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(56) 对比文件

Jun Gao等.Genomic Dissection of
Chinese Yangtze River Delta White Goat
Based on Whole Genome Sequencing.
《animals》.2025,全文.

审查员 李佳栋

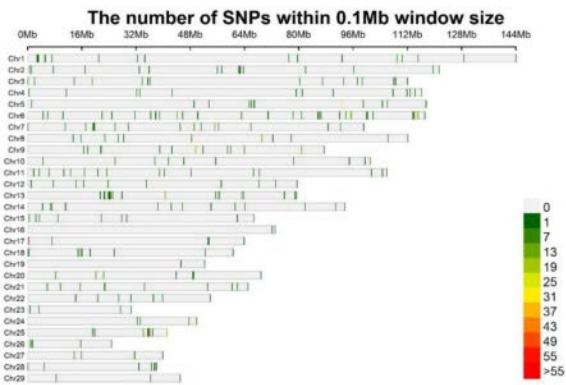
权利要求书5页 说明书27页 附图1页

(54) 发明名称

一种用于崇明白山羊血统鉴定的SNP分子标
记组合及其应用

(57) 摘要

本发明公开了一种用于崇明白山羊血统鉴定
的SNP分子标记组合,所述SNP分子标记组合由
1000个(1K)的SNP分子标记组成,所述SNP分子标
记在山羊参考基因组ARS1上的物理位置和编号
如说明书表1所示。利用这些SNP分子标记并基于
靶向捕获芯片基因分型技术,可实现对崇明白山
羊个体的血统精准分析,特别是崇明白山羊的品
种鉴定和亲缘关系鉴定。本发明解决了现有技术
中尚未有合适的SNP芯片检测手段和分析方法对
崇明白山羊个体进行血统精准鉴定的技术问题。



1.SNP分子标记组合在崇明白山羊血统鉴定中的应用,其特征在于,所述SNP分子标记组合由1000个SNP分子标记组成,所述SNP分子标记在崇明白山羊参考基因组ARS1上的编号和物理位置如下表所示:

编号	物理位置	编号	物理位置	编号	物理位置	编号	物理位置	编号	物理位置
1	1_2841644	201	6_63110278	401	7_55264861	601	13_24656411	801	21_5856026
2	1_3055751	202	6_63110597	402	7_55266496	602	13_24656737	802	21_9742244
3	1_3185598	203	6_63111895	403	7_55274632	603	13_24657216	803	21_15500945
4	1_5091606	204	6_63114148	404	7_55282483	604	13_24657234	804	21_22724188
5	1_5091656	205	6_70887924	405	7_56294176	605	13_24657500	805	21_22724210
6	1_5091684	206	6_70952609	406	7_56299252	606	13_24657885	806	21_22724218
7	1_5114235	207	6_70963450	407	7_56303821	607	13_24658531	807	21_22816846
8	1_5144835	208	6_70964141	408	7_65882562	608	13_25142683	808	21_22816850
9	1_7160267	209	6_70964850	409	7_88623995	609	13_27840106	809	21_22863286
10	1_21017436	210	6_70964851	410	7_92262901	610	13_40485135	810	21_22864681
11	1_32401706	211	6_70967009	411	7_92263374	611	13_40485453	811	21_22865257
12	1_34585365	212	6_70974688	412	7_92264779	612	13_40493782	812	21_34538300
13	1_77030266	213	6_71040583	413	7_99119924	613	13_40494554	813	21_53023056
14	1_79629025	214	6_78259063	414	7_99121156	614	13_40495227	814	21_60335548
15	1_92744609	215	6_78294163	415	8_13471745	615	13_40518869	815	21_61833025
16	1_108905991	216	6_80773068	416	8_15748523	616	13_40547093	816	21_61834815
17	1_108918658	217	6_85637101	417	8_22755639	617	13_40547239	817	21_61834842
18	1_110483597	218	6_85637115	418	8_26706332	618	13_40548037	818	21_61834931
19	1_110494263	219	6_85637139	419	8_28261109	619	13_40548557	819	21_61835119
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21	1_110507791	221	6_85643530	421	8_48301572	621	13_40551009	821	21_61835349
22	1_110509526	222	6_85647606	422	8_48340138	622	13_40560235	822	21_61835350
23	1_115176087	223	6_85652956	423	8_48368136	623	13_40567678	823	21_65032364
24	1_115177605	224	6_85652963	424	8_48372331	624	13_40572922	824	22_14191255
25	1_128617475	225	6_85679492	425	8_48387056	625	13_40578373	825	22_20699822
26	1_144004051	226	6_85848939	426	8_48392891	626	13_40579377	826	22_20728519
27	2_594675	227	6_86467622	427	8_48394924	627	13_40587468	827	22_26840831
28	2_1103351	228	6_91974425	428	8_69092582	628	13_40590432	828	22_30491380
29	2_7567913	229	6_93841530	429	8_69094973	629	13_40592198	829	22_37086917
30	2_16922746	230	6_93843220	430	8_69099638	630	13_55454501	830	22_39774578
31	2_16922747	231	6_93844082	431	8_69102253	631	13_55456659	831	22_53878952
32	2_32953214	232	6_95359048	432	8_69103851	632	13_55457517	832	22_53879002
33	2_35805484	233	6_95359163	433	8_69105296	633	13_55460785	833	23_725610
34	2_55962641	234	6_95409900	434	8_69105899	634	13_55461462	834	23_3243082
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36	2_55998266	236	6_95411242	436	8_69107467	636	13_55464009	836	23_30633025
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39	2_62242384	239	6_95415468	439	8_69111768	639	13_55464854	839	24_47596720
40	2_62242481	240	6_95415948	440	8_69114254	640	13_55465650	840	24_49814135
41	2_62243618	241	6_95418266	441	8_69117460	641	13_55470418	841	24_49818011
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43	2_62245225	243	6_95418593	443	8_77709316	643	13_55477102	843	24_49819694
44	2_62246042	244	6_95423930	444	8_106287850	644	13_55481561	844	24_49819731

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47	2_62248025	247	6_95456454	447	9_16502245	647	13_55506143	847	24_49825141
48	2_62251257	248	6_95463282	448	9_17719271	648	13_56285722	848	25_19174220
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50	2_62762843	250	6_95464070	450	9_21564344	650	13_56630011	850	25_19788617
51	2_63640313	251	6_95464111	451	9_21762847	651	13_56632616	851	25_19789174
52	2_81931737	252	6_95464193	452	9_38883300	652	13_56643215	852	25_19806482
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70	3_33757752	270	6_95489922	470	9_49665386	670	14_61178599	870	25_35540811
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162	6_24821399	362	7_49140921	562	11_105931493	762	18_15209743	962	25_41023265
163	6_31653917	363	7_49143302	563	12_1027345	763	18_15212568	963	25_41023397
164	6_36255527	364	7_49143428	564	12_7618417	764	18_15213354	964	25_41023559
165	6_36256449	365	7_49143510	565	12_7619718	765	18_15218042	965	25_41024216
166	6_36256526	366	7_49144189	566	12_7625623	766	18_15881264	966	25_41024307
167	6_36258545	367	7_49144374	567	12_14260743	767	18_15882828	967	25_41028240
168	6_36258751	368	7_49150999	568	12_16555342	768	18_16074219	968	25_41072736
169	6_36259271	369	7_49153031	569	12_23693195	769	18_16101541	969	25_41073521
170	6_36259322	370	7_49154105	570	12_35032666	770	18_16105168	970	25_41074134
171	6_36259709	371	7_49155979	571	12_57128258	771	18_16105733	971	25_41074233
172	6_36362076	372	7_49156047	572	12_68130930	772	18_16107195	972	26_889332
173	6_36372637	373	7_49156592	573	12_73166067	773	18_18458922	973	26_889333
174	6_36372786	374	7_49159581	574	12_79448953	774	18_25551645	974	26_1450424
175	6_37636721	375	7_49169190	575	13_21460763	775	18_52364275	975	26_1451037
176	6_37641238	376	7_49169520	576	13_22587182	776	18_60635049	976	26_15681567
177	6_37903173	377	7_49176570	577	13_22588811	777	19_45199788	977	26_24723355
178	6_38908621	378	7_49180460	578	13_22655200	778	19_52267490	978	27_13745102
179	6_44129230	379	7_49181571	579	13_22657495	779	20_8274619	979	27_15861325
180	6_44129584	380	7_49182921	580	13_22707221	780	20_20125269	980	27_15878188
181	6_44130300	381	7_49183099	581	13_22732675	781	20_20125781	981	27_31530205
182	6_44130878	382	7_49183595	582	13_22791997	782	20_20128219	982	27_31535493
183	6_44138018	383	7_49186709	583	13_22803756	783	20_20128728	983	27_31536842
184	6_44139536	384	7_49187032	584	13_23766283	784	20_22397060	984	27_31538099
185	6_44140505	385	7_51163188	585	13_24060461	785	20_43849749	985	27_31538246
186	6_44142697	386	7_55232174	586	13_24062544	786	20_48625679	986	27_31538608
187	6_44143833	387	7_55233190	587	13_24309012	787	20_48627061	987	27_39868806
188	6_44144087	388	7_55242267	588	13_24631761	788	20_48635426	988	28_109535
189	6_44145901	389	7_55242314	589	13_24635780	789	20_48635575	989	28_4847916
190	6_44150289	390	7_55243647	590	13_24636208	790	20_48778197	990	28_32850087
191	6_45698068	391	7_55245786	591	13_24636865	791	20_48833706	991	28_36537503
192	6_45747555	392	7_55246307	592	13_24639635	792	20_48834151	992	28_37361878
193	6_50155046	393	7_55246989	593	13_24639861	793	20_48918800	993	28_37369521
194	6_50196426	394	7_55248663	594	13_24640102	794	20_48918901	994	28_37375796
195	6_50200774	395	7_55253473	595	13_24642684	795	20_48922339	995	28_37456210
196	6_50205740	396	7_55255060	596	13_24643153	796	20_48937000	996	28_37939104
197	6_50214668	397	7_55259243	597	13_24643299	797	20_48937172	997	28_37989273

198	6_63092832	398	7_55259947	598	13_24643310	798	20_48941658	998	29_8380096
199	6_63095067	399	7_55260391	599	13_24648853	799	20_48952026	999	29_36277174
200	6_63105133	400	7_55260416	600	13_24656001	800	20_68809171	1000	29_44990803

上表中,SNP分子标记的物理位置均以染色体_物理位置表示。

2.如权利要求1所述的应用,其特征在于,所述崇明白山羊血统鉴定包括崇明白山羊的品种鉴定和亲缘关系鉴定。

一种用于崇明白山羊血统鉴定的SNP分子标记组合及其应用

技术领域

[0001] 本发明涉及一种用于崇明白山羊血统鉴定的SNP分子标记组合及其应用,属于生物技术领域。

背景技术

[0002] 单核苷酸多态性(Single Nucleotide Polymorphism, SNP)分子标记,因其数量多、分布广、多态性丰富和易于检测等优势,在农业育种等领域有着广泛的应用。然而,此类固相芯片的SNP密度普遍较高,导致分型成本居高不下。

[0003] 崇明白山羊是中国优良地方山羊品种之一,该品种以肉质细嫩、膻味轻、适应性强著称。然而,目前针对崇明白山羊个体的血统溯源、亲缘关系鉴定及遗传多样性评估,仍缺乏针对性的SNP芯片检测技术和方法。建立适应本土品种的精准鉴定体系,已成为种质资源保护、良种繁育及产业化开发亟待突破的核心问题。

发明内容

[0004] 本发明的目的在于解决上述现有技术的不足,提供一种用于崇明白山羊血统鉴定的SNP分子标记组合,利用其并基于靶向捕获芯片基因分型技术,可实现对崇明白山羊个体的血统精准分析。

[0005] 本发明采用如下技术方案:

