www.sciencemag.org/cgi/content/full/1177808/DC1

Supporting Online Material for

Coat Variation in the Domestic Dog Is Governed by Variants in Three Genes

Edouard Cadieu, Mark Neff, Pascale Quignon, Kari Walsh, Kevin Chase, Heidi G. Parker, Bridgett M. VonHoldt, Alison Rhue, Adam Boyko, Alexandra Byers, Aaron Wong, Dana S. Mosher, Abdel G. Elkahloun, Tyrone C. Spady, Catherine André, K. Gordon Lark, Michelle Cargill, Carlos D. Bustamante, Robert K. Wayne, Elaine A. Ostrander*

*To whom correspondence should be addressed. E-mail: eostrand@mail.nih.gov

Published 27 August 2009 on *Science* Express
DOI: 10.1126/science.1177808

This PDF file includes:

Materials and Methods:

Sample Collection and DNA Isolation

DNA was isolated from blood samples collected from AKC registered dogs of established breeds with at least three generations of available pedigree data. Individuals were recruited through AKC-sanctioned dog shows, specialty events, breed clubs, and veterinary clinics. Pedigree analyses were used to ensure that only dogs with no common grandparents were included. The first dataset includes 96 dachshunds representing all three coat varieties; 33 wire-haired, 34 smooth coat, and 29 long-haired dogs. The second dataset includes a set of 76 PWD; 35 with curly hair and 41 with wavy hair. The third dataset consists of 903 dogs from 80 breeds with eight to 12 dogs unrelated at the grandparent level chosen to represent each breed (Table S2). The choice of multiple unrelated dogs maximizes the number of informative meiosis scanned for each breed. The final dataset, used only in the furnishings analysis, includes 96 dogs from a single extended family of dachshunds that segregate all three coat types; 25 wire-haired, 66 smooth coated, and 5 long-haired dachshunds.

Samples were collected by licensed veterinarians or trained veterinary technicians through venipuncture of the cephalic vein using standard protocols approved by the NHGRI Animal Care and Use Committee. Collection procedures associated with the dachshund pedigree were approved by U.C. Davis Animal Care and Use Committee. Blood samples for the association studies were collected into ACD or EDTA anticoagulant in test tubes and shipped at room temperature to the Ostrander laboratory at NHGRI. Samples were stored at 4^0C prior to DNA extraction. DNA isolation was performed off-site using standard proteinase K/phenol-chloroform isolation methods (HealthGene, Inc., Ontario, Canada). Extracted DNA samples were suspended in 10 mM Tris base, 0.1 mM EDTA, labeled with a coded identifier, and stored at -80^0C. For the dachshund family collection was overseen by

U.C. Davis staff. DNA was isolated on site using standard protocols (*1*) and samples were stored as described above.

Genome Wide Association Study

Samples were genotyped using the Affymetrix Version 2, Canine SNP chip which has approximately 127,000 features. The standard Affymetrix "GeneChip® Mapping 500K Assay" protocol was followed using 250 ng of phenol/chloroform extracted-DNA for each dog (http://www.affymetrix.com/support/downloads/manuals/500k_assay_manual.pdf). Before the hybridization step, the volume of the reaction was reduced to 35 µl by heat evaporation to allow the entire reaction to be hybridized to the SNP chip. Chips were run in the NHGRI genotyping core facility. Genotypes were called using the BRLMM-p algorithm (http://www.affymetrix.com/support/technical/whitepapers/brlmmp_whitepaper.pdf) on batched sets of CEL files (*2*).All calls were combined into one dataset and analyzed using PLINK (*3*). SNPs with a call rate of <90%, that were heterozygous in >60% of individuals, or had discordant genotype calls in >1/3 of 158 duplicate pairs were discarded. Of the remaining SNPs, 43 had minor allele frequencies of <1%. The resulting sets of informative SNPs were as follows; 51,071 in the dachshund dataset and 40,812 in the CanMap dataset were used in the association analyses described in this study. The SNP chips for the PWD dataset were run at the University of Utah core facility and a similar process was used to define the 56,395 informative SNPs. A complete list of SNPs is available at http://research.nhgri.nih.gov/dog_genome/.

Dachshund Pedigree Microsatellite Genotyping

A pedigree of 96 dachshunds was genotyped using a set of 167 well distributed canine-specific microsatellite markers and standard conditions (*4, 5*). Genotypes were analyzed using MENDEL (*6*). The fine mapping for the family utilized 28 additional microsatellites,

genotyped on 37 dachshunds, of which nine carried the wire hair/furnishings phenotype and 28 were smooth coated.

Case/Control Data Analysis

The multibreed dataset was divided into cases and controls based on the presence or absence of the phenotype in question according to the AKC breed standard descriptions (*7*). Phenotypes for each breed are listed in Table S2. For the first phenotype, furnishings, we used 225 dogs from 19 breeds with furnishings as cases and 650 dogs from 58 breeds without furnishings as controls. For the second phenotype, hair length, we used 319 dogs from 31 breeds with long hair as cases and 364 dogs from 34 breeds with short hair as controls. For the last phenotype, curl, we used 61 curly-haired dogs from five breeds as cases and 429 non-curly haired dogs from 37 breeds as controls. Individuals from the single breed datasets (dachshund and Portuguese water dog) were phenotyped based on owner descriptions or variety classifications. Single marker χ^2 association, model-based Fisher association, and haplotype association was performed on all datasets using the PLINK analysis program (*3*).

Fine Mapping in the Case Control Datasets

Additional SNPs were chosen from public databases utilizing the canine genome sequence (*8*) (http://www.broad.mit.edu/node/459, http://www.ncbi.nlm.nih.gov/projects/SNP/). Assays were designed for SNPs from the region around the peak of strongest association at each locus.

For the furnishings locus on CFA13, the best associated-haplotype (*P*-value=4 x10^{-292}) derived from the GWAS studies included seven SNPs at positions spanning 11,593,074-11,718,754. We genotyped 88 SNPs from positions 10,184,498 -12,586,193 on 177 cases (30 breeds) and 176 controls (21 breeds) (Figure S1, Table S3).

For the hair length locus on CFA32, 41 SNPs spanning 1.3 Mb from position 6,793,199 – 8,133,439 were genotyped on 293 cases (39 breeds) and 197 controls (32 breeds) (Figure S3 and Table S6).

For the curl locus on CFA27, 59 SNPs spanning the peak and covering a Keratin genes cluster (20 genes) from positions 4,967,176 -5,969,708 were genotyped on 91 cases (10 breeds) and 577 controls (97 breeds) (Figure S4 and Table S8). SNPs were genotyped using the SNPlex™ genotyping system and an ABI 3730XL genome analyzer with standard protocols (Applied Biosystems, Santa Clara, CA).

Sequencing

Primers to surround all conserved segments within the associated haplotypes and to tile across regions of particular interest were designed using the Primer3 program (*9*). Segments were amplified using standard PCR protocols and a 40 cycle, touch-down thermocycler program with the annealing temperature reduced by ½ a degree for the first 20 cycles, then held steady at the lowest temperature for the last 20 cycles.

For regions with high GC content we used a slightly modified protocol. We added GC-melt reagent (Clontech, Mountain View, CA) at 0.5 – 1M concentration, increased the TM of the primers to between 67 to 72 °C and ran the following two temperature thermocycler program: 35 cycles of (95 °C 30 sec and 68 °C 2 min/kb) followed by a 10 min final extension at 72^{o}C. Primer sequences can be found in Table S4.

Each segment was sequenced using BigDye terminator sequencing kits and standard protocols (Applied Biosystems, Santa Clara, CA).

