter sib group above diagonal

CAN DEU DFS GBR NOR NZL USA ZAF NLD AUS IRL

CAN 0 7 79 43 4 45 110 60 3 52 2
DEU 6 0 37 3 8 9 6 0 9 21 2
DFS 73 29 0 40 74 131 109 43 29 144 8
GBR 44 3 39 0 11 39 55 30 9 38 5
NOR 4 8 56 12 0 28 28 0 19 34 38
NZL 45 9 126 38 27 0 72 31 7 107 5
USA 112 6 106 55 27 73 0 58 17 74 9
ZAF 64 0 41 28 0 29 54 0 1 32 1
NLD 3 8 29 9 19 7 17 1 0 14 6
AUS 51 20 123 37 29 108 75 33 12 0 6
IRL 2 2 6 5 38 5 9 1 6 5 0

RDC

common bulls below diagonal

common three quarter sib group above diagonal

	CAN	DEU	DFS	GBR	NOR	NZL	USA	ZAF	NLD	AUS	IRL
CAN	0	7	80	43	4	45	110	60	4	52	2
DEU	6	0	38	3	8	9	6	0	9	21	2
DFS	74	30	0	40	74	131	109	43	29	144	8
GBR	44	3	39	0	11	39	55	30	9	38	5
NOR	4	8	56	12	0	28	28	0	20	34	38
NZL	45	9	126	38	27	0	72	31	7	107	5
USA	112	6	106	55	27	73	0	58	19	74	9
ZAF	64	0	41	28	0	29	54	0	1	32	1
NLD	4	8	29	9	20	7	18	1	0	14	6
AUS	51	20	123	37	29	108	75	33	12	0	6
IRL	2	2	6	5	38	5	9	1	6	5	0