[0006] 一种用于崇明白山羊血统鉴定的SNP分子标记组合,所述SNP分子标记组合由1000个(1K)的SNP分子标记组成,所述SNP分子标记在山羊参考基因组AR S1(https://www.ncbi.nlm.nih.gov/datasets/genome/GCF_001704415.1/)上的物理位置和编号见表1:

[0007] 表1上海崇明白山羊1000个SNP分子标记位置

[0008]

编号	物理位置	编号	物理位置	编号	物理位置	编号	物理位置	编号	物理位置
1	1_2841644	201	6_63110278	401	7_55264861	601	13_24656411	801	21_5856026
2	1_3055751	202	6_63110597	402	7_55266496	602	13_24656737	802	21_9742244
3	1_3185598	203	6_63111895	403	7_55274632	603	13_24657216	803	21_15500945
4	1_5091606	204	6_63114148	404	7_55282483	604	13_24657234	804	21_22724188
5	1_5091656	205	6_70887924	405	7_56294176	605	13_24657500	805	21_22724210
6	1_5091684	206	6_70952609	406	7_56299252	606	13_24657885	806	21_22724218
7	1_5114235	207	6_70963450	407	7_56303821	607	13_24658531	807	21_22816846
8	1_5144835	208	6_70964141	408	7_65882562	608	13_25142683	808	21_22816850
9	1_7160267	209	6_70964850	409	7_88623995	609	13_27840106	809	21_22863286
10	1_21017436	210	6_70964851	410	7_92262901	610	13_40485135	810	21_22864681
11	1_32401706	211	6_70967009	411	7_92263374	611	13_40485453	811	21_22865257
12	1_34585365	212	6_70974688	412	7_92264779	612	13_40493782	812	21_34538300
13	1_77030266	213	6_71040583	413	7_99119924	613	13_40494554	813	21_53023056
14	1_79629025	214	6_78259063	414	7_99121156	614	13_40495227	814	21_60335548
15	1_92744609	215	6_78294163	415	8_13471745	615	13_40518869	815	21_61833025
16	1_108905991	216	6_80773068	416	8_15748523	616	13_40547093	816	21_61834815
17	1_108918658	217	6_85637101	417	8_22755639	617	13_40547239	817	21_61834842
18	1_110483597	218	6_85637115	418	8_26706332	618	13_40548037	818	21_61834931
19	1_110494263	219	6_85637139	419	8_28261109	619	13_40548557	819	21_61835119
20	1_110498382	220	6_85642099	420	8_28355418	620	13_40550542	820	21_61835230
21	1_110507791	221	6_85643530	421	8_48301572	621	13_40551009	821	21_61835349
22	1_110509526	222	6_85647606	422	8_48340138	622	13_40560235	822	21_61835350
23	1_115176087	223	6_85652956	423	8_48368136	623	13_40567678	823	21_65032364
24	1_115177605	224	6_85652963	424	8_48372331	624	13_40572922	824	22_14191255
25	1_128617475	225	6_85679492	425	8_48387056	625	13_40578373	825	22_20699822
26	1_144004051	226	6_85848939	426	8_48392891	626	13_40579377	826	22_20728519
27	2_594675	227	6_86467622	427	8_48394924	627	13_40587468	827	22_26840831
28	2_1103351	228	6_91974425	428	8_69092582	628	13_40590432	828	22_30491380
29	2_7567913	229	6_93841530	429	8_69094973	629	13_40592198	829	22_37086917
30	2_16922746	230	6_93843220	430	8_69099638	630	13_55454501	830	22_39774578
31	2_16922747	231	6_93844082	431	8_69102253	631	13_55456659	831	22_53878952
32	2_32953214	232	6_95359048	432	8_69103851	632	13_55457517	832	22_53879002
33	2_35805484	233	6_95359163	433	8_69105296	633	13_55460785	833	23_725610
34	2_55962641	234	6_95409900	434	8_69105899	634	13_55461462	834	23_3243082
35	2_55962878	235	6_95411103	435	8_69106557	635	13_55461464	835	23_27416525
36	2_55998266	236	6_95411242	436	8_69107467	636	13_55464009	836	23_30633025

[0009]

37	2_57202994	237	6_95412458	437	8_69108710	637	13_55464647	837	24_32405535
38	2_62240631	238	6_95415003	438	8_69111556	638	13_55464759	838	24_33287499
39	2_62242384	239	6_95415468	439	8_69111768	639	13_55464854	839	24_47596720
40	2_62242481	240	6_95415948	440	8_69114254	640	13_55465650	840	24_49814135
41	2_62243618	241	6_95418266	441	8_69117460	641	13_55470418	841	24_49818011
42	2_62243632	242	6_95418561	442	8_72345525	642	13_55475268	842	24_49819377
43	2_62245225	243	6_95418593	443	8_77709316	643	13_55477102	843	24_49819694
44	2_62246042	244	6_95423930	444	8_106287850	644	13_55481561	844	24_49819731
45	2_62246258	245	6_95438964	445	8_112160011	645	13_55483038	845	24_49822050
46	2_62246338	246	6_95444046	446	9_16502242	646	13_55496929	846	24_49824478
47	2_62248025	247	6_95456454	447	9_16502245	647	13_55506143	847	24_49825141
48	2_62251257	248	6_95463282	448	9_17719271	648	13_56285722	848	25_19174220
49	2_62532608	249	6_95463418	449	9_17724352	649	13_56305933	849	25_19788465
50	2_62762843	250	6_95464070	450	9_21564344	650	13_56630011	850	25_19788617
51	2_63640313	251	6_95464111	451	9_21762847	651	13_56632616	851	25_19789174
52	2_81931737	252	6_95464193	452	9_38883300	652	13_56643215	852	25_19806482
53	2_96165613	253	6_95464304	453	9_38888739	653	13_56648790	853	25_34160437
54	2_119541744	254	6_95464415	454	9_39006406	654	13_56652231	854	25_34160459
55	2_121338605	255	6_95464559	455	9_42558608	655	13_63176740	855	25_34160465
56	3_18625	256	6_95464648	456	9_49641886	656	13_63750481	856	25_35381640
57	3_20524	257	6_95466676	457	9_49642064	657	13_75721735	857	25_35383213
58	3_21113	258	6_95466714	458	9_49644761	658	13_78834447	858	25_35384126
59	3_2034502	259	6_95466946	459	9_49645056	659	13_79258898	859	25_35385922
60	3_13767974	260	6_95467348	460	9_49645520	660	14_4408682	860	25_35411975
61	3_19046773	261	6_95467867	461	9_49648062	661	14_6801945	861	25_35421679
62	3_19064904	262	6_95467913	462	9_49648615	662	14_7238148	862	25_35426633
63	3_19076246	263	6_95472823	463	9_49649198	663	14_11160276	863	25_35429789
64	3_19078763	264	6_95473091	464	9_49649779	664	14_11230915	864	25_35442407
65	3_19079017	265	6_95475293	465	9_49650446	665	14_11233512	865	25_35445630
66	3_19080029	266	6_95475837	466	9_49652868	666	14_38411431	866	25_35447926
67	3_19083285	267	6_95478308	467	9_49653297	667	14_42338938	867	25_35453025
68	3_19101846	268	6_95479713	468	9_49657051	668	14_45647951	868	25_35492843
69	3_19103885	269	6_95480911	469	9_49663529	669	14_54100409	869	25_35510612
70	3_33757752	270	6_95489922	470	9_49665386	670	14_61178599	870	25_35540811
71	3_35423050	271	6_95489955	471	9_49672578	671	14_64077767	871	25_35569149
72	3_36062101	272	6_95490690	472	9_49672772	672	14_81808829	872	25_35569151
73	3_80269698	273	6_95491719	473	9_49674138	673	14_81808832	873	25_35597728
74	3_86949392	274	6_95492965	474	9_49677503	674	14_90800757	874	25_35682081
75	3_93191008	275	6_95494814	475	9_49679158	675	14_90818616	875	25_35699509
76	3_93191762	276	6_95494950	476	9_49679216	676	14_90819554	876	25_35731158
77	3_93192249	277	6_95498163	477	9_49681174	677	14_90822759	877	25_35769013
78	3_93192418	278	6_95501715	478	9_49681354	678	14_93563694	878	25_35772064
79	3_93192432	279	6_95506971	479	9_49681361	679	15_442774	879	25_35773260

[0010]

80	3_97191248	280	6_95533502	480	9_49682649	680	15_2444069	880	25_35773305
81	3_97191599	281	6_95534227	481	9_49682693	681	15_3472136	881	25_35777453
82	3_97194491	282	6_95546454	482	9_49682836	682	15_3472156	882	25_35779250
83	3_97288699	283	6_95548939	483	9_49683012	683	15_9002114	883	25_35784106
84	3_97292083	284	6_95549791	484	9_49683103	684	15_21744341	884	25_35791388
85	3_97293694	285	6_95558951	485	9_49683185	685	15_21745182	885	25_35796889
86	3_98649826	286	6_95568987	486	9_49683512	686	15_27783443	886	25_35799339
87	3_107954738	287	6_95569159	487	9_49684258	687	15_29227924	887	25_35802590
88	3_108463176	288	6_95569335	488	9_49684638	688	15_61835671	888	25_35805526
89	3_112040992	289	6_95576589	489	9_49684918	689	15_66744231	889	25_35818473
90	4_504884	290	6_95576812	490	9_49684951	690	15_66744233	890	25_35819806
91	4_11412361	291	6_95577709	491	9_49685241	691	16_72115111	891	25_35819810
92	4_32154700	292	6_95587608	492	9_49685838	692	16_72929787	892	25_35823035
93	4_33082590	293	6_95589016	493	9_49685851	693	17_357485	893	25_35823846
94	4_33082599	294	6_95589188	494	9_49686190	694	17_357502	894	25_35830260
95	4_42631244	295	6_95595632	495	9_49686725	695	17_357585	895	25_35833046
96	4_79249828	296	6_95595938	496	9_49715471	696	17_357738	896	25_35833607
97	4_81004110	297	6_95597478	497	9_51747804	697	17_357758	897	25_35835635
98	4_90091831	298	6_95598708	498	9_58905456	698	17_362314	898	25_35836393
99	4_107789574	299	6_100019665	499	9_58905457	699	17_362382	899	25_35839566
100	4_111877336	300	6_100271903	500	9_59866796	700	17_362385	900	25_35842042
101	4_112842422	301	6_101894414	501	9_63934209	701	17_362423	901	25_35845064
102	4_114265909	302	6_113614939	502	9_80800836	702	17_362424	902	25_35845094
103	4_114266697	303	6_113984975	503	9_80810031	703	17_362554	903	25_35846862
104	4_116208380	304	6_114620046	504	9_80810341	704	17_362556	904	25_35848070
105	5_1161400	305	6_114620166	505	9_80811317	705	17_362580	905	25_35848904
106	5_49082708	306	6_114620284	506	9_80814961	706	17_362641	906	25_35848906
107	5_53512488	307	6_114620342	507	9_80817564	707	17_362642	907	25_35849057
108	5_53530868	308	6_114620343	508	9_80821913	708	17_363482	908	25_35849440
109	5_65332010	309	6_114620356	509	9_87426234	709	17_368089	909	25_35850321
110	5_65929865	310	6_114620415	510	10_4479300	710	17_368940	910	25_35850399
111	5_65931817	311	6_114621181	511	10_25778144	711	17_368942	911	25_35851602
112	5_66737732	312	6_114626063	512	10_37518530	712	17_371318	912	25_35852524
113	5_66909844	313	6_114632732	513	10_41523573	713	17_371689	913	25_35853124
114	5_66923747	314	6_114633681	514	10_46119687	714	17_371785	914	25_35853364
115	5_66925502	315	6_114636816	515	10_55511893	715	17_372546	915	25_35854250
116	5_66927107	316	6_114639795	516	10_78396277	716	17_372547	916	25_35859188
117	5_92632958	317	6_114640401	517	10_94895115	717	17_372574	917	25_35859289
118	5_92635181	318	6_114642974	518	10_99470978	718	17_372592	918	25_35859462
119	5_92638526	319	6_114643522	519	10_100998046	719	17_372605	919	25_35859546
120	5_92641158	320	6_114643549	520	10_100998065	720	17_372626	920	25_35859563
121	5_92642716	321	6_114643552	521	10_100998067	721	17_372853	921	25_35859961
122	5_92646904	322	6_114643598	522	10_100998072	722	17_372866	922	25_35862520