Genotyping the Causal Mutations

An additional and unique set of samples consisting of at least 661 dogs from 108 breeds representing multiple coat phenotypes was used to confirm each mutation. The number of cases and controls for each of the three phenotypes (furnishings, length of hair, and curl) are respectively: Furnishings - 298 cases and 406 controls (including 11 wild canids); Long hair - 292 cases, 204 controls (including 9 wild canids) and 27 samples from breeds that segregate long and short hair; Curl - 36 cases, 538 controls (including 9 wild canids) and 87 dogs from breeds that segregate curly and non-curly coats. (Table S1).

To genotype the insertion in *RSPO2*, the size of each segment was checked on agarose gels to determine the presence or absence. (Figure S5). For the two point mutations in *FGF5* and *KRT71*, PCR and sequencing was performed as described in the fine mapping section with sequences called and aligned using the Phred/Phrap/Consed package (*10, 11*) and SNPs genotyped using Polyphred (*12*). A complete list of primers can be found in Table S4.

Expression Analysis

Skin samples were isolated by a punch biopsy of 4mm from the muzzles of thirteen dogs, including 7 with furnishings and 6 without. Total RNA was isolated primarily from the epidermal and dermal layer of the skin using standard protocols (*13*) . Transcript levels were estimated by quantitative PCR with the Power SYBR Green PCR master mix (Applied Biosystems) and manufacturers suggested protocols. Quantities were normalized to the reference gene *NFU1 (*previously called *HIRP5)* (accession number XM_850340) *(14, 15)*. To ensure that the biopsies contain hair in the same cycle, we evaluated the expression of *FGF5*. Indeed, *FGF5* has highly variable expression over the course of the hair cycle and differs by approximately 4000 copies /ng with an expression peak during the anagen phase

(*13*). In our experiment there was no significant difference in the *FGF5* expression between the samples from dogs with and without furnishings.

Figure S1: Haplotype drawing from Snplex data in the furnishings locus on CFA13. The orange color represents the major homozygous genotype in the cases, the green color represent the minor homozygous genotype in the cases, white color represent the heterozygous genotype, and black color is no data.

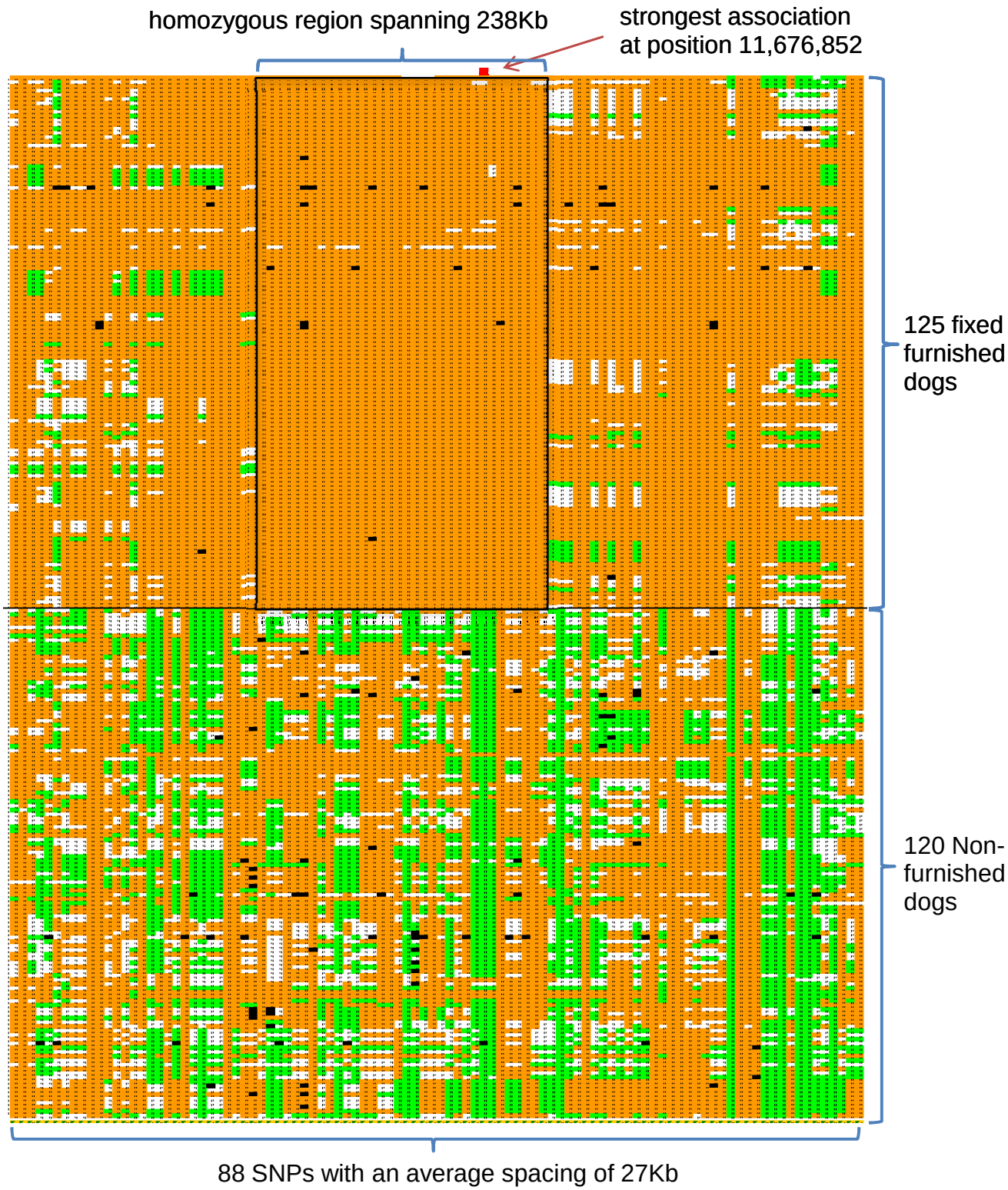


Figure S2. Quantitative analysis of expression of the *RSPO2* gene in dogs with and without furnishings. qPCR was performed on 7 dogs with furnishings and 6 dogs without. Transcript amounts were normalized to a reference gene and averaged across all individuals in each group.

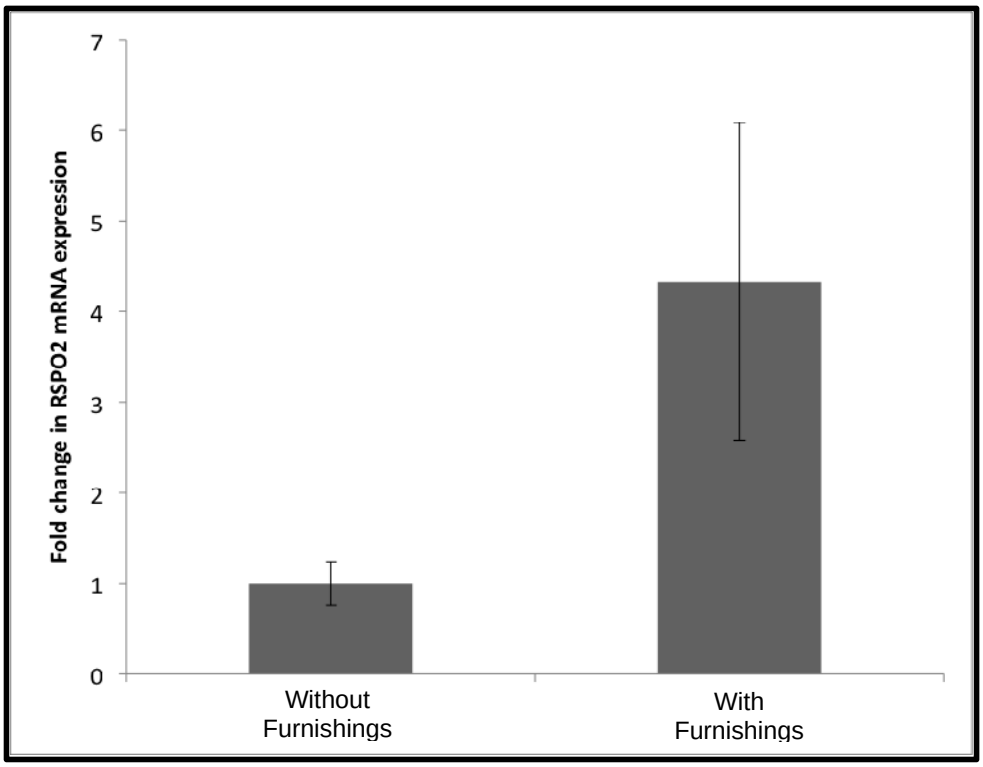


Figure S3: Haplotype drawing from Snplex data in the fur length locus on CFA32. The orange color represents the homozygous major allele in the cases, the green color represent the homozygous minor allele in the cases, white color represent the heterozygous genotype, and black color is no data.

