

1H

2H

3H

4H

0.0 BOPA1_3692-940
1.7 *HvHXK4*
5.4 *HvBRD*
7.4 SCRI_RS_213799
13.3 *HvRAX1*
13.4 SCRI_RS_231889
18.1 SCRI_RS_153672
19.9 *Ppd-H1/HvPRR37*
22.2 SCRI_RS_131218

39.4 BOPA1_ABC03253-1-2-279 *HvDWT1*
41.8 *HvCO18*
41.9 SCRI_RS_141655
42.0 BOPA1_265-1229
49.1 BOPA1_3598-489
50.0 *HvFT4*
50.5 SCRI_RS_198460
50.6 SCRI_RS_158928
58.0 *eps2/HvCEN/eam6*
58.1 *HvSUSIBA2/HvHOX2*
58.2 BOPA2_12_31288
58.3 BOPA1_ABC06091-1-1-187
58.8 BOPA1_4717-386
58.9 BOPA2_12_10948
59.4 *HD6-2H/HvKNOX1*
59.9 BOPA1_1826-229
60.0 SCRI_RS_165574
62.0 BOPA2_12_10545
64.6 SCRI_RS_198848
64.7 *HvCO4*
69.3 BOPA1_6804-1197
75.2 BOPA1_7549-782 *Vrs1*
90.1 BOPA1_8632-1809
90.4 *HvMAX3/HvCCD7/HvHTD1/HvD17*
103.7 BOPA1_8523-316
107.2 BOPA2_12_31402
107.3 *BFL/HvAPO2*
112.2 *HvSSIIIb* SCRI_RS_151556
112.9 BOPA1_111-499

14.9 SCRI_RS_209312
15.2 *HvSTE1/HvD7*

37.1 *HvAS2* SCRI_RS_136959
39.5 SCRI_RS_237761
39.6 *Vrs4*
51.3 SCRI_RS_906 *HvBR1/HvD61/uzu1*
51.6 SCRI_RS_90637
52.0 *HvFT2*
52.6 BOPA1_4453-422
59.1 BOPA1_8180-450
59.3 *HvHXK9*
59.6 SCRI_RS_13376
62.5 SCRI_RS_138291 *HvHXK6*
62.8 SCRI_RS_225522
62.9 *HvMAX4/HvCCD8/HvD10*
64.1 *HvGA2ox1*
64.2 BOPA1_4149-219

88.2 SCRI_RS_174067
90.2 *HvLNT-1*

98.2 *HvCMF1*
100.3 BOPA1_2500-1514
104.5 BOPA2_12_31220
106.0 *HvGA20ox3*

25.8 *INT-C*
26.3 *HvCO10*
27.5 BOPA1_1001-1187

50.0 BOPA2_12_30605
50.8 SCRI_RS_154048
51.0 BOPA2_12_31382
51.1 *HvCO16*
51.3 *HvPRR59*
51.4 BOPA2_12_20156 *HvPhyB/HvPRR73/HvGELP112/HvWDL1*

66.0 SCRI_RS_143825
66.9 *HvD14/HvHTD2*
67.5 BOPA1_4139-888

79.6 BOPA1_ConsensusGBS0461-3
81.6 *HvSUT1*

103.7 *HvCMF4*
103.8 SCRI_RS_157611
111.1 *HvRIM1*
113.4 BOPA1_2297-1250
113.7 SCRI_RS_9164
114.0 *Vrn-H2/HvZCCT-Ha/b/c*

5H

6H

7H

1.0 *HvSUT2*
3.3 SCRI_RS_168359

43.7 *HvCO3*
43.8 *HvTPS1*
44.1 *HvND1/HvTFL1*
44.2 BOPA1_4152-573 *HvCPD*
46.4 *HvCMF13*
46.5 *HvAS1*
46.6 *HvD53*
47.2 *HvBC12/GGD1*

96.6 SCRI_RS_206565 *HvMND6*
97.2 *HvPRR95*

125.5 SCRI_RS_133602
125.6 BOPA1_5571-640
125.7 *Vrn-H1/HvPhyC*
130.0 SCRI_RS_210928
130.7 *HvRAX3*

165.8 SCRI_RS_194125
168.8 SCRI_RS_219619 *HvGA20ox1*

49.2 SCRI_RS_234724 *HvCMF3*
52.5 SCRI_RS_166120
52.6 *HvCO7*
54.8 *HvCYP734A7*
55.0 BOPA1_3658-1310 *HvCO5/HvCry1a/HvCry2*
55.3 *HvPRR1/HvTOC1*
55.4 BOPA1_210-450
58.4 SCRI_RS_223224
59.1 *HvCry1b*
65.0 BOPA1_1140-1508
67.9 BOPA2_12_31289 *HvCO14*
68.2 BOPA1_3773-756 *HvCO2*
69.3 BOPA1_7706-924
70.0 BOPA1_5187-752
71.3 *HvCO11*

88.6 SCRI_RS_222802 *HvCOP1*

95.0 BOPA1_10425-725 *HvTPS2*

1.7 *HvKAO1*
1.9 *HvD3*
2.5 SCRI_RS_13615
4.1 SCRI_RS_42792
11.8 BOPA2_12_31450
12.8 *HvDLT*
13.9 *HvWAXY*

27.6 SCRI_RS_106456
27.7 BOPA1_3313-1443
29.9 *HvMAX2*
34.3 *Vrn-H3/HvFT1*
37.6 BOPA1_1213-1959 *HvSSI*
38.8 BOPA2_12_31305
40.4 SCRI_RS_166536
41.9 *HvCO8*

54.3 *HvSS*
54.4 BOPA2_12_30880
61.5 BOPA2_12_10657
61.7 *HvVRT-2*
61.8 BOPA1_5695-922
70.3 SCRI_RS_200107
70.5 *HvCO15/HvWFP1/HvIPA1/HvSPL14*
70.8 *HvLHY/HvCCA1*

120.4 BOPA1_7216-297 *HvESR1*
120.8 *HvCO6*

- genes associated with different allelic frequencies among Kazakhstan regions (KA, KV, and KB)
- genes associated with different allelic frequencies among Kazakhstan regions and between Kazakhstan and Europe
- genes associated with different allelic frequencies among Kazakhstan regions and between Kazakhstan and Africa
- genes associated with different allelic frequencies between Kazakhstan and Europe
- genes associated with different allelic frequencies between Kazakhstan and Africa
- genes associated with different allelic frequencies among Kazakhstan, Europe, and Africa