[0011]

123	5_92647635	323	6_114643691	523	10_100998078	723	17_372892	923	25_35862855
124	5_92647839	324	6_114643881	524	10_100998162	724	17_372905	924	25_35870531
125	5_92647916	325	6_114644265	525	10_100998167	725	17_372926	925	25_35871003
126	5_92648244	326	6_114645251	526	10_100998175	726	17_372951	926	25_35871750
127	5_92649621	327	6_114645253	527	10_100998176	727	17_372969	927	25_35874838
128	5_92649752	328	6_114645289	528	10_101039451	728	17_373005	928	25_35879711
129	5_92649903	329	6_114645658	529	11_1762813	729	17_373026	929	25_35880185
130	5_92650249	330	6_115198277	530	11_3391320	730	17_373029	930	25_35886015
131	5_92650364	331	6_117166783	531	11_3402467	731	17_373044	931	25_35886125
132	5_92650871	332	7_10325	532	11_3402639	732	17_373053	932	25_35889179
133	5_92650967	333	7_11112863	533	11_3406374	733	17_373063	933	25_35892315
134	5_92650976	334	7_17155929	534	11_3411975	734	17_373075	934	25_35893851
135	5_92651015	335	7_19345724	535	11_3411997	735	17_373080	935	25_35898487
136	5_92651558	336	7_19367602	536	11_3424800	736	17_373085	936	25_35901587
137	5_92652835	337	7_19385051	537	11_6333666	737	17_373098	937	25_35904973
138	5_92654393	338	7_19388352	538	11_10666169	738	17_373136	938	25_35908004
139	5_92654568	339	7_19405218	539	11_10666562	739	17_373169	939	25_35908670
140	5_92654734	340	7_19423323	540	11_12632935	740	17_373243	940	25_35909072
141	5_92655001	341	7_19439120	541	11_12633045	741	17_373276	941	25_35912242
142	5_92656880	342	7_19439924	542	11_12633402	742	17_373552	942	25_35923191
143	5_92657296	343	7_19443766	543	11_12636063	743	17_373745	943	25_35924187
144	5_92659327	344	7_19531094	544	11_12637570	744	17_373768	944	25_35953495
145	5_92660556	345	7_19542398	545	11_12639071	745	17_374014	945	25_35964904
146	5_92662284	346	7_19579232	546	11_12639611	746	17_374017	946	25_35968673
147	5_92662296	347	7_19581699	547	11_16727799	747	17_374036	947	25_35968677
148	5_98969646	348	7_19602379	548	11_16727800	748	17_374060	948	25_35974466
149	5_98970681	349	7_19603021	549	11_20725099	749	17_375394	949	25_35976451
150	5_104583975	350	7_19608888	550	11_23376530	750	17_7216846	950	25_35978991
151	5_106107394	351	7_19611801	551	11_38927524	751	17_53187662	951	25_35989570
152	5_106113630	352	7_19627135	552	11_38935100	752	17_53502035	952	25_36869245
153	5_106113643	353	7_19792438	553	11_40278859	753	17_63806844	953	25_41020755
154	5_117556494	354	7_25773872	554	11_40290835	754	18_36617	954	25_41021926
155	6_4569512	355	7_29657560	555	11_48111203	755	18_432689	955	25_41021933
156	6_5875308	356	7_45008576	556	11_66612775	756	18_14754300	956	25_41022123
157	6_10433537	357	7_49109996	557	11_66627073	757	18_14769434	957	25_41022357
158	6_21898526	358	7_49122194	558	11_66627077	758	18_14769436	958	25_41022429
159	6_21898786	359	7_49123138	559	11_68315014	759	18_15192654	959	25_41022451
160	6_21899804	360	7_49126587	560	11_101401509	760	18_15202048	960	25_41022580
161	6_21930570	361	7_49133621	561	11_104627980	761	18_15202553	961	25_41023185
162	6_24821399	362	7_49140921	562	11_105931493	762	18_15209743	962	25_41023265
163	6_31653917	363	7_49143302	563	12_1027345	763	18_15212568	963	25_41023397
164	6_36255527	364	7_49143428	564	12_7618417	764	18_15213354	964	25_41023559
165	6_36256449	365	7_49143510	565	12_7619718	765	18_15218042	965	25_41024216

[0012]

166	6_36256526	366	7_49144189	566	12_7625623	766	18_15881264	966	25_41024307
167	6_36258545	367	7_49144374	567	12_14260743	767	18_15882828	967	25_41028240
168	6_36258751	368	7_49150999	568	12_16555342	768	18_16074219	968	25_41072736
169	6_36259271	369	7_49153031	569	12_23693195	769	18_16101541	969	25_41073521
170	6_36259322	370	7_49154105	570	12_35032666	770	18_16105168	970	25_41074134
171	6_36259709	371	7_49155979	571	12_57128258	771	18_16105733	971	25_41074233
172	6_36362076	372	7_49156047	572	12_68130930	772	18_16107195	972	26_889332
173	6_36372637	373	7_49156592	573	12_73166067	773	18_18458922	973	26_889333
174	6_36372786	374	7_49159581	574	12_79448953	774	18_25551645	974	26_1450424
175	6_37636721	375	7_49169190	575	13_21460763	775	18_52364275	975	26_1451037
176	6_37641238	376	7_49169520	576	13_22587182	776	18_60635049	976	26_15681567
177	6_37903173	377	7_49176570	577	13_22588811	777	19_45199788	977	26_24723355
178	6_38908621	378	7_49180460	578	13_22655200	778	19_52267490	978	27_13745102
179	6_44129230	379	7_49181571	579	13_22657495	779	20_8274619	979	27_15861325
180	6_44129584	380	7_49182921	580	13_22707221	780	20_20125269	980	27_15878188
181	6_44130300	381	7_49183099	581	13_22732675	781	20_20125781	981	27_31530205
182	6_44130878	382	7_49183595	582	13_22791997	782	20_20128219	982	27_31535493
183	6_44138018	383	7_49186709	583	13_22803756	783	20_20128728	983	27_31536842
184	6_44139536	384	7_49187032	584	13_23766283	784	20_22397060	984	27_31538099
185	6_44140505	385	7_51163188	585	13_24060461	785	20_43849749	985	27_31538246
186	6_44142697	386	7_55232174	586	13_24062544	786	20_48625679	986	27_31538608
187	6_44143833	387	7_55233190	587	13_24309012	787	20_48627061	987	27_39868806
188	6_44144087	388	7_55242267	588	13_24631761	788	20_48635426	988	28_109535
189	6_44145901	389	7_55242314	589	13_24635780	789	20_48635575	989	28_4847916
190	6_44150289	390	7_55243647	590	13_24636208	790	20_48778197	990	28_32850087
191	6_45698068	391	7_55245786	591	13_24636865	791	20_48833706	991	28_36537503
192	6_45747555	392	7_55246307	592	13_24639635	792	20_48834151	992	28_37361878
193	6_50155046	393	7_55246989	593	13_24639861	793	20_48918800	993	28_37369521
194	6_50196426	394	7_55248663	594	13_24640102	794	20_48918901	994	28_37375796
195	6_50200774	395	7_55253473	595	13_24642684	795	20_48922339	995	28_37456210
196	6_50205740	396	7_55255060	596	13_24643153	796	20_48937000	996	28_37939104
197	6_50214668	397	7_55259243	597	13_24643299	797	20_48937172	997	28_37989273
198	6_63092832	398	7_55259947	598	13_24643310	798	20_48941658	998	29_8380096
199	6_63095067	399	7_55260391	599	13_24648853	799	20_48952026	999	29_36277174
200	6_63105133	400	7_55260416	600	13_24656001	800	20_68809171	1000	29_44990803

[0013] 注:SNP分子标记的物理位置均以染色体_物理位置表示。例如第1个SNP分子标记的物理位置为1_2841644,表示在山羊参考基因组的1号染色体上的2841644碱基处。

[0014] 本发明中,所述SNP分子标记是通过筛选崇明白山羊与其它国内外总计10个山羊品种的基因型数据进行筛选获得的。筛选的方法是在崇明白山羊品种(CM)与其它品种间最小等位基因频率(MAF)差值的绝对值(Δ MAF)排序最高的SNP位点,这些位点可以理解为是最具有崇明白山羊品种信息量代表性的SNP位点(breed-informative SNPs)。

[0015] 一种用于崇明白山羊血统鉴定的试剂盒,所述试剂盒包含用于检测上述SNP分子

标记组合的探针。

[0016] 一种用于崇明白山羊血统鉴定的SNP芯片,所述SNP芯片上设有检测上述SNP分子标记组合的探针。

[0017] 进一步,所述SNP芯片为液相芯片。

[0018] 上述SNP芯片在崇明白山羊血统鉴定中的应用。所述崇明白山羊血统鉴定包括崇明白山羊的品种鉴定。

[0019] 本发明的有益效果:本发明提供了一种用于崇明白山羊血统鉴定的SNP分子标记组合,该SNP分子标记组合由1000个1K的SNP分子标记组成,利用本发明的SNP分子标记组合并基于靶向捕获芯片基因分型技术,可实现对崇明白山羊个体的血统精准分析。

附图说明

[0020] 图1为实施例1中崇明白山羊1K品种鉴定SNP位点在崇明白山羊参考基因组ARS1上的染色体分布图。

具体实施方式

[0021] 下面结合附图和具体实施例对本发明的技术方案作清楚、完整地说明。

[0022] 实施例1

[0023] 1.崇明白山羊1K品种鉴定SNP位点的筛选

[0024] 1) 基于对上海崇明白山羊核心保种群体(上海园都种羊场)的60个个体以及江苏海门山羊核心保种场的30头个体进行了全基因组重测序。使用fastp软件(0.20.0)版,参数:-n 10-q 20-u 40)对原始读数进行过滤。相关全基因组重测序数据已存入可公开访问的网站:<http://www.cncb.ac.cn>,生物项目编号为PRJCA031876和PRJCA031233,GSA编号为CRA020146和CRA019905。随后使用Burrows-Wheeler Aligner (BWA) v0.7.17 (Li and Durbin, 2009) 将干净的测序读数映射到山羊参考基因组ARS1 (https://www.ncbi.nlm.nih.gov/datasets/genome/GCF_001704415.1/) 上。基因组分析工具包(GATK) v4.0 (Van der Auwera et al., 2013) 用于遗传变异的挖掘 (SNP calling)。

[0025] 2) 除了自测的上述90个山羊基因组重测序数据外,另从美国国家生物技术信息中心(National Center for Biotechnology Information, NCBI) 公共数据库 (<https://www.ncbi.nlm.nih.gov/>) 下载了国外三种代表性山羊(安哥拉山羊、波尔山羊、萨能奶山羊,表2) 和国内5个代表性山羊品种(济宁青山羊、马头山羊、云南弥勒红骨山羊、关中奶山羊、云上黑山羊,表3) 的基因组重测序数据,总计个体数量为232头。