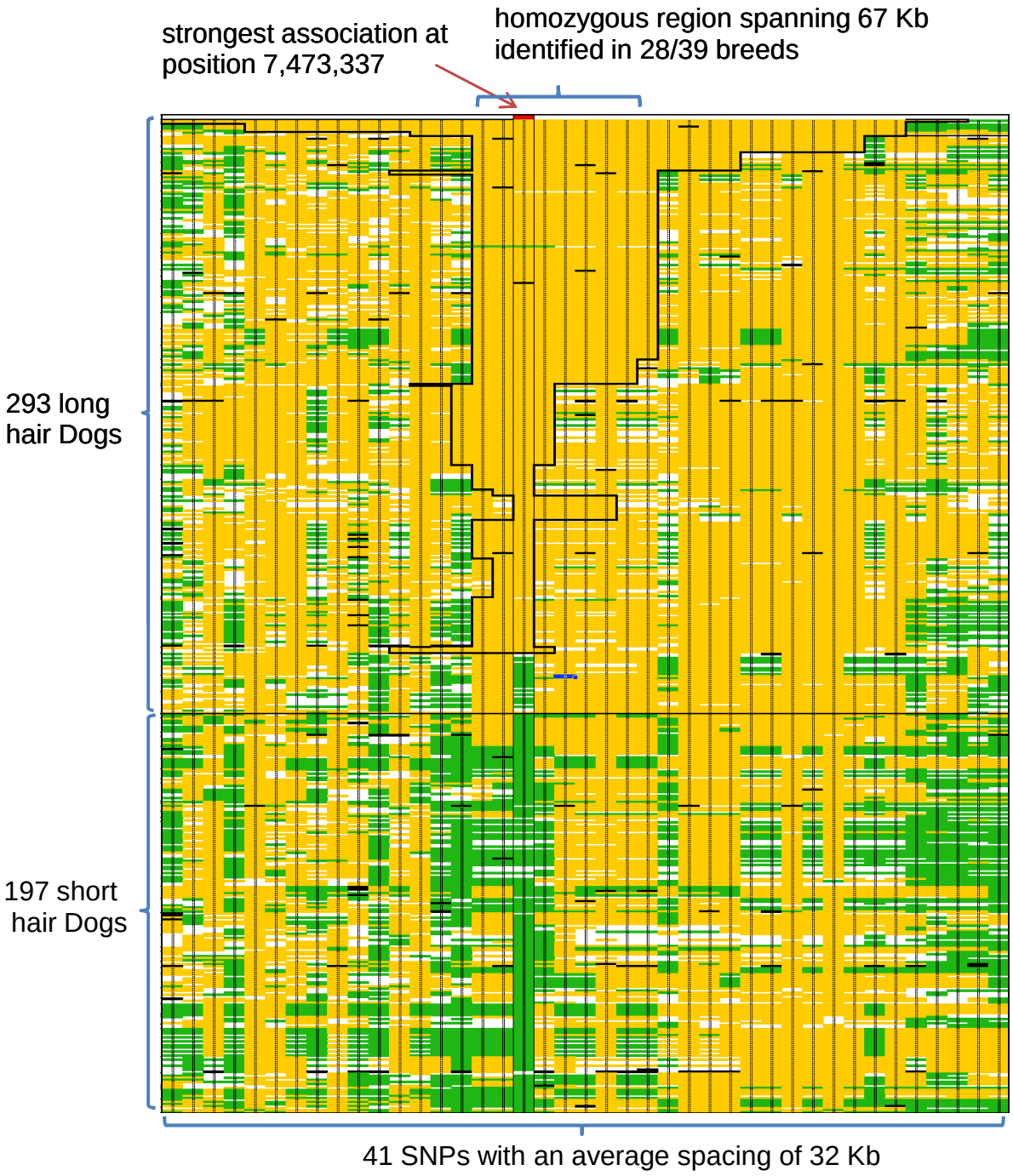


Figure S4. Genotypes of 59 SNPs in the curly locus on CFA27 in 122 dogs. The orange color represents the homozygous major allele in the cases, the green color represent the homozygous minor allele in the cases, white color represent the heterozygous genotype, and black color is no data. The SNP that shows the highest association is highlighted with a red box and arrow.

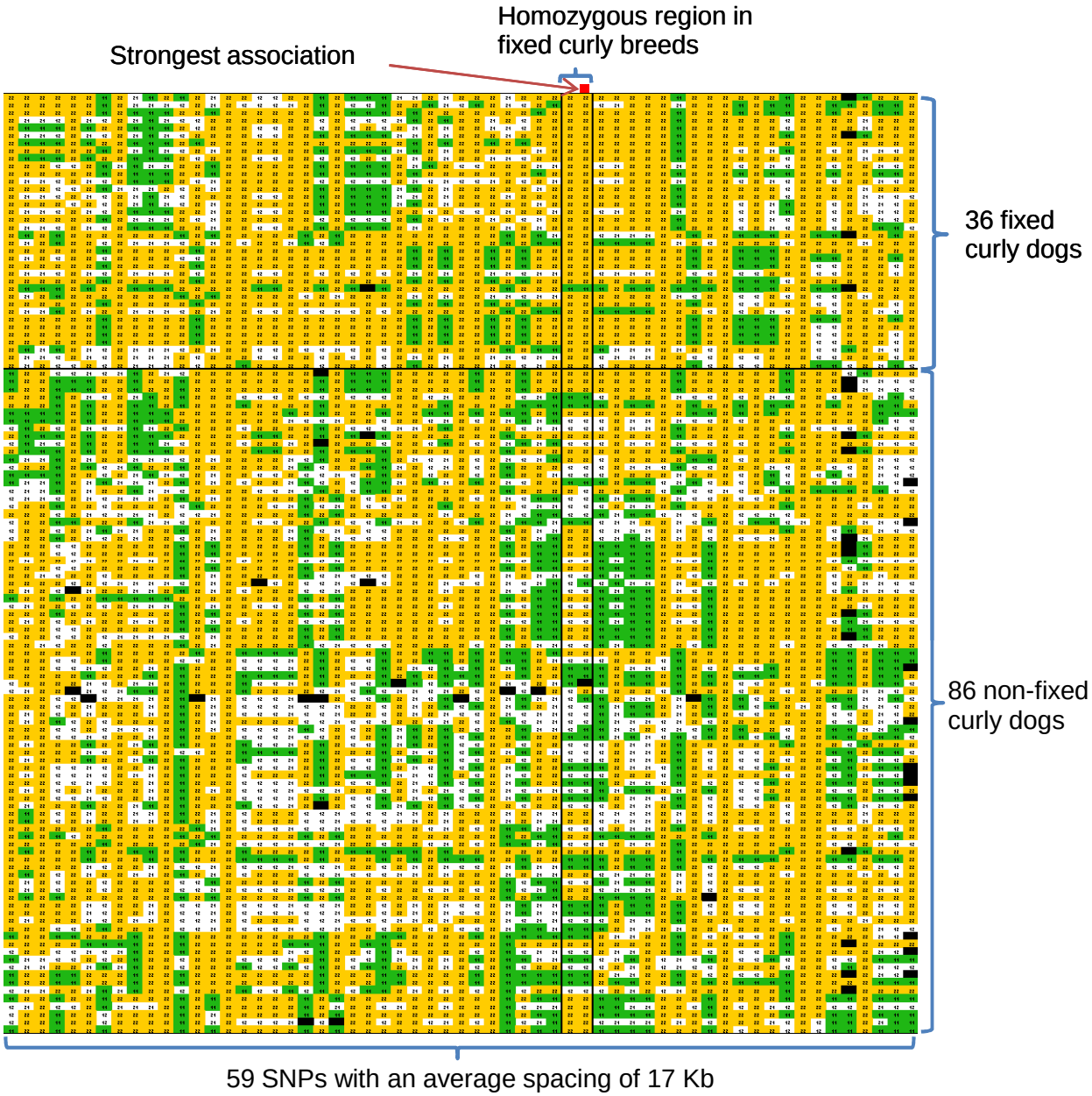
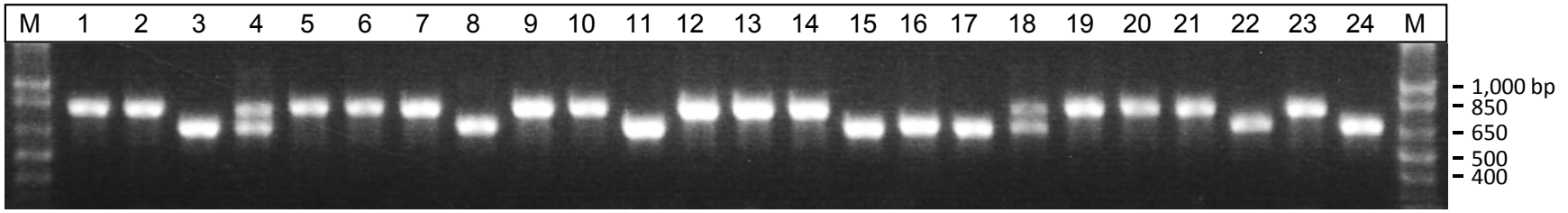