[0026] 表2本发明所用的国外三个品种的山羊全基因组重测序数据来源

	SRA 编号	安哥拉山羊	SRA 编号	波尔山羊	SRA 编号	萨能奶山羊
[0027]	ERR8446380.sra	Angora_goat	ERR3281524.sra	Boer_goat	SRR6246098.sra	Saanen_goat
	ERR8446378.sra	Angora_goat	ERR3281517.sra	Boer_goat	SRR6246095.sra	Saanen_goat
	ERR8446376.sra	Angora_goat	ERR3281523.sra	Boer_goat	SRR6246097.sra	Saanen_goat
	ERR4133618.sra	Angora_goat	ERR3281521.sra	Boer_goat	SRR6246100.sra	Saanen_goat
	ERR4133615.sra	Angora_goat	ERR3281526.sra	Boer_goat	SRR6246096.sra	Saanen_goat
	ERR8446379.sra	Angora_goat	ERR3281519.sra	Boer_goat	ERR3281565.sra	Saanen_goat
	ERR4133525.sra	Angora_goat	ERR3281522.sra	Boer_goat	ERR3281564.sra	Saanen_goat
	ERR4133570.sra	Angora_goat	ERR3281525.sra	Boer_goat	ERR3281563.sra	Saanen_goat
	ERR4133364.sra	Angora_goat	ERR3281520.sra	Boer_goat	ERR3284992.sra	Saanen_goat
	ERR8446377.sra	Angora_goat	ERR3281582.sra	Boer_goat	ERR3281562.sra	Saanen_goat
	ERR4133550.sra	Angora_goat	ERR3281583.sra	Boer_goat	ERR3284993.sra	Saanen_goat
	ERR4133346.sra	Angora_goat	ERR3281518.sra	Boer_goat	ERR3281560.sra	Saanen_goat
	ERR4133588.sra	Angora_goat	ERR3281581.sra	Boer_goat	ERR3281561.sra	Saanen_goat
	ERR4133622.sra	Angora_goat	ERR3284997.sra	Boer_goat	ERR4133306.sra	Saanen_goat
	ERR4133625.sra	Angora_goat	ERR3281580.sra	Boer_goat	ERR4133302.sra	Saanen_goat
	ERR4133643.sra	Angora_goat	ERR3284999.sra	Boer_goat	ERR405775.sra	Saanen_goat
	ERR4133628.sra	Angora_goat	ERR3284998.sra	Boer_goat	ERR4133541.sra	Saanen_goat
	ERR4133606.sra	Angora_goat	ERR3284996.sra	Boer_goat	ERR4133312.sra	Saanen_goat
	ERR4133528.sra	Angora_goat	ERR3281527.sra	Boer_goat	ERR4133340.sra	Saanen_goat
	ERR4133551.sra	Angora_goat	ERR4133530.sra	Boer_goat	ERR4133335.sra	Saanen_goat
	ERR4133341.sra	Angora_goat	ERR4133527.sra	Boer_goat	ERR405774.sra	Saanen_goat
	ERR4133646.sra	Angora_goat	ERR4133515.sra	Boer_goat	ERR405777.sra	Saanen_goat
	ERR4133600.sra	Angora_goat	ERR4133536.sra	Boer_goat	ERR405778.sra	Saanen_goat
	ERR4133549.sra	Angora_goat	ERR2309120.sra	Boer_goat	SRR7700835.sra	Saanen_goat
	ERR4133591.sra	Angora_goat	ERR4133524.sra	Boer_goat	ERR405776.sra	Saanen_goat
	ERR4133602.sra	Angora_goat	ERR2309121.sra	Boer_goat	ERR470101.sra	Saanen_goat
	ERR4133597.sra	Angora_goat	ERR2309119.sra	Boer_goat	ERR470102.sra	Saanen_goat
	ERR4133619.sra	Angora_goat	ERR2309135.sra	Boer_goat	SRR7700827.sra	Saanen_goat
[0028]			ERR2309134.sra	Boer_goat		
			ERR2309137.sra	Boer_goat		
			ERR2309136.sra	Boer_goat		
			ERR2309123.sra	Boer_goat		
			ERR2309118.sra	Boer_goat		
			ERR4133496.sra	Boer_goat		
[0029]			ERR2309122.sra	Boer_goat		
			SRR3144618.sra	Boer_goat		

[0029] 表3本发明所用的国内5个品种的山羊全基因组重测序数据来源

[0030]

SRA 编号	关中奶山羊	SRA 编号	济宁青山羊	SRA 编号	马头山羊
SRR20216604.sra	Guanzhong_goat	SRR10083585.sra	Jining_goat	SRR27024555.sra	matou_goat
SRR20216608.sra	Guanzhong_goat	SRR10083608.sra	Jining_goat	SRR27024567.sra	matou_goat
SRR20216613.sra	Guanzhong_goat	SRR10083613.sra	Jining_goat	SRR27024565.sra	matou_goat
SRR20216614.sra	Guanzhong_goat	SRR10083599.sra	Jining_goat	SRR27024566.sra	matou_goat
SRR20216616.sra	Guanzhong_goat	SRR10083586.sra	Jining_goat	SRR27024552.sra	matou_goat
SRR20216611.sra	Guanzhong_goat	SRR10083609.sra	Jining_goat	SRR27024564.sra	matou_goat
SRR20216609.sra	Guanzhong_goat	SRR10083611.sra	Jining_goat	SRR27024553.sra	matou_goat
SRR20216605.sra	Guanzhong_goat	SRR10083584.sra	Jining_goat	SRR27024554.sra	matou_goat
SRR20216607.sra	Guanzhong_goat	SRR10083617.sra	Jining_goat	SRR27024556.sra	matou_goat
SRR20216603.sra	Guanzhong_goat	SRR10083612.sra	Jining_goat	SRR27024560.sra	matou_goat
SRR20216606.sra	Guanzhong_goat	SRR10083590.sra	Jining_goat	SRR27024562.sra	matou_goat
SRR20216618.sra	Guanzhong_goat	SRR10083619.sra	Jining_goat	SRR27024551.sra	matou_goat
SRR20216601.sra	Guanzhong_goat	SRR10083616.sra	Jining_goat	SRR27024563.sra	matou_goat
SRR20216602.sra	Guanzhong_goat	SRR10083581.sra	Jining_goat	SRR27024558.sra	matou_goat
SRR20216617.sra	Guanzhong_goat	SRR10083583.sra	Jining_goat	SRR27024557.sra	matou_goat
SRR20216612.sra	Guanzhong_goat	SRR10083597.sra	Jining_goat	SRR27024549.sra	matou_goat
SRR20216620.sra	Guanzhong_goat	SRR10083610.sra	Jining_goat	SRR27024548.sra	matou_goat
SRR20216619.sra	Guanzhong_goat	SRR10083615.sra	Jining_goat	SRR27024550.sra	matou_goat
SRR20216610.sra	Guanzhong_goat	SRR10083618.sra	Jining_goat	SRR27024561.sra	matou_goat
SRR20216615.sra	Guanzhong_goat	SRR10083582.sra	Jining_goat	SRR27024559.sra	matou_goat
		SRR10083594.sra	Jining_goat		
		SRR10083588.sra	Jining_goat		
		SRR10083592.sra	Jining_goat		
		SRR10083598.sra	Jining_goat		
		SRR10083607.sra	Jining_goat		
		SRR10083601.sra	Jining_goat		
		SRR10083606.sra	Jining_goat		
		SRR10083600.sra	Jining_goat		
		SRR10083591.sra	Jining_goat		
		SRR10083589.sra	Jining_goat		
		SRR10083603.sra	Jining_goat		
		SRR10083602.sra	Jining_goat		
		SRR10083595.sra	Jining_goat		
		SRR10083614.sra	Jining_goat		
		SRR10083620.sra	Jining_goat		
		SRR10083593.sra	Jining_goat		
		SRR10083605.sra	Jining_goat		
		SRR10083596.sra	Jining_goat		
		SRR10083604.sra	Jining_goat		

		SRR10083587.sra	Jining_goat
SRA 编号	红骨山羊	SRA 编号	云上黑山羊
SRR11696588.sra	Redbone_goat	SRR11425770.sra	YS_black_goat
SRR11696599.sra	Redbone_goat	SRR11425761.sra	YS_black_goat
SRR11696598.sra	Redbone_goat	SRR11425781.sra	YS_black_goat
SRR11696586.sra	Redbone_goat	SRR11425788.sra	YS_black_goat
SRR11696583.sra	Redbone_goat	SRR11425794.sra	YS_black_goat
SRR11696580.sra	Redbone_goat	SRR11425793.sra	YS_black_goat
SRR11696595.sra	Redbone_goat	SRR11425759.sra	YS_black_goat
SRR11696592.sra	Redbone_goat	SRR11425767.sra	YS_black_goat
SRR11696594.sra	Redbone_goat	SRR11425769.sra	YS_black_goat
SRR11696582.sra	Redbone_goat	SRR11425773.sra	YS_black_goat
SRR11696591.sra	Redbone_goat	SRR11425768.sra	YS_black_goat
SRR11696587.sra	Redbone_goat	SRR11425760.sra	YS_black_goat
SRR11696584.sra	Redbone_goat	SRR11425776.sra	YS_black_goat
SRR11696593.sra	Redbone_goat	SRR11425787.sra	YS_black_goat
SRR11696590.sra	Redbone_goat	SRR11425774.sra	YS_black_goat
SRR11696597.sra	Redbone_goat	SRR11425757.sra	YS_black_goat
SRR11696581.sra	Redbone_goat	SRR11425766.sra	YS_black_goat
SRR11696589.sra	Redbone_goat	SRR11425790.sra	YS_black_goat
SRR11696585.sra	Redbone_goat	SRR11425756.sra	YS_black_goat
SRR11696596.sra	Redbone_goat	SRR11425758.sra	YS_black_goat
		SRR11425777.sra	YS_black_goat
		SRR11425791.sra	YS_black_goat
		SRR11425780.sra	YS_black_goat
		SRR11425786.sra	YS_black_goat
		SRR11425782.sra	YS_black_goat
		SRR11425771.sra	YS_black_goat
		SRR11425784.sra	YS_black_goat
		SRR11425763.sra	YS_black_goat
		SRR11425775.sra	YS_black_goat
		SRR11425779.sra	YS_black_goat
		SRR11425792.sra	YS_black_goat
		SRR11425785.sra	YS_black_goat
		SRR11425764.sra	YS_black_goat
		SRR11425772.sra	YS_black_goat
		SRR11425778.sra	YS_black_goat
		SRR11425762.sra	YS_black_goat
		SRR11425789.sra	YS_black_goat
		SRR11425765.sra	YS_black_goat
		SRR11425783.sra	YS_black_goat
		SRR11469714.sra	YS_black_goat

[0032] 3) 通过对上述这些山羊品种全基因组数据的变异鉴定及SNP筛选,获得1000个品种鉴定位点。筛选的方法是照缺失率小于10%,杂合率小于50%的条件进行过滤并计算各个群体在全部位点的 Δ MAF,即单个群体与其他群体的最小等位基因频率(MAF)差值绝对

值,取崇明白山羊(CM)品种 Δ MAF排序最高的1K SNP位点,这些位点可以理解为是最具有崇明白山羊品种信息量代表性的SNP位点(breed-informative SNPs)。这些崇明白山羊1K品种鉴定SNP位点在山羊参考基因组ARS1上的染色体分布图见图1。

[0033] 2.制备用于崇明白山羊1K血统鉴定的SNP液相芯片

[0034] 基于上述筛选的1K品种鉴定SNP位点,根据DNA互补原理,在每个SNP位点设计一条或多条覆盖位点的探针,探针长度为110bp,位点对应探针条数为(1-2根),探针GC含量为30-70%,探针同源区域个数 ≤ 5 ,探针由石家庄博瑞迪生物技术有限公司合成,从而制得用于崇明白山羊品种鉴定1K SNP液相芯片。

[0035] 实施例2

[0036] 崇明白山羊血统鉴定的方法:

[0037] 1.山羊DNA样品的提取

[0038] 从山羊前腔静脉,利用无菌注射器采血(2-3mL),注射入提前加入抗凝剂的采血管中,通过离心步骤将血液细胞与血浆分离,将血液细胞沉淀洗涤后,加入裂解缓冲液,破坏细胞膜释放DNA,并加入蛋白酶K来消化细胞蛋白,加入乙酸和异丙醇使DNA凝固和沉淀,然后通过离心将DNA沉淀从上清液中分离出来。将DNA沉淀用乙酸盐缓冲液洗涤,去除杂质和残余的蛋白酶,用无水溶液或TE缓冲液溶解DNA,-20℃保存供后续实验使用(山羊组织样本(如耳组织或肌肉组织等)的DNA也可替代山羊血液DNA)。