Figure S5: For the mutation in *RSPO2* , the size of each segment was checked on agarose gels to determine the presence or absence of the insertion (167 bp). We performed a PCR with primer SQ7058 (Table S4) on 704 samples (dogs + wild canids). Here, it's an example of gel. M correspond to the 1 Kb Plus DNA Ladder. Without exception, All PCR with insertion (817 bp) correspond to dogs with furnishings such as Scottish Terrier(1), WIre-haired Dachshund(2). All PCR without insertion (676 bp) correspond to dogs without furnishings such as Cavalier King Charles Spaniel(3), Long-Haired Dachshund(8). PCR with both variants correspond to dogs where can segregate the furnishings phenotype such as German Wirehaired Pointer(4) and Wire-haired Dachshund(18).



Lane 1) Scottish Terrier
Lane 2) Wire-haired Dachshund
Lane 3) Cavalier King Charles Spaniel
Lane 4) German Wirehaired Pointer
Lane 5) Kerry Blue Terrier
Lane 6) Yorkshire Terrier
Lane 7) Wire Fox Terrier
Lane 8) Long-haired Dachshund
Lane 9) Wire-haired Dachshund
Lane 10) Soft Coated Wheaten Terrier
Lane 11) Short-haired Dachshund
Lane 12) Airedale Terrier
Lane 13) Wire-haired Dachshund
Lane 14) Glen of Imaal Terrier
Lane 15) Cocker Spaniel
Lane 16) Saluki
Lane 17) Basenji
Lane 18) Wire-haired Dachshund
Lane 19) Portuguese Water Dog
Lane 20) Wire-haired Dachshund
Lane 21) Glen of Imaal Terrier
Lane 22) Saluki
Lane 23) Scottish Terrier
Lane 24) Long-haired Dachshund

Table S1. Genotypes of 707 dogs at all three coat controlling mutations. Combinations of the three genotypes can explain seven different coat phenotypes. The mutation is highlighted in yellow, the wild-type allele is in blue, and heterozygous genoytpes are green.

BREED*	length[a]	furnishings	curl	*FGF5* Genotype[b]	*RSPO2* Genotype[c]	*KRT71* Genotype[d]
Afghan Hound	Long	no	no	GG	11	CC
Afghan Hound	Long	no	no	GG	11	CC
Afghan Hound	Long	no	no	GG	11	CC
Afghan Hound	Long	no	no	GG	11	CC
Afghan Hound	Long	no	no	GG	11	CC
Afghan Hound	Long	no	no	GG	11	CC
Afghan Hound	Long	no	no	GG	11	CC
Afghan Hound	Long	no	no	GG	11	CC
Afghan Hound	Long	no	no	GT	11	CC
Afghan Hound	Long	no	no	GT	11	CC
Afghan Hound	Long	no	no	GT	11	CC
Afghan Hound	Long	no	no		11	CC
Airedale Terrier*	Medium	yes	both	GG	22	TT
Airedale Terrier	Medium	yes	both	GT	22	TT
Airedale Terrier	Medium	yes	both	TT	22	TT
Akita	Short	no	no	GG	11	CC
Akita	Short	no	no	GG	11	CC
Alaskan Malamute	Medium	no	no	GG	11	CC
Alaskan Malamute	Medium	no	no	GG	11	CC
Alaskan Malamute	Medium	no	no	GT	11	CC
American Eskimo Dog	Long	no	no	TT	11	CC
American Eskimo Dog	Long	no	no	TT	11	CC
American Eskimo Dog	Long	no	no	TT	11	CC
American Eskimo Dog	Long	no	no	TT	11	CC
American Water Spaniel*	Medium	no	both	TT	11	CC
American Water Spaniel	Medium	no	both	TT	11	
Anatolian Shepherd*	Varies	no	no	GG	11	CC
Australian Shepherd	Long	no	no	GT	11	CC
Australian Shepherd	Long	no	no	TT	11	CC
Australian Shepherd	Long	no	no	TT	11	CC
Australian Shepherd	Long	no	no	TT	11	CC
Australian Shepherd	Long	no	no	TT	11	CC
Australian Terrier	Medium	yes	no	GG	22	CC
Australian Terrier	Medium	yes	no	GG	22	CC
Australian Terrier	Medium	yes	no	GG	22	CC
Australian Terrier	Medium	yes	no	GG	22	CC
Australian Terrier	Medium	yes	no	GG	22	CC
Australian Terrier	Medium	yes	no	GG	22	CC
Australian Terrier	Medium	yes	no	GG	22	
Basenji	Short	no	no		11	CC
Basenji	Short	no	no	GG	11	CC
Basenji	Short	no	no	GG	11	CC
Basenji	Short	no	no	GG	11	CC
Basenji	Short	no	no	GG	11	CC
Basenji	Short	no	no	GG	11	CC
Basenji	Short	no	no	GG	11	CC
Basenji	Short	no	no	GG	11	CC
Basenji	Short	no	no	GG	11	CC
Basenji	Short	no	no	GG	11	CC
Basset Hound	Short	no	no	GG	11	CC
Basset Hound	Short	no	no	GG	11	CC

Basset Hound	Short	no	no	GG	11	CC
Basset Hound	Short	no	no	GG	11	CC
Basset Hound	Short	no	no	GG	11	CC
Basset Hound	Short	no	no	GG	11	CC
Beagle	Short	no	no	GG	11	CC
Beagle	Short	no	no	GG	11	CC
Bearded Collie	Long	yes	no		22	CC
Bearded Collie	Long	yes	no		22	CC
Bearded Collie	Long	yes	no	TT	22	CC
Belgian Tervuren	Long	no	no	TT	11	CC
Belgian Tervuren	Long	no	no	TT	11	CC
Bernese Mountain Dog	Long	no	no		11	
Bernese Mountain Dog	Long	no	no	TT	11	CC
Bernese Mountain Dog	Long	no	no	TT	11	CC
Bernese Mountain Dog	Long	no	no	TT	11	CC
Bernese Mountain Dog	Long	no	no	TT	11	CC
Bichon Frise*	Long	yes	both	TT	22	CT
Bichon Frise	Long	yes	both	TT	22	CT
Bichon Frise	Long	yes	both	TT	22	TT
Bichon Frise	Long	yes	both	TT	22	TT
Bichon Frise	Long	yes	both	TT	22	TT
Bichon Frise	Long	yes	both	TT	22	TT
Bichon Frise	Long	yes	both	TT	22	
Black Russian Terrier	Medium	yes	no	TT	22	CC
Black Russian Terrier	Medium	yes	no	TT	22	CC
Black Russian Terrier	Medium	yes	no	TT	22	CC
Black Russian Terrier	Medium	yes	no	TT	22	CC
Black Russian Terrier	Medium	yes	no	TT	22	CC
Black Russian Terrier	Medium	yes	no	TT	22	CC
Bloodhound	Short	no	no	GG	11	CC
Bloodhound	Short	no	no	GG	11	CC
Bloodhound	Short	no	no	GG	11	CC
Bloodhound	Short	no	no	GG	11	CC
Bloodhound	Short	no	no	GG	11	
Border Collie*	Varies	no	no	GT	11	CT
Border Collie	Varies	no	no	TT	11	CC
Border Collie	Varies	no	no	TT	11	CC
Border Collie	Varies	no	no	TT	11	CC
Border Collie	Varies	no	no	TT	11	
Border Terrier	Short	yes	no	GG	22	CC
Border Terrier	Short	yes	no	GG	22	CC
Border Terrier	Short	yes	no	GG	22	CC
Border Terrier	Short	yes	no	GG	22	CC
Border Terrier	Short	yes	no	GG	22	CC
Border Terrier	Short	yes	no	GG	22	
Borzoi	Long	no	no	TT	11	CC
Borzoi	Long	no	no	TT	11	CC
Borzoi	Long	no	no	TT	11	CC
Borzoi	Long	no	no	TT	11	CC
Borzoi	Long	no	no	TT	11	CC
Borzoi	Long	no	no	TT	11	CC
Borzoi	Long	no	no	TT	11	CC
Borzoi	Long	no	no	TT	11	CC
Boston Terrier	Short	no	no	GG	11	CC
Boston Terrier	Short	no	no	GG	11	CC
Boston Terrier	Short	no	no	GG	11	CC
Boston Terrier	Short	no	no	GG	11	CC
Boston Terrier	Short	no	no	GG	11	CC
Bouvier des Flandres	Medium	yes	no		22	

Bouvier des Flandres	Medium	yes	no	TT	22	CC
Bouvier des Flandres	Medium	yes	no	TT	22	CC
Boxer	Short	no	no		11	CC
Boxer	Short	no	no	GG	11	CC
Boxer	Short	no	no	GG	11	CC
Boxer	Short	no	no	GG	11	CC
Boxer	Short	no	no	GG	11	CC
Boxer	Short	no	no	GG	11	CC
Boykin Spaniel*	Medium	no	both	TT	11	CC
Boykin Spaniel	Medium	no	both	TT	11	CT
Boykin Spaniel	Medium	no	both	TT	11	CT
Boykin Spaniel	Medium	no	both	TT	11	CT
Briard	Long	yes	no		22	CC
Briard	Long	yes	no		22	CC
Briard	Long	yes	no	TT	22	CC
Briard	Long	yes	no	TT	22	CC
Briard	Long	yes	no	TT	22	CC
Briard	Long	yes	no	TT	22	CC
Briard	Long	yes	no	TT	22	
Brittany	Long	no	no	TT	11	CC
Brittany	Long	no	no	TT	11	CC
Brittany	Long	no	no	TT	11	CC
Brittany	Long	no	no	TT	11	CC
Brittany	Long	no	no	TT	11	CC
Brittany	Long	no	no	TT	11	CC
Brittany	Long	no	no	TT	11	CC
Brussels Griffon*	Short	no	no	GG	11	CC
Brussels Griffon	Short	no	no	GG	11	CC
Brussels Griffon	Short	yes	no	GG	12	CC
Brussels Griffon	Short	yes	no	GG	12	CC
Brussels Griffon	Short	yes	no	GG	22	CC
Bulldog	Short	no	no	GG		CC
Bullmastiff	Short	no	no	GG	11	CC
Bullmastiff	Short	no	no	GG	11	CC
Bullmastiff	Short	no	no	GG	11	CC
Bullmastiff	Short	no	no	GT	11	CC
Cairn Terrier	Medium	yes	no	GG	22	CC
Cairn Terrier	Medium	yes	no	GG	22	CC
Cairn Terrier	Medium	yes	no	GG	22	CC
Cairn Terrier	Medium	yes	no	GT	22	CC
Cairn Terrier	Medium	yes	no		22	
Cardigan Welsh Corgi	Medium	no	no	GG	11	CC
Cardigan Welsh Corgi	Medium	no	no	GG	11	CC
Cardigan Welsh Corgi	Medium	no	no	GT	11	CC
Cardigan Welsh Corgi	Medium	no	no	TT	11	CC
Cavalier King Charles Spaniel	Long	no	no	TT	11	CC
Cavalier King Charles Spaniel	Long	no	no	TT	11	CC
Chesapeake Bay Retriever*	Short	no	both	GG	11	CT
Chesapeake Bay Retriever	Short	no	both	GG	11	CT
Chesapeake Bay Retriever	Short	no	both	GG	11	CT
Chihuahua*	Varies	no	no	GG	11	CT
Chihuahua	Varies	no	no	GT	11	CC
Chihuahua	Varies	no	no	TT	11	CC
Chihuahua	Varies	no	no	TT	11	CC
Chihuahua	Varies	no	no	TT	11	CT
Chihuahua	Varies	no	no	TT	11	CT
Chinese Crested	Long	yes	no	GT	12	CC
Chinese Crested	Long	yes	no	TT	22	CC
Chinese Crested	Long	yes	no	TT	22	CC

Chinese Crested	Long	yes	no		22	
Chinese Shar-Pei	Short	no	no	GG	11	CC
Chinese Shar-Pei	Short	no	no	GG	11	CC
Chinese Shar-Pei	Short	no	no	GG	11	CC
Chinese Shar-Pei	Short	no	no	GG	11	CC
Chinese Shar-Pei	Short	no	no	GG	11	
Chinese Shar-Pei	Short	no	no	GT	11	CC
Chow Chow*	Varies	no	no	GT	11	CC
Clumber Spaniel	Long	no	no	TT	11	CC
Clumber Spaniel	Long	no	no	TT	11	CC
Cocker Spaniel	Long	no	no	TT	11	CC
Cocker Spaniel	Long	no	no	TT	11	CC
Cocker Spaniel	Long	no	no	TT	11	CC
Cocker Spaniel	Long	no	no	TT	11	CC
Collie*	Short	no	no	GG	11	CC
Collie	Long	no	no	TT	11	CC
Collie	Long	no	no	TT	11	CC
Collie	Long	no	no	TT	11	CC
Dachshund*	Short	no	no	GG	11	CC
Dachshund	Short	no	no	GG	11	CC
Dachshund	Short	no	no	GG	11	CC
Dachshund	Short	no	no	GG	11	CC
Dachshund	Short	no	no	GG	11	CC
Dachshund	Short	no	no	GG	11	CC
Dachshund	Short	no	no	GG	11	CC
Dachshund	Short	no	no	GG	11	CC
Dachshund	Short	no	no	GG	11	CC
Dachshund	Short	no	no	GG	11	CC
Dachshund	Short	no	no	GG	11	CC
Dachshund	Short	no	no	GG	11	CC
Dachshund	Short	no	no	GG	11	CC
Dachshund	Short	no	no	GG	11	CC
Dachshund	Short	no	no	GG	11	CC
Dachshund	Short	no	no	GG	11	CC
Dachshund	Short	no	no	GG	11	
Dachshund	Medium	yes	no	GG	12	CC
Dachshund	Medium	yes	no	GG	12	CC
Dachshund	Medium	yes	no	GG	12	CC
Dachshund	Medium	yes	no	GG	12	CC
Dachshund	Medium	yes	no	GG	12	CC
Dachshund	Medium	yes	no	GG	12	CC
Dachshund	Medium	yes	no	GG	12	CC
Dachshund	Medium	yes	no	GG	22	CC
Dachshund	Medium	yes	no	GG	22	CC
Dachshund	Medium	yes	no	GG	22	CC
Dachshund	Medium	yes	no	GG	22	CC
Dachshund	Medium	yes	no	GG	22	CC
Dachshund	Medium	yes	no	GG	22	CC
Dachshund	Medium	yes	no	GG	22	CC
Dachshund	Medium	yes	no	GG	22	CC
Dachshund	Medium	yes	no	GG	22	CC
Dachshund	Medium	yes	no	GG	22	CC
Dachshund	Medium	yes	no	GG	22	CC
Dachshund	Medium	yes	no	GG	22	CC
Dachshund	Medium	yes	no	GG	22	CC
Dachshund	Medium	yes	no	GG	22	CC
Dachshund	Medium	yes	no	GG	22	CC
Dachshund	Medium	yes	no	GG	22	CC
Dachshund	Medium	yes	no	GG	22	CT