[0039] 2.DNA样品质量检测

[0040] 用Agilent 2100生物分析仪(Agilent)对DNA浓度进行测定,用1%琼脂糖凝胶电泳检测DNA的完整性。检测合格的样品放入4℃冰箱保存备用。

[0041] 3.液相芯片检测

[0042] 采用实施例1制备的液相芯片,按照液相芯片检测标准流程操作。液相芯片上的用生物素修饰的探针可以与变性后的重测序文库中目标区域杂交形成双链,利用链霉亲和素包被的磁珠将携带有生物素的分子吸附,经过洗脱、扩增和靶向的高通量深度重测序。随后将获得的靶向测序数据采用fastp软件(Chen et al.,2018)进行质控后,用BWA软件(Li and Durbin,2009)将测序数据比对至山羊参考基因组ARS1上,采用GATK4软件(Van der Auwera et al.,2013)的标准流程检测,获得检测样本的1K SNP位点的基因型数据。

[0043] 4.待鉴定样本数据与模型数据的整合

[0044] 利用Plink v1.9软件(Purcell et al.,2007)将获得的液相芯片检测的样本1K SNP基因分型数据文件与实施例1建立的崇明白山羊品种鉴定模型数据集(10个品种鉴定模型文件,被放置在畜禽遗传资源基因库公共管理系统中的文件下载目录下,下载网址链接为<http://120.26.68.213:4569/project1.html>),将其中需鉴定的山羊样本芯片检测结果数据与模型文件CM.ped和CM.map文件按相同的1K SNP位点进行提取合并,仅保留二等位基因型位点,并生成New.bed文件,并在整合后的New.bed文件中,把待检测样本的品种名称用“_”标识。

[0045] 将上述整合后的New.bed文件,使用ADMIXTURE v1.3.0软件(Alexander et al.,2009)对文件进行运算。祖先集群参数K设置为10(代表模型设定为10个品种),在Linux系统下运行Admixture软件,命令如下:Admixture Tmp.bed10-supervised-j12。将运行完成后的结果(在Dist文件夹下找到后缀名为Tmp.10.Q的文件)导入Excel表中,并找到对应待检

测样本的品种血统百分组成的计算结果 (ADMIXTURE软件具体说明参见<https://daalexander.github.io/admixture/download.html>),即完成了对待检样本的血统组分计算。

[0046] 崇明白山羊品种鉴定模型的预测结果及准确性验证:

[0047] 采用实施例2的鉴定方法,对实施例1所述10个品种的322个山羊的1K SNP位点的基因型分析,测试结果见表4:

[0048] 表4崇明白山羊品种鉴定模型的预测结果及准确性验证

[0049]

样本	崇明	波尔	萨能	安哥拉	济宁	云上	红骨	关中	马头	海门	预测结果	一致性
Angora_1	0.00%	0.00%	0.00%	91.15%	0.00%	8.84%	0.00%	0.00%	0.00%	0.00%	Angora	TRUE
Angora_10	0.00%	0.00%	0.00%	99.99%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Angora	TRUE
Angora_11	0.00%	0.00%	0.00%	99.99%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Angora	TRUE
Angora_12	0.00%	0.00%	0.52%	99.47%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Angora	TRUE
Angora_13	0.00%	0.00%	0.00%	99.99%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Angora	TRUE
Angora_14	0.00%	0.00%	0.00%	99.99%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Angora	TRUE
Angora_15	0.00%	0.00%	0.00%	94.06%	0.00%	0.00%	0.00%	5.93%	0.00%	0.00%	Angora	TRUE
Angora_16	0.00%	0.56%	0.00%	99.44%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Angora	TRUE

[0050]

Angora_17	0.00%	0.00%	0.00%	99.99%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Angora	TRUE
Angora_18	0.00%	0.00%	0.00%	99.99%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Angora	TRUE
Angora_19	0.00%	0.00%	0.00%	85.87%	14.12%	0.00%	0.00%	0.00%	0.00%	0.00%	Angora	TRUE
Angora_2	0.00%	0.00%	0.00%	95.44%	3.18%	0.00%	0.00%	0.00%	0.00%	1.37%	Angora	TRUE
Angora_20	0.00%	0.00%	0.00%	99.99%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Angora	TRUE
Angora_21	0.00%	0.00%	0.00%	99.99%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Angora	TRUE
Angora_22	0.00%	0.00%	0.00%	99.99%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Angora	TRUE
Angora_23	0.00%	0.00%	0.00%	99.99%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Angora	TRUE
Angora_24	0.00%	0.00%	0.00%	94.09%	0.00%	0.00%	0.00%	5.90%	0.00%	0.00%	Angora	TRUE
Angora_25	0.00%	2.69%	0.00%	70.96%	0.00%	0.00%	0.00%	0.00%	13.79%	12.55%	Angora	TRUE
Angora_26	0.00%	0.00%	0.28%	99.71%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Angora	TRUE
Angora_27	0.00%	0.00%	0.00%	99.99%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Angora	TRUE
Angora_3	0.00%	0.00%	0.00%	54.49%	22.28%	2.08%	0.00%	9.67%	0.00%	11.47%	Angora	TRUE
Angora_4	0.00%	0.00%	0.00%	97.68%	0.00%	0.00%	0.00%	0.00%	0.00%	2.31%	Angora	TRUE
Angora_5	0.00%	0.00%	4.44%	95.55%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Angora	TRUE
Angora_6	0.00%	0.00%	0.00%	98.21%	1.79%	0.00%	0.00%	0.00%	0.00%	0.00%	Angora	TRUE
Angora_7	0.00%	0.00%	0.00%	99.99%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Angora	TRUE
Angora_8	0.00%	0.00%	0.00%	99.99%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Angora	TRUE
Angora_9	0.00%	0.00%	0.00%	99.99%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Angora	TRUE
Boer_1	0.00%	95.73%	0.00%	0.00%	0.00%	4.26%	0.00%	0.00%	0.00%	0.00%	Boer	TRUE
Boer_10	0.00%	99.99%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Boer	TRUE
Boer_11	0.00%	97.87%	0.00%	2.12%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Boer	TRUE
Boer_12	0.00%	99.99%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Boer	TRUE
Boer_13	0.00%	99.99%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Boer	TRUE
Boer_14	0.00%	99.99%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Boer	TRUE
Boer_15	0.00%	99.99%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Boer	TRUE
Boer_16	0.00%	95.32%	2.33%	0.00%	0.00%	0.00%	0.00%	0.00%	2.34%	0.00%	Boer	TRUE
Boer_17	0.00%	99.99%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Boer	TRUE
Boer_18	0.00%	99.99%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Boer	TRUE
Boer_19	0.00%	99.99%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Boer	TRUE

[0051]

Boer_2	0.00%	93.16 %	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	6.83%	0.00%	Boer	TRUE
Boer_20	0.00%	85.55 %	0.00%	0.00%	9.21%	2.72%	0.00%	2.51%	0.00%	0.00%	Boer	TRUE
Boer_21	0.00%	98.13 %	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.87%	Boer	TRUE
Boer_22	0.00%	91.94 %	0.00%	0.00%	0.00%	4.64%	0.00%	3.41%	0.00%	0.00%	Boer	TRUE
Boer_23	0.00%	99.99 %	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Boer	TRUE
Boer_24	0.00%	65.84 %	3.56%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	30.59 %	Boer	TRUE
Boer_25	0.00%	99.17 %	0.00%	0.00%	0.00%	0.00%	0.00%	0.82%	0.00%	0.00%	Boer	TRUE
Boer_26	0.00%	57.67 %	26.27 %	0.00%	0.00%	1.40%	0.00%	0.61%	0.00%	14.05 %	Boer	TRUE
Boer_28	0.00%	99.99 %	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Boer	TRUE
Boer_29	0.00%	99.99 %	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Boer	TRUE
Boer_3	0.00%	99.99 %	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Boer	TRUE
Boer_30	0.00%	99.99 %	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Boer	TRUE
Boer_31	0.00%	99.99 %	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Boer	TRUE
Boer_32	0.00%	84.80 %	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	15.20 %	0.00%	Boer	TRUE
Boer_34	0.00%	97.97 %	0.00%	0.00%	0.00%	0.00%	0.00%	2.02%	0.00%	0.00%	Boer	TRUE
Boer_35	0.00%	63.63 %	0.00%	32.46%	0.00%	0.00%	0.00%	0.00%	3.90%	0.00%	Boer	TRUE
Boer_36	0.00%	98.11 %	0.00%	0.00%	0.00%	1.88%	0.00%	0.00%	0.00%	0.00%	Boer	TRUE
Boer_4	0.00%	99.99 %	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Boer	TRUE
Boer_5	1.18%	66.46 %	3.06%	0.00%	0.00%	0.00%	0.00%	7.46%	17.90 %	3.93%	Boer	TRUE
Boer_6	0.00%	97.85 %	2.14%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Boer	TRUE
Boer_7	0.00%	92.39 %	0.00%	0.00%	0.00%	7.60%	0.00%	0.00%	0.00%	0.00%	Boer	TRUE
Boer_8	0.00%	95.66 %	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	4.33%	0.00%	Boer	TRUE

[0052]

Boer_9	0.00%	80.66%	0.00%	19.33%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Boer	TRUE
CM_1	62.07%	0.00%	0.00%	0.00%	8.98%	0.00%	11.92%	0.00%	15.45%	1.58%	CM	TRUE
CM_10	77.24%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.08%	22.67%	0.00%	CM	TRUE
CM_11	77.47%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	6.17%	0.00%	16.36%	CM	TRUE
CM_12	99.99%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	CM	TRUE
CM_13	90.50%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.95%	0.00%	7.55%	CM	TRUE
CM_14	80.34%	0.00%	0.00%	0.00%	0.00%	0.00%	17.48%	2.17%	0.00%	0.00%	CM	TRUE
CM_15	95.33%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	4.66%	CM	TRUE
CM_16	89.00%	0.00%	0.00%	0.00%	0.00%	0.00%	10.99%	0.00%	0.00%	0.00%	CM	TRUE
CM_17	90.47%	0.00%	0.00%	0.00%	0.00%	0.00%	9.53%	0.00%	0.00%	0.00%	CM	TRUE
CM_18	94.54%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	5.45%	CM	TRUE
CM_19	70.29%	3.39%	0.00%	0.00%	0.00%	0.00%	0.00%	7.31%	0.00%	19.01%	CM	TRUE
CM_2	84.91%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	3.36%	11.72%	CM	TRUE
CM_20	87.55%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	12.44%	CM	TRUE
CM_21	76.77%	0.00%	0.00%	0.00%	0.00%	5.70%	11.10%	0.00%	0.00%	6.43%	CM	TRUE
CM_22	89.68%	1.09%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	9.22%	CM	TRUE
CM_23	38.06%	0.00%	0.00%	0.00%	0.00%	11.43%	21.55%	0.00%	0.00%	28.96%	CM	TRUE
CM_24	97.76%	0.00%	0.00%	0.00%	0.00%	1.70%	0.00%	0.00%	0.00%	0.54%	CM	TRUE
CM_25	82.48%	0.00%	0.00%	0.00%	4.37%	0.00%	13.14%	0.00%	0.00%	0.00%	CM	TRUE
CM_26	88.22%	0.00%	0.00%	0.00%	0.00%	1.63%	0.00%	5.28%	0.00%	4.86%	CM	TRUE
CM_27	93.63%	0.00%	0.00%	0.00%	0.00%	6.36%	0.00%	0.00%	0.00%	0.00%	CM	TRUE
CM_28	50.00%	4.08%	0.00%	0.00%	0.00%	0.00%	0.00%	0.34%	0.00%	45.58%	CM	TRUE

[0053]

CM_29	86.77 %	0.00%	0.00%	0.00%	0.00%	0.00%	13.22 %	0.00%	0.00%	0.00%	CM	TRUE
CM_3	85.36 %	1.68%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	3.51%	9.44%	CM	TRUE
CM_30	89.21 %	1.28%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	9.51%	CM	TRUE
CM_31	99.97 %	0.00%	0.00%	0.00%	0.00%	0.00%	0.02%	0.00%	0.00%	0.00%	CM	TRUE
CM_32	99.99 %	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	CM	TRUE
CM_33	76.98 %	0.00%	0.84%	0.00%	0.37%	0.00%	0.00%	0.00%	0.00%	21.80 %	CM	TRUE
CM_34	80.94 %	0.00%	0.00%	0.00%	0.00%	0.00%	10.66 %	0.00%	0.00%	8.39%	CM	TRUE
CM_35	87.50 %	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	12.50 %	0.00%	CM	TRUE
CM_36	89.71 %	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	10.28 %	CM	TRUE
CM_37	99.99 %	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	CM	TRUE
CM_38	83.29 %	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	16.71 %	CM	TRUE
CM_39	88.21 %	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	11.79 %	CM	TRUE
CM_4	74.78 %	14.42 %	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	3.99%	6.81%	CM	TRUE
CM_40	65.89 %	0.00%	1.61%	0.00%	6.25%	0.00%	0.00%	0.00%	0.00%	26.24 %	CM	TRUE
CM_41	71.98 %	0.00%	0.00%	0.00%	0.83%	0.00%	0.00%	0.00%	0.00%	27.18 %	CM	TRUE
CM_42	58.87 %	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	41.12 %	CM	TRUE
CM_43	96.00 %	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	3.99%	0.00%	CM	TRUE
CM_44	92.11 %	0.00%	0.00%	0.00%	7.88%	0.00%	0.00%	0.00%	0.00%	0.00%	CM	TRUE
CM_45	71.80 %	0.00%	0.00%	0.00%	0.00%	0.00%	10.03 %	0.00%	0.00%	18.16 %	CM	TRUE
CM_46	69.59 %	0.00%	0.00%	0.00%	0.00%	0.00%	10.04 %	0.00%	0.00%	20.36 %	CM	TRUE
CM_47	93.72 %	0.33%	0.00%	0.00%	0.00%	1.89%	0.00%	0.00%	0.00%	4.05%	CM	TRUE
CM_48	69.36 %	0.00%	0.00%	0.00%	0.00%	14.27 %	11.71 %	0.00%	0.00%	4.65%	CM	TRUE

[0054]

CM_49	18.26 %	0.00%	0.00%	0.00%	10.58 %	6.22%	17.29 %	0.00%	0.00%	47.65 %	CM	FALSE
CM_5	92.98 %	2.35%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	3.46%	1.20%	CM	TRUE
CM_50	56.83 %	1.59%	14.69 %	0.00%	0.00%	0.00%	0.00%	0.00%	19.07 %	7.81%	CM	TRUE
CM_51	76.04 %	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	23.95 %	CM	TRUE
CM_52	54.53 %	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.63%	33.79 %	10.04 %	CM	TRUE
CM_53	68.32 %	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	31.68 %	0.00%	CM	TRUE
CM_54	69.47 %	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	22.00 %	8.52%	CM	TRUE
CM_55	93.67 %	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.90%	0.00%	4.42%	CM	TRUE
CM_56	76.83 %	8.79%	0.00%	0.00%	0.00%	0.60%	0.00%	3.06%	0.00%	10.73 %	CM	TRUE
CM_57	92.11 %	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	7.88%	CM	TRUE
CM_58	73.83 %	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	13.38 %	12.78 %	CM	TRUE
CM_59	43.24 %	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	39.78 %	16.97 %	CM	TRUE
CM_6	94.97 %	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	5.02%	CM	TRUE
CM_60	87.92 %	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	11.55 %	0.52%	CM	TRUE
CM_7	88.24 %	0.00%	0.00%	0.00%	0.00%	0.00%	8.80%	0.00%	2.95%	0.00%	CM	TRUE
CM_8	70.10 %	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	3.80%	12.22 %	13.87 %	CM	TRUE
CM_9	70.77 %	3.50%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	4.91%	20.81 %	CM	TRUE
Guangzhong_1	0.00%	0.00%	0.00%	0.00%	0.00%	3.02%	0.00%	96.97 %	0.00%	0.00%	Guangzhong	TRUE
Guangzhong_1 0	0.00%	3.54%	0.00%	0.00%	0.00%	0.00%	0.00%	89.39 %	0.00%	7.07%	Guangzhong	TRUE
Guangzhong_1 1	0.00%	0.00%	0.00%	0.00%	0.00%	0.61%	0.00%	88.06 %	0.00%	11.32 %	Guangzhong	TRUE
Guangzhong_1 2	0.00%	0.00%	0.00%	0.00%	6.00%	0.00%	0.00%	93.99 %	0.00%	0.00%	Guangzhong	TRUE
Guangzhong_1 3	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	89.95 %	0.00%	10.04 %	Guangzhong	TRUE

[0055]

Guanzhong_1								99.99				
4	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	%	0.00%	0.00%	Guanzhong	TRUE
Guanzhong_1								96.78				
5	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	%	0.00%	3.22%	Guanzhong	TRUE
Guanzhong_1								99.99				
6	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	%	0.00%	0.00%	Guanzhong	TRUE
Guanzhong_1								99.99				
7	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	%	0.00%	0.00%	Guanzhong	TRUE
Guanzhong_1								99.74				
8	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	%	0.00%	0.25%	Guanzhong	TRUE
Guanzhong_1								99.99				
9	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	%	0.00%	0.00%	Guanzhong	TRUE
Guanzhong_2								99.34				
	0.00%	0.00%	0.66%	0.00%	0.00%	0.00%	0.00%	%	0.00%	0.00%	Guanzhong	TRUE
Guanzhong_3								99.99				
	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	%	0.00%	0.00%	Guanzhong	TRUE
Guanzhong_4								99.99				
	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	%	0.00%	0.00%	Guanzhong	TRUE
Guanzhong_5								99.99				
	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	%	0.00%	0.00%	Guanzhong	TRUE
Guanzhong_6								99.99				
	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	%	0.00%	0.00%	Guanzhong	TRUE
Guanzhong_7								92.48				
	0.00%	0.00%	0.00%	0.00%	0.00%	3.40%	0.00%	%	0.00%	4.11%	Guanzhong	TRUE
Guanzhong_8								86.95				
	0.00%	0.08%	0.00%	0.00%	5.43%	0.00%	0.00%	%	0.00%	7.52%	Guanzhong	TRUE
Guanzhong_9								96.27				
	0.00%	3.72%	0.00%	0.00%	0.00%	0.00%	0.00%	%	0.00%	0.00%	Guanzhong	TRUE
HM_1								0.00%	13.34	79.71		
	0.00%	0.00%	0.00%	0.00%	6.95%	0.00%	0.00%	%	%	%	HM	TRUE
HM_10								0.00%	13.42	76.30		
	0.00%	10.27%	0.00%	0.00%	0.00%	0.00%	0.00%	%	%	%	HM	TRUE
HM_11								0.00%	0.00%	97.48		
	2.51%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	%	%	%	HM	TRUE
HM_12								0.00%	0.00%	99.99		
	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	%	%	%	HM	TRUE
HM_13								0.00%	0.00%	99.99		
	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	%	%	%	HM	TRUE
HM_14								0.00%	0.00%	96.00		
	0.00%	0.00%	0.00%	0.00%	0.00%	3.99%	0.00%	%	%	%	HM	TRUE
HM_15								0.00%	0.00%	99.99		
	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	%	%	%	HM	TRUE
HM_16								0.00%	0.00%	90.94		
	0.00%	0.00%	0.00%	0.00%	8.69%	0.36%	0.00%	%	%	%	HM	TRUE

[0056]

HM_17	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	99.99%	HM	TRUE
HM_18	4.92%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	95.07%	HM	TRUE
HM_19	7.13%	0.00%	0.00%	0.00%	0.00%	3.25%	0.00%	0.00%	0.00%	89.62%	HM	TRUE
HM_2	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	4.07%	95.92%	HM	TRUE
HM_20	0.00%	0.00%	0.00%	0.00%	0.00%	4.69%	0.00%	0.00%	0.00%	95.30%	HM	TRUE
HM_21	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	99.99%	HM	TRUE
HM_22	0.00%	0.00%	0.00%	0.00%	0.00%	9.61%	0.00%	0.00%	0.00%	90.38%	HM	TRUE
HM_23	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	99.99%	HM	TRUE
HM_24	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	99.99%	HM	TRUE
HM_25	5.80%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	94.20%	HM	TRUE
HM_26	0.00%	0.00%	0.00%	0.00%	13.89%	0.00%	0.00%	0.00%	0.00%	86.10%	HM	TRUE
HM_27	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	99.99%	HM	TRUE
HM_28	0.00%	0.00%	0.00%	0.00%	25.27%	0.00%	0.00%	0.00%	0.00%	74.72%	HM	TRUE
HM_29	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	99.99%	HM	TRUE
HM_3	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	8.05%	91.94%	HM	TRUE
HM_30	0.00%	0.00%	0.00%	0.00%	27.49%	0.00%	0.00%	0.00%	0.00%	72.50%	HM	TRUE
HM_4	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	2.94%	97.05%	HM	TRUE
HM_5	17.84%	9.39%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	15.91%	56.86%	HM	TRUE
HM_6	0.00%	0.00%	0.20%	0.00%	0.00%	0.00%	0.00%	0.00%	4.93%	94.86%	HM	TRUE
HM_7	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	28.42%	71.57%	HM	TRUE
HM_8	0.00%	13.47%	0.00%	0.00%	0.00%	0.00%	0.00%	6.06%	14.31%	66.15%	HM	TRUE
HM_9	21.10%	0.00%	1.02%	0.00%	0.00%	0.00%	0.00%	0.90%	24.57%	52.40%	HM	TRUE

[0057]

Jining_1	0.00%	4.55%	0.00%	0.00%	95.44%	0.00%	0.00%	0.00%	0.00%	0.00%	Jining	TRUE
Jining_10	9.90%	5.38%	0.00%	0.00%	82.31%	0.00%	0.00%	0.00%	0.00%	2.41%	Jining	TRUE
Jining_11	0.06%	11.42%	0.00%	0.00%	45.07%	4.32%	0.00%	0.00%	0.00%	39.12%	Jining	TRUE
Jining_12	0.00%	3.67%	1.33%	0.00%	83.75%	0.00%	9.34%	0.00%	0.00%	1.90%	Jining	TRUE
Jining_13	0.00%	0.00%	0.00%	0.00%	53.15%	0.00%	15.97%	9.84%	0.00%	21.03%	Jining	TRUE
Jining_14	0.00%	0.00%	2.69%	0.00%	92.36%	0.00%	0.00%	0.00%	0.00%	4.95%	Jining	TRUE
Jining_15	0.00%	9.91%	0.00%	0.00%	90.08%	0.00%	0.00%	0.00%	0.00%	0.00%	Jining	TRUE
Jining_16	0.00%	7.20%	0.00%	0.00%	75.58%	6.12%	0.00%	0.00%	0.00%	11.09%	Jining	TRUE
Jining_17	0.00%	0.00%	4.77%	0.00%	92.32%	0.00%	0.00%	0.00%	0.00%	2.90%	Jining	TRUE
Jining_18	0.00%	7.51%	2.69%	0.00%	62.97%	0.00%	0.00%	8.11%	0.00%	18.71%	Jining	TRUE
Jining_19	0.00%	0.00%	0.00%	0.00%	97.73%	0.00%	2.26%	0.00%	0.00%	0.00%	Jining	TRUE
Jining_2	0.00%	0.00%	0.00%	0.00%	90.55%	0.00%	7.50%	1.94%	0.00%	0.00%	Jining	TRUE
Jining_20	0.00%	0.00%	0.00%	1.96%	67.96%	0.00%	0.00%	0.00%	2.79%	27.29%	Jining	TRUE
Jining_21	0.00%	0.00%	0.00%	0.00%	99.99%	0.00%	0.00%	0.00%	0.00%	0.00%	Jining	TRUE
Jining_22	0.00%	0.00%	0.00%	0.00%	97.10%	0.00%	0.00%	0.00%	0.00%	2.89%	Jining	TRUE
Jining_23	0.00%	0.00%	0.00%	0.00%	99.99%	0.00%	0.00%	0.00%	0.00%	0.00%	Jining	TRUE
Jining_24	0.00%	0.00%	0.00%	0.00%	99.99%	0.00%	0.00%	0.00%	0.00%	0.00%	Jining	TRUE
Jining_25	0.00%	0.00%	0.00%	0.00%	69.54%	0.00%	0.00%	3.12%	0.00%	27.33%	Jining	TRUE
Jining_26	0.00%	0.00%	0.00%	0.00%	91.17%	0.00%	6.58%	0.00%	0.00%	2.24%	Jining	TRUE
Jining_27	0.00%	0.00%	0.00%	2.76%	87.42%	0.00%	0.00%	0.00%	0.00%	9.81%	Jining	TRUE
Jining_28	0.00%	1.93%	0.00%	0.00%	93.41%	0.00%	0.00%	0.00%	0.00%	4.65%	Jining	TRUE
Jining_29	0.00%	0.00%	0.00%	0.00%	99.99%	0.00%	0.00%	0.00%	0.00%	0.00%	Jining	TRUE