Dachshund	Medium	yes	no	GG	22	
Dachshund	Short	no	no	GT	11	CC
Dachshund	Short	no	no	GT	11	CC
Dachshund	Short	no	no	GT	11	CC
Dachshund	Short	no	no	GT	11	CC
Dachshund	Short	no	no	GT	11	CC
Dachshund	Short	no	no	GT	11	CC
Dachshund	Short	no	no	GT	11	CC
Dachshund	Short	no	no	GT	11	CC
Dachshund	Short	no	no	GT	11	CC
Dachshund	Short	no	no	GT	11	CC
Dachshund	Short	no	no	GT	11	
Dachshund	Medium	yes	no	GT	12	CC
Dachshund	Medium	yes	no	GT	12	CC
Dachshund	Medium	yes	no	GT	12	CC
Dachshund	Medium	yes	no	GT	12	CC
Dachshund	Long	no	no	TT	11	CC
Dachshund	Long	no	no	TT	11	CC
Dachshund	Long	no	no	TT	11	CC
Dachshund	Long	no	no	TT	11	CC
Dachshund	Long	no	no	TT	11	CC
Dachshund	Long	no	no	TT	11	CC
Dachshund	Long	no	no	TT	11	CC
Dachshund	Long	no	no	TT	11	CC
Dachshund	Long	no	no	TT	11	CC
Dachshund	Long	no	no	TT	11	CC
Dachshund	Long	no	no	TT	11	CC
Dachshund	Long	no	no	TT	11	CC
Dachshund	Long	no	no	TT	11	CC
Dachshund	Long	no	no	TT	11	CC
Dachshund	Long	no	no	TT	11	CC
Dachshund	Long	no	no	TT	11	CC
Dachshund	Long	no	no	TT	11	CC
Dachshund	Long	no	no	TT	11	CC
Dachshund	Long	no	no	TT	11	CC
Dachshund	Long	no	no	TT	11	CC
Dachshund	Long	no	no	TT	11	CC
Dachshund	Long	no	no	TT	11	CC
Dachshund	Long	no	no	TT	11	
Dachshund	Short	no	no		11	CC
Dachshund	Short	no	no		11	
Dachshund[e]	Long	yes	no	TT	12	CC
Dandie Dinmont Terrier	Medium	yes	no	GG	22	CC
Dandie Dinmont Terrier	Medium	yes	no	GG	22	CC
Dandie Dinmont Terrier	Medium	yes	no	GG	22	CC
Dandie Dinmont Terrier	Medium	yes	no	GG	22	CC
Dandie Dinmont Terrier	Medium	yes	no	GG	22	CC
Doberman Pinscher	Short	no	no	GG	11	CC
Doberman Pinscher	Short	no	no	GG	11	CC
Doberman Pinscher	Short	no	no	GG	11	CC
Doberman Pinscher	Short	no	no	GG	11	CC
Doberman Pinscher	Short	no	no	GG	11	CC
Doberman Pinscher	Short	no	no	GG	11	CC
Doberman Pinscher	Short	no	no	GG	11	
English Cocker Spaniel	Long	no	no	TT	11	CC
English Cocker Spaniel	Long	no	no	TT	11	CC
English Cocker Spaniel	Long	no	no	TT	11	CC
English Cocker Spaniel	Long	no	no	TT	11	
English Setter	Long	no	no	TT	11	CC

English Springer Spaniel	Long	no	no	TT	11	CC
English Springer Spaniel	Long	no	no	TT	11	CC
English Springer Spaniel	Long	no	no	TT	11	CC
English Springer Spaniel	Long	no	no	TT	11	CC
English Springer Spaniel	Long	no	no	TT	11	CC
English Springer Spaniel	Long	no	no	TT	11	
Entlebucher Mountain Dog	Short	no	no	GG	11	CC
Entlebucher Mountain Dog	Short	no	no	GG	11	CC
Entlebucher Mountain Dog	Short	no	no	GG	11	CC
Entlebucher Mountain Dog	Short	no	no	GG	11	CC
Entlebucher Mountain Dog	Short	no	no	GG	11	CC
Entlebucher Mountain Dog	Short	no	no	GT	11	CC
Flat-Coated Retriever	Long	no	no	TT	11	CC
Flat-coated Retriever	Long	no	no	TT	11	CC
Flat-Coated Retriever	Long	no	no	TT	11	CC
Flat-Coated Retriever	Long	no	no	TT	11	CC
Flat-Coated Retriever	Long	no	no	TT	11	CC
German Shepherd Dog	Medium	no	no	GG	11	CC
German Shepherd Dog	Medium	no	no	GT	11	CC
German Shepherd Dog	Medium	no	no	GT	11	CC
German Shepherd Dog	Medium	no	no	GT	11	CC
German Shepherd Dog	Medium	no	no		11	CC
German Shorthaired Pointer	Short	no	no	GG	11	CC
German Shorthaired Pointer	Short	no	no	GG	11	CC
German Shorthaired Pointer	Short	no	no	GG	11	CC
German Shorthaired Pointer	Short	no	no	GG	11	CC
German Shorthaired Pointer	Short	no	no	GG	11	CC
German Shorthaired Pointer	Short	no	no	GG	11	CC
German Shorthaired Pointer	Short	no	no		11	CC
German Wirehaired Pointer	Medium	yes	no	GG	12	CC
German Wirehaired Pointer	Medium	yes	no	GG	12	CC
German Wirehaired Pointer	Medium	yes	no	GG	22	CC
German Wirehaired Pointer	Medium	yes	no	GG	22	CC
German Wirehaired Pointer	Medium	yes	no	GG	22	
Giant Schnauzer	Medium	yes	no	GG	22	CC
Giant Schnauzer	Medium	yes	no	TT	22	CC
Giant Schnauzer	Medium	yes	no	TT	22	CC
Giant Schnauzer	Medium	yes	no	TT	22	CC
Giant Schnauzer	Medium	yes	no	TT	22	CC
Glen of Imaal Terrier	Medium	yes	no	GG	22	CC
Glen of Imaal Terrier	Medium	yes	no	GG	22	CC
Glen of Imaal Terrier	Medium	yes	no	GG	22	CC
Glen of Imaal Terrier	Medium	yes	no	GG	22	CC
Glen of Imaal Terrier	Medium	yes	no	GG	22	CC
Glen of Imaal Terrier	Medium	yes	no	GG	22	
Glen of Imaal Terrier	Medium	yes	no		22	CC
Golden Jackal	Short	no	no		11	CC
Golden Jackal	Short	no	no	GG	11	CC
Golden Jackal	Short	no	no	GG	11	CC
Golden Jackal	Short	no	no	GG	11	CC
Golden Jackal	Short	no	no	GG	11	CC
Golden Jackal	Short	no	no		11	CC
Golden Retriever	Long	no	no	TT	11	CC
Golden Retriever	Long	no	no	TT	11	CC
Golden Retriever	Long	no	no	TT	11	CC
Gordon Setter	Long	no	no	TT	11	CC
Gordon Setter	Long	no	no	TT	11	CC
Gordon Setter	Long	no	no	TT	11	CC
Gordon Setter	Long	no	no	TT	11	CC