[0058]

Jining_3	0.00%	7.85%	0.00%	0.00%	80.25%	0.00%	0.00%	0.00%	0.00%	11.89%	Jining	TRUE
Jining_30	0.00%	11.30%	0.00%	0.00%	88.40%	0.00%	0.29%	0.00%	0.00%	0.00%	Jining	TRUE
Jining_31	0.00%	0.00%	0.00%	0.00%	88.87%	0.00%	0.00%	6.15%	0.00%	4.96%	Jining	TRUE
Jining_32	0.00%	0.00%	0.00%	0.00%	90.31%	0.00%	9.68%	0.00%	0.00%	0.00%	Jining	TRUE
Jining_33	0.00%	7.94%	0.73%	0.00%	44.83%	15.56%	0.00%	4.76%	3.42%	22.75%	Jining	TRUE
Jining_34	0.00%	0.87%	3.62%	0.00%	86.42%	0.00%	0.00%	0.00%	0.00%	9.08%	Jining	TRUE
Jining_35	0.00%	4.08%	0.00%	0.00%	95.03%	0.00%	0.00%	0.88%	0.00%	0.00%	Jining	TRUE
Jining_36	0.00%	0.00%	0.00%	0.00%	84.22%	0.00%	0.00%	0.00%	0.00%	15.78%	Jining	TRUE
Jining_37	0.00%	0.00%	0.00%	0.00%	96.35%	0.00%	0.00%	0.00%	0.00%	3.64%	Jining	TRUE
Jining_38	0.00%	0.00%	0.00%	0.00%	97.83%	0.00%	2.16%	0.00%	0.00%	0.00%	Jining	TRUE
Jining_39	0.00%	0.00%	0.00%	0.00%	98.21%	0.00%	0.00%	0.00%	0.00%	1.78%	Jining	TRUE
Jining_4	0.00%	7.72%	0.00%	0.00%	72.71%	0.00%	12.08%	0.00%	0.00%	7.48%	Jining	TRUE
Jining_40	0.00%	0.00%	0.00%	0.00%	99.29%	0.00%	0.00%	0.70%	0.00%	0.00%	Jining	TRUE
Jining_5	0.00%	0.00%	0.00%	0.00%	89.93%	0.00%	0.00%	0.00%	0.00%	10.07%	Jining	TRUE
Jining_6	0.00%	0.00%	0.00%	0.00%	87.14%	0.00%	0.00%	7.13%	0.00%	5.72%	Jining	TRUE
Jining_7	0.00%	0.00%	0.00%	0.00%	99.11%	0.00%	0.88%	0.00%	0.00%	0.00%	Jining	TRUE
Jining_8	0.00%	0.00%	4.62%	0.89%	58.57%	3.75%	0.00%	0.00%	0.00%	32.16%	Jining	TRUE
Jining_9	0.00%	0.00%	0.00%	0.00%	95.06%	2.82%	2.12%	0.00%	0.00%	0.00%	Jining	TRUE
matou_1	0.00%	2.18%	0.00%	0.00%	0.00%	35.27%	0.00%	0.00%	43.75%	18.80%	matou	TRUE
matou_10	0.00%	5.06%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	94.94%	0.00%	matou	TRUE
matou_11	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	8.67%	0.00%	91.32%	0.00%	matou	TRUE
matou_12	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.41%	99.58%	0.00%	matou	TRUE

[0059]

matou_13	4.65%	0.00%	5.63%	0.00%	0.00%	0.00%	0.00%	0.00%	78.29	11.42	matou	TRUE
									%	%		
matou_14	0.00%	0.00%	0.00%	0.00%	1.79%	0.00%	0.00%	0.00%	98.21	0.00%	matou	TRUE
									%			
matou_15	0.00%	0.00%	0.00%	0.00%	1.11%	0.00%	0.00%	0.00%	98.88	0.00%	matou	TRUE
									%			
matou_16	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	3.63%	0.00%	96.36	0.00%	matou	TRUE
									%			
matou_17	0.00%	43.88	4.09%	0.00%	0.00%	0.00%	0.00%	0.00%	52.02	0.00%	matou	TRUE
		%							%			
matou_18	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	8.05%	0.00%	91.94	0.00%	matou	TRUE
									%			
matou_19	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	5.01%	0.00%	94.98	0.00%	matou	TRUE
									%			
matou_2	0.00%	0.57%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	97.08	2.34%	matou	TRUE
									%			
matou_20	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	99.99	0.00%	matou	TRUE
									%			
matou_3	0.00%	0.00%	0.00%	0.00%	0.00%	2.27%	0.00%	0.00%	91.51	6.22%	matou	TRUE
									%			
matou_4	0.00%	0.00%	0.00%	0.00%	0.00%	36.31	0.00%	3.83%	31.23	28.62	matou	FALSE
						%			%	%		
matou_5	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	99.99	0.00%	matou	TRUE
									%			
matou_6	0.00%	20.69	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	79.30	0.00%	matou	TRUE
		%							%			
matou_7	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	12.18	87.81	0.00%	matou	TRUE
								%	%			
matou_8	0.00%	25.79	0.00%	2.53%	0.00%	0.00%	3.79%	0.00%	67.88	0.00%	matou	TRUE
		%							%			
matou_9	6.77%	0.00%	0.00%	0.00%	0.00%	10.27	0.00%	0.00%	82.95	0.00%	matou	TRUE
						%			%			
Red_boned_1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	88.51	0.00%	11.48	0.00%	Red_boned	TRUE
							%		%			
Red_boned_1 0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	99.99	0.00%	0.00%	0.00%	Red_boned	TRUE
							%					
Red_boned_1 1	0.00%	0.00%	0.00%	0.00%	0.00%	2.05%	81.84	0.00%	16.10	0.00%	Red_boned	TRUE
							%		%			
Red_boned_1 2	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	94.58	5.41%	0.00%	0.00%	Red_boned	TRUE
							%					
Red_boned_1 3	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	99.99	0.00%	0.00%	0.00%	Red_boned	TRUE
							%					
Red_boned_1 4	0.00%	0.00%	0.00%	0.00%	0.00%	13.37	86.62	0.00%	0.00%	0.00%	Red_boned	TRUE
						%	%					

[0060]

Red_boned_1		12.34					84.44	2.42%			Red_boned	TRUE
5	0.00%	%	0.00%	0.00%	0.00%	0.00%	%		0.00%	0.79%		
Red_boned_1							99.99	0.00%			Red_boned	TRUE
6	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	%		0.00%	0.00%		
Red_boned_1							72.34	27.65			Red_boned	TRUE
7	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	%	%	0.00%	0.00%		
Red_boned_1					21.84		69.78	8.38%			Red_boned	TRUE
8	0.00%	0.00%	0.00%	0.00%	%	0.00%	%		0.00%	0.00%		
Red_boned_1					14.32		74.96	10.71			Red_boned	TRUE
9	0.00%	0.00%	0.00%	0.00%	%	0.00%	%	%	0.00%	0.00%		
Red_boned_2							99.99	0.00%			Red_boned	TRUE
	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	%		0.00%	0.00%		
Red_boned_2							96.37	0.00%			Red_boned	TRUE
0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	%		3.62%	0.00%		
Red_boned_3							99.99	0.00%			Red_boned	TRUE
	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	%		0.00%	0.00%		
Red_boned_4							99.99	0.00%			Red_boned	TRUE
	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	%		0.00%	0.00%		
Red_boned_5						1.91%	55.70	0.00%	42.39		Red_boned	TRUE
	0.00%	0.00%	0.00%	0.00%	0.00%		%	%	0.00%			
Red_boned_6							99.99	0.00%			Red_boned	TRUE
	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	%		0.00%	0.00%		
Red_boned_7							86.53	13.47			Red_boned	TRUE
	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	%	%	0.00%	0.00%		
Red_boned_8							93.06	0.00%			Red_boned	TRUE
	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	%		6.93%	0.00%		
Red_boned_9					10.09		89.91	0.00%			Red_boned	TRUE
	0.00%	0.00%	0.00%	0.00%	%	0.00%	%		0.00%	0.00%		
Saanen_1			64.20					35.80			Saanen	TRUE
	0.00%	0.00%	%	0.00%	0.00%	0.00%	0.00%	%	0.00%	0.00%		
Saanen_10			99.99					0.00%			Saanen	TRUE
	0.00%	0.00%	%	0.00%	0.00%	0.00%	0.00%		0.00%	0.00%		
Saanen_16			79.94		3.31%	0.66%		3.23%			Saanen	TRUE
	0.00%	4.03%	%	0.00%			0.00%		8.83%	0.00%		
Saanen_17			75.83			16.52		3.61%			Saanen	TRUE
	0.00%	4.04%	%	0.00%	0.00%	%	0.00%		0.00%	0.00%		
Saanen_19			99.99					0.00%			Saanen	TRUE
	0.00%	0.00%	%	0.00%	0.00%	0.00%	0.00%		0.00%	0.00%		
Saanen_2			99.99					0.00%			Saanen	TRUE
	0.00%	0.00%	%	0.00%	0.00%	0.00%	0.00%		0.00%	0.00%		
Saanen_20			73.48			12.27		13.48			Saanen	TRUE
	0.00%	0.00%	%	0.00%	0.00%	%	0.00%	%	0.00%	0.76%		
Saanen_21			33.38	50.05		16.57		0.00%			Saanen	TRUE
	0.00%	%	%		0.00%	%	0.00%	0.00%	0.00%	0.00%		

[0061]

Saanen_22	0.00%	0.00%	80.08%	0.00%	0.00%	0.41%	0.00%	0.00%	19.50%	0.00%	Saanen	TRUE
Saanen_23	0.00%	0.00%	66.70%	0.00%	0.00%	31.08%	0.00%	0.00%	0.00%	2.21%	Saanen	TRUE
Saanen_24	0.00%	0.00%	99.99%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Saanen	TRUE
Saanen_25	0.00%	0.00%	99.99%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Saanen	TRUE
Saanen_26	0.00%	0.00%	99.99%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Saanen	TRUE
Saanen_27	0.00%	0.00%	99.99%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Saanen	TRUE
Saanen_28	0.00%	0.00%	99.99%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Saanen	TRUE
Saanen_29	0.00%	0.00%	99.99%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Saanen	TRUE
Saanen_3	0.00%	0.00%	58.89%	0.00%	0.00%	0.00%	0.00%	41.11%	0.00%	0.00%	Saanen	TRUE
Saanen_30	0.00%	0.00%	99.99%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Saanen	TRUE
Saanen_31	0.00%	0.00%	85.46%	0.00%	0.00%	0.00%	0.00%	14.53%	0.00%	0.00%	Saanen	TRUE
Saanen_32	0.00%	0.00%	88.89%	0.00%	0.00%	0.00%	0.00%	11.10%	0.00%	0.00%	Saanen	TRUE
Saanen_33	0.00%	0.00%	99.31%	0.00%	0.00%	0.68%	0.00%	0.00%	0.00%	0.00%	Saanen	TRUE
Saanen_34	0.00%	0.00%	80.07%	0.00%	0.00%	0.00%	0.00%	19.92%	0.00%	0.00%	Saanen	TRUE
Saanen_35	0.00%	0.00%	93.99%	0.00%	0.00%	0.00%	0.00%	6.00%	0.00%	0.00%	Saanen	TRUE
Saanen_36	0.00%	0.00%	83.91%	0.00%	0.00%	0.00%	0.00%	16.08%	0.00%	0.00%	Saanen	TRUE
Saanen_37	0.00%	0.00%	90.09%	0.00%	0.00%	0.00%	0.00%	9.90%	0.00%	0.00%	Saanen	TRUE
Saanen_38	0.00%	5.63%	77.97%	0.00%	0.00%	0.00%	0.00%	16.40%	0.00%	0.00%	Saanen	TRUE
Saanen_4	0.00%	0.00%	79.17%	0.00%	2.67%	0.00%	0.00%	15.76%	0.00%	2.39%	Saanen	TRUE
Saanen_5	0.00%	0.00%	99.57%	0.42%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Saanen	TRUE
Saanen_6	3.22%	0.00%	80.89%	0.00%	0.00%	0.00%	0.00%	7.49%	0.00%	8.39%	Saanen	TRUE
Saanen_7	0.00%	0.00%	93.28%	0.00%	0.00%	0.00%	0.00%	6.71%	0.00%	0.00%	Saanen	TRUE

[0062]

Saanen_8	0.00%	10.26 %	89.74 %	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Saanen	TRUE
Saanen_9	0.00%	0.00%	95.08 %	0.00%	0.00%	0.00%	0.00%	0.00%	4.91%	0.00%	Saanen	TRUE
YS_black_1	0.00%	0.00%	0.00%	0.00%	0.00%	99.99 %	0.00%	0.00%	0.00%	0.00%	YS_black	TRUE
YS_black_10	0.00%	0.00%	0.00%	0.00%	0.00%	99.99 %	0.00%	0.00%	0.00%	0.00%	YS_black	TRUE
YS_black_11	0.00%	0.00%	0.00%	0.00%	0.00%	99.99 %	0.00%	0.00%	0.00%	0.00%	YS_black	TRUE
YS_black_12	0.00%	0.00%	0.00%	0.00%	0.00%	99.99 %	0.00%	0.00%	0.00%	0.00%	YS_black	TRUE
YS_black_13	0.00%	0.00%	0.00%	0.00%	0.00%	97.38 %	0.00%	0.00%	0.00%	2.61%	YS_black	TRUE
YS_black_14	0.00%	0.00%	0.00%	0.00%	23.95 %	57.49 %	0.00%	0.00%	2.16%	16.40 %	YS_black	TRUE
YS_black_15	0.00%	0.00%	0.00%	0.00%	5.19%	94.80 %	0.00%	0.00%	0.00%	0.00%	YS_black	TRUE
YS_black_16	0.00%	12.83 %	0.00%	0.00%	0.00%	87.16 %	0.00%	0.00%	0.00%	0.00%	YS_black	TRUE
YS_black_17	0.00%	0.00%	0.00%	0.00%	0.00%	99.99 %	0.00%	0.00%	0.00%	0.00%	YS_black	TRUE
YS_black_18	0.00%	0.00%	0.89%	0.00%	0.00%	99.10 %	0.00%	0.00%	0.00%	0.00%	YS_black	TRUE
YS_black_19	0.00%	0.00%	0.00%	0.00%	0.00%	99.99 %	0.00%	0.00%	0.00%	0.00%	YS_black	TRUE
YS_black_2	0.00%	6.23%	0.00%	0.00%	21.03 %	72.73 %	0.00%	0.00%	0.00%	0.00%	YS_black	TRUE
YS_black_20	0.00%	0.00%	0.00%	0.00%	0.00%	99.99 %	0.00%	0.00%	0.00%	0.00%	YS_black	TRUE
YS_black_21	0.00%	17.99 %	0.00%	0.00%	0.00%	81.01 %	0.00%	0.99%	0.00%	0.00%	YS_black	TRUE
YS_black_22	0.00%	0.00%	0.00%	0.00%	0.00%	99.99 %	0.00%	0.00%	0.00%	0.00%	YS_black	TRUE
YS_black_23	0.00%	0.00%	0.00%	0.00%	0.00%	85.78 %	11.74 %	0.00%	0.00%	2.48%	YS_black	TRUE
YS_black_24	0.00%	0.00%	0.00%	0.00%	0.00%	73.08 %	16.77 %	0.00%	0.00%	10.15 %	YS_black	TRUE
YS_black_25	0.00%	12.17 %	0.00%	0.00%	0.00%	69.22 %	0.00%	6.67%	0.00%	11.93 %	YS_black	TRUE
YS_black_26	0.00%	9.54%	0.00%	0.00%	0.00%	82.64 %	0.00%	7.81%	0.00%	0.00%	YS_black	TRUE
YS_black_27	0.00%	0.00%	0.00%	0.00%	18.10 %	56.67 %	25.22 %	0.00%	0.00%	0.00%	YS_black	TRUE

[0063]

YS_black_28	0.00%	0.00%	0.00%	0.00%	0.00%	89.96%	7.97%	0.00%	0.00%	2.06%	YS_black	TRUE
YS_black_29	0.00%	0.00%	0.00%	0.00%	0.00%	99.99%	0.00%	0.00%	0.00%	0.00%	YS_black	TRUE
YS_black_3	0.00%	0.00%	0.00%	0.00%	0.00%	96.95%	0.00%	0.00%	0.00%	3.04%	YS_black	TRUE
YS_black_30	0.00%	0.00%	2.69%	0.00%	0.00%	96.94%	0.00%	0.00%	0.00%	0.37%	YS_black	TRUE
YS_black_31	0.00%	0.00%	0.00%	0.00%	0.00%	92.94%	6.70%	0.00%	0.00%	0.36%	YS_black	TRUE
YS_black_32	0.00%	0.00%	0.00%	0.00%	0.00%	75.78%	24.21%	0.00%	0.00%	0.00%	YS_black	TRUE
YS_black_33	0.00%	0.00%	0.00%	0.00%	5.11%	78.29%	5.07%	0.00%	0.00%	11.53%	YS_black	TRUE
YS_black_34	0.00%	0.00%	0.00%	0.00%	0.00%	99.99%	0.00%	0.00%	0.00%	0.00%	YS_black	TRUE
YS_black_35	0.00%	0.00%	0.00%	0.00%	0.00%	97.10%	2.89%	0.00%	0.00%	0.00%	YS_black	TRUE
YS_black_36	0.00%	0.00%	0.00%	0.00%	0.47%	72.67%	26.85%	0.00%	0.00%	0.00%	YS_black	TRUE
YS_black_37	0.00%	0.00%	0.00%	0.00%	15.55%	83.77%	0.00%	0.00%	0.00%	0.68%	YS_black	TRUE
YS_black_38	0.00%	0.00%	0.00%	0.00%	0.00%	97.94%	0.00%	2.05%	0.00%	0.00%	YS_black	TRUE
YS_black_39	0.00%	0.69%	0.00%	0.00%	0.00%	82.78%	0.00%	0.00%	12.67%	3.85%	YS_black	TRUE
YS_black_4	0.00%	0.00%	0.00%	0.00%	14.53%	76.75%	0.00%	7.69%	0.00%	1.02%	YS_black	TRUE
YS_black_40	0.00%	0.00%	0.00%	0.00%	6.35%	77.21%	7.13%	0.00%	5.55%	3.76%	YS_black	TRUE
YS_black_5	0.00%	0.00%	0.00%	0.00%	14.86%	85.02%	0.00%	0.00%	0.00%	0.12%	YS_black	TRUE
YS_black_6	0.00%	0.00%	0.00%	0.00%	0.00%	81.97%	15.40%	0.78%	0.00%	1.85%	YS_black	TRUE
YS_black_7	0.00%	0.00%	0.00%	0.00%	0.00%	94.27%	0.00%	0.00%	0.00%	5.72%	YS_black	TRUE
YS_black_8	0.00%	0.00%	0.00%	0.00%	0.00%	97.47%	0.00%	2.52%	0.00%	0.00%	YS_black	TRUE
YS_black_9	0.00%	0.00%	0.00%	0.00%	0.00%	96.17%	3.83%	0.00%	0.00%	0.00%	YS_black	TRUE

[0064] 注：列名为山羊品种、模型预测结果及与实际的一致性，行名为个体编号，一致性中TRUE表示预测结果与实际品种相符合，结果显示共2个样本模型预测与实际不符合(FALSE)，其余均为TRUE，准确率(一致性)为 $320/322 \times 100\% = 99.38\%$ 。

[0065] 由表4可以看出，本发明筛选的1K位点能够准确对崇明白山羊个体作出精准鉴定，

且其它品种的血统判断与实际品种的血统均完全相符(模型根据血统成份最大百分占比,判定为该品种个体,验证结果显示模型判断准确率达到99.38%)。本发明不仅能对个体的血统进行定性判断,而且对每个个体血统的组成和百分比也能获得计算(见表4)。

[0066] 本发明的SNP分子标记组合为崇明白山羊纯种个体的鉴定、筛选奠定了良好的基础,目前,基于本发明的SNP分子标记组合设计的试剂盒已在位于崇明的上海园都白山羊保种场进行大规模的应用。

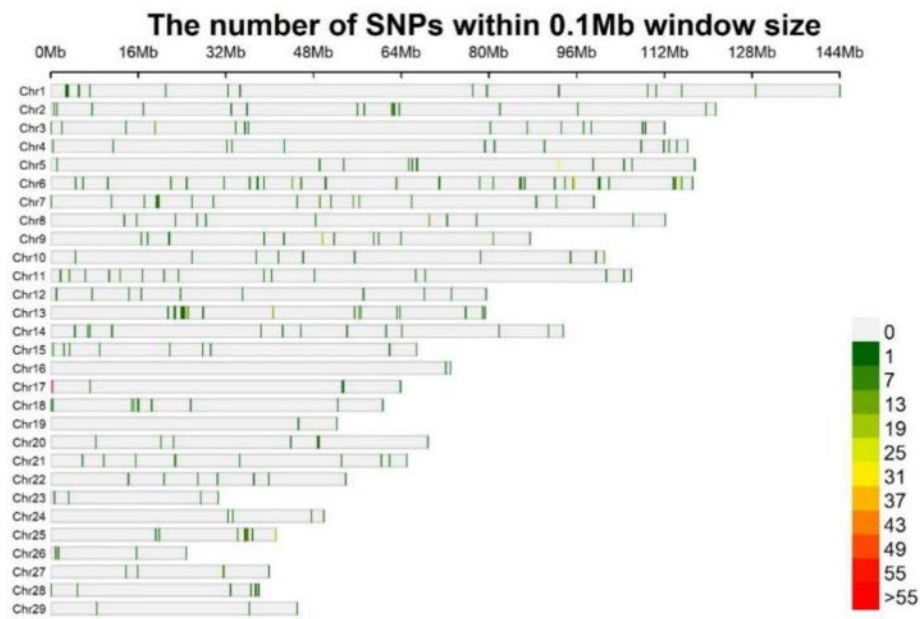


图1