Gray wolf	Short	no	no	GG	11	CC
Gray wolf	Short	no	no	GG	11	
Great Dane	Short	no	no	GG	11	CC
Great Dane	Short	no	no	GG	11	CC
Great Dane	Short	no	no	GG	11	CC
Great Dane	Short	no	no	GG	11	CC
Great Pyrenees	Long	no	no	TT	11	CC
Great Pyrenees	Long	no	no	TT	11	CC
Great Pyrenees	Long	no	no	TT	11	CC
Great Pyrenees	Long	no	no	TT	11	CC
Greater Swiss Mountain Dog	Short	no	no	GG	11	CC
Greater Swiss Mountain Dog	Short	no	no	GG	11	
Greyhound	Short	no	no	GG	11	CC
Greyhound	Short	no	no	GG	11	CC
Greyhound	Short	no	no	GG	11	CC
Greyhound	Short	no	no	GG	11	CC
Greyhound	Short	no	no	GG	11	CC
Havanese	Long	yes	no	TT	12	CC
Havanese	Long	yes	no	TT	22	CC
Havanese	Long	yes	no	TT	22	CC
Havanese	Long	yes	no	TT	22	CC
Havanese	Long	yes	no	TT	22	CC
Havanese	Long	yes	no	TT	22	CC
Havanese	Long	yes	no	TT	22	CC
Havanese	Long	yes	no	TT	22	CC
Havanese	Long	yes	no	TT	22	CT
Havanese	Long	yes	no	TT	22	CT
Havanese	Long	yes	no	TT	22	CT
Havanese	Long	yes	no	TT	22	
Irish Terrier	Short	yes	no	GG	22	CC
Irish Terrier	Short	yes	no	GG	22	CC
Irish Terrier	Short	yes	no	GG	22	CC
Irish Water Spaniel	Long	no	yes	TT	11	TT
Irish Water Spaniel	Long	no	yes	TT	11	TT
Irish Water Spaniel	Long	no	yes	TT	11	TT
Irish Water Spaniel	Long	no	yes	TT	11	TT
Irish Water Spaniel	Long	no	yes	TT	11	TT
Irish Water Spaniel	Long	no	yes	TT	11	TT
Irish Water Spaniel	Long	no	yes	TT	11	TT
Irish Water Spaniel	Long	no	yes	TT	11	TT
Irish Water Spaniel	Long	no	yes	TT	11	TT
Irish Water Spaniel	Long	no	yes	TT	11	TT
Irish Water Spaniel	Long	no	yes	TT	11	TT
Irish Water Spaniel	Long	no	yes	TT	11	TT
Irish Water Spaniel	Long	no	yes	TT	11	TT
Irish Water Spaniel	Long	no	yes	TT	11	TT
Irish Water Spaniel	Long	no	yes	TT	11	TT
Irish Water Spaniel	Long	no	yes	TT	11	TT
Irish Water Spaniel	Long	no	yes	TT	11	TT
Irish Water Spaniel	Long	no	yes	TT	11	TT
Irish Water Spaniel	Long	no	yes	TT	11	
Irish Wolfhound	Short	yes	no	GG	22	CC
Irish Wolfhound	Short	yes	no	GG	22	CC
Irish Wolfhound	Short	yes	no	GG	22	CC
Irish Wolfhound	Short	yes	no	GG	22	CC
Irish Wolfhound	Short	yes	no	GG	22	CC
Irish Wolfhound	Short	yes	no	GG	22	CC
Irish Wolfhound	Short	yes	no	GG	22	
Italian Greyhound	Short	no	no	GG	11	CC

Italian Greyhound	Short	no	no	GG	11	CC
Italian Greyhound	Short	no	no	GG	11	
Japanese Chin	Long	no	no		11	
Japanese Chin	Long	no	no	GG	11	CC
Japanese Chin	Long	no	no	TT	11	CC
Japanese Chin	Long	no	no	TT	11	CC
Japanese Chin	Long	no	no		11	CC
Kerry Blue Terrier*	Medium	yes	both	GT	22	TT
Kerry Blue Terrier	Medium	yes	both	TT	22	CC
Kuvasz*	Medium	no	both	GG		TT
Kuvasz	Medium	no	both	GT	11	CT
Kuvasz	Medium	no	both	GT	11	CT
Kuvasz	Medium	no	both	GT	11	TT
Kuvasz	Medium	no	both	GT	11	TT
Kuvasz	Medium	no	both	GT	11	TT
Kuvasz	Medium	no	both	TT	11	CT
Kuvasz	Medium	no	both	TT	11	CT
Kuvasz	Medium	no	both	TT	11	CT
Kuvasz	Medium	no	both	TT	11	CT
Kuvasz	Medium	no	both	TT	11	CT
Kuvasz	Medium	no	both	TT	11	TT
Kuvasz	Medium	no	both	TT	11	TT
Kuvasz	Medium	no	both	TT	11	TT
Kuvasz	Medium	no	both	TT	11	TT
Labrador Retriever	Short	no	no	GG	11	CC
Labrador Retriever	Short	no	no	GG	11	CC
Labrador Retriever	Short	no	no	GG	11	CC
Labrador Retriever	Short	no	no	GG	11	CC
Labrador Retriever	Short	no	no	GG	11	CC
Leonberger	Medium	no	no	TT	11	CC
Leonberger	Medium	no	no	TT	11	CT
Lhasa Apso	Long	yes	no	TT	22	CC
Lhasa Apso	Long	yes	no	TT	22	CC
Lhasa Apso	Long	yes	no	TT	22	CC
Maltese	Long	yes	no		22	CC
Maltese	Long	yes	no	TT	22	CC
Maltese	Long	yes	no	TT	22	CC
Maltese	Long	yes	no	TT	22	CT
Maltese	Long	yes	no	TT	22	
Mastiff	Short	no	no	GG	11	CC
Mastiff	Short	no	no	GG	11	CC
Mastiff	Short	no	no	GG	11	CC
Newfoundland	Long	no	no		11	CC
Newfoundland	Long	no	no	TT	11	CC
Newfoundland	Long	no	no	TT	11	CC
Newfoundland	Long	no	no	TT	11	CC
Newfoundland	Long	no	no	TT	11	CC
Newfoundland	Long	no	no	TT		CC
Norfolk Terrier	Short	yes	no	GG	22	CC
Norfolk Terrier	Short	yes	no	GG	22	CC
Norfolk Terrier	Short	yes	no	GG	22	CC
Norfolk Terrier	Short	yes	no	GG	22	CC
Norfolk Terrier	Short	yes	no	GG	22	CC
Norwich Terrier	Short	yes	no	GG	22	CC
Old English Sheepdog	Long	yes	no	TT	22	CC
Old English Sheepdog	Long	yes	no	TT	22	CC
Old English Sheepdog	Long	yes	no	TT	22	CC
Old English Sheepdog	Long	yes	no	TT	22	CC
Old English Sheepdog	Long	yes	no	TT	22	CC

Old English Sheepdog	Long	yes	no	TT	22	CC
Old English Sheepdog	Long	yes	no	TT	22	
Old English Sheepdog	Long	yes	no	TT	22	
Papillon	Long	no	no	TT	11	CC
Papillon	Long	no	no	TT	11	CC
Papillon	Long	no	no	TT	11	CC
Papillon	Long	no	no	TT	11	CC
Papillon	Long	no	no	TT	11	CC
Papillon	Long	no	no	TT	11	CC
Papillon	Long	no	no	TT	11	CC
Papillon	Long	no	no	TT	11	CC
Pekingese	Long	no	no	TT	11	CC
Pekingese	Long	no	no	TT	11	CC
Pekingese	Long	no	no	TT	11	CC
Pekingese	Long	no	no	TT	11	CC
Pembroke Welsh Corgi	Medium	no	no	GG	11	CC
Pembroke Welsh Corgi	Medium	no	no	GG	11	CC
Petit Basset Griffon Vendeen	Short	yes	no	GG	22	CC
Petit Basset Griffon Vendeen	Short	yes	no	GG	22	CC
Petit Basset Griffon Vendeen	Short	yes	no	GG	22	CC
Petit Basset Griffon Vendeen	Short	yes	no	GG	22	CC
Petit Basset Griffon Vendeen	Short	yes	no		22	CC
Pharaoh Hound	Short	no	no	GG	11	CT
Pharaoh Hound	Short	no	no	GG	11	
Pomeranian	Long	no	no		11	CC
Pomeranian	Long	no	no	TT	11	CC
Pomeranian	Long	no	no	TT	11	CC
Pomeranian	Long	no	no	TT	11	CC
Pomeranian	Long	no	no	TT	11	CC
Pomeranian	Long	no	no	TT	11	CC
Portuguese Water Dog*	Long	yes	both		22	CT
Portuguese Water Dog	Long	yes	both	TT	12	CC
Portuguese Water Dog	Long	yes	both	TT	12	CC
Portuguese Water Dog	Long	yes	both	TT	12	CC
Portuguese Water Dog	Long	yes	both	TT	12	CT
Portuguese Water Dog	Long	yes	both	TT	12	CT
Portuguese Water Dog	Long	yes	both	TT	12	CT
Portuguese Water Dog	Long	yes	both	TT	12	TT
Portuguese Water Dog	Long	yes	both	TT	12	TT
Portuguese Water Dog	Long	yes	both	TT	12	
Portuguese Water Dog	Long	yes	both	TT	12	
Portuguese Water Dog	Long	yes	both	TT	22	CC
Portuguese Water Dog	Long	yes	both	TT	22	CC
Portuguese Water Dog	Long	yes	both	TT	22	CC
Portuguese Water Dog	Long	yes	both	TT	22	CC
Portuguese Water Dog	Long	yes	both	TT	22	CC
Portuguese Water Dog	Long	yes	both	TT	22	CC
Portuguese Water Dog	Long	yes	both	TT	22	CC
Portuguese Water Dog	Long	yes	both	TT	22	CC
Portuguese Water Dog	Long	yes	both	TT	22	CC
Portuguese Water Dog	Long	yes	both	TT	22	CC
Portuguese Water Dog	Long	yes	both	TT	22	CT
Portuguese Water Dog	Long	yes	both	TT	22	CT
Portuguese Water Dog	Long	yes	both	TT	22	CT
Portuguese Water Dog	Long	yes	both	TT	22	CT
Portuguese Water Dog	Long	yes	both	TT	22	CT
Portuguese Water Dog	Long	yes	both	TT	22	CT
Portuguese Water Dog	Long	yes	both	TT	22	CT
Portuguese Water Dog	Long	yes	both	TT	22	CT

Portuguese Water Dog	Long	yes	both	TT	22	CT
Portuguese Water Dog	Long	yes	both	TT	22	CT
Portuguese Water Dog	Long	yes	both	TT	22	CT
Portuguese Water Dog	Long	yes	both	TT	22	CT
Portuguese Water Dog	Long	yes	both	TT	22	CT
Portuguese Water Dog	Long	yes	both	TT	22	TT
Portuguese Water Dog	Long	yes	both	TT	22	TT
Portuguese Water Dog	Long	yes	both	TT	22	TT
Portuguese Water Dog	Long	yes	both	TT	22	TT
Portuguese Water Dog	Long	yes	both	TT	22	TT
Portuguese Water Dog	Long	yes	both		22	CC
Portuguese Water Dog	Long	yes	both		22	CC
Portuguese Water Dog[T]	Long	no	both	TT	11	CT
Portuguese Water Dog[T]	Long	no	both		11	TT
Pug	Short	no	no	GG	11	CC
Pug	Short	no	no	GG	11	CC
Pug	Short	no	no	GG	11	CC
Pug	Short	no	no	GG	11	CC
Pug	Short	no	no	GG	11	CC
Pug	Short	no	no	GG	11	CC
Pug	Short	no	no	GG	11	CC
Pug	Short	no	no	GG	11	CC
Pug	Short	no	no	GG	11	CC
Pug	Short	no	no	GG	11	CC
Pug	Short	no	no	GG	11	CC
Pug	Short	no	no	GG	11	CC
Pug	Short	no	no	GG	11	CC
Rottweiler	Short	no	no	GG	11	CC
Rottweiler	Short	no	no	GG	11	CC
Rottweiler	Short	no	no	GG	11	CC
Rottweiler	Short	no	no	GG	11	CC
Rottweiler	Short	no	no	GG	11	CC
Rottweiler	Short	no	no	GG	11	CC
Rottweiler	Short	no	no	GG	11	
Rottweiler	Short	no	no	GT	11	CC
Saint Bernard*	Varies	no	no	GT	11	CC
Saint Bernard	Varies	no	no	GT	11	CC
Saint Bernard	Varies	no	no	GT	11	CC
Saint Bernard	Varies	no	no	GT	11	CC
Saint Bernard	Varies	no	no	TT	11	CC
Saint Bernard	Varies	no	no	TT	11	CC
Saluki*	Varies	no	no	GG	11	CC
Saluki	Varies	no	no	GT	11	CC
Saluki	Varies	no	no	TT	11	CC
Saluki	Varies	no	no	TT	11	CC
Saluki	Varies	no	no	TT	11	CC
Saluki	Varies	no	no	TT	11	CC
Saluki	Varies	no	no	TT	11	CC
Saluki	Varies	no	no	TT	11	
Samoyed	Long	no	no	GT	11	CC
Samoyed	Long	no	no	TT	11	CC
Samoyed	Long	no	no	TT	11	CC
Scottish Deerhound	Short	yes	no	GG	22	CC
Scottish Deerhound	Short	yes	no	GG	22	CC
Scottish Deerhound	Short	yes	no	GG	22	CC
Scottish Deerhound	Short	yes	no	GG	22	CC
Scottish Deerhound	Short	yes	no	GG	22	CC
Scottish Deerhound	Short	yes	no	GT	22	CC

Scottish Terrier	Medium	yes	no	GG	22	CC
Scottish Terrier	Medium	yes	no	GG	22	CC
Scottish Terrier	Medium	yes	no	GG	22	CC
Scottish Terrier	Medium	yes	no	GG	22	CC
Scottish Terrier	Medium	yes	no	GG	22	CC
Scottish Terrier	Medium	yes	no	GG	22	CC
Scottish Terrier	Medium	yes	no	GG	22	CC
Scottish Terrier	Medium	yes	no	GG	22	
Shih Tzu	Long	yes	no	TT	22	CC
Shih Tzu	Long	yes	no	TT	22	CC
Shih Tzu	Long	yes	no	TT	22	CC
Shih Tzu	Long	yes	no	TT	22	CC
Shih Tzu	Long	yes	no	TT	22	CC
Shih Tzu	Long	yes	no	TT	22	CC
Shih Tzu	Long	yes	no	TT	22	CC
Silky Terrier	Long	yes	no		22	CC
Silky Terrier	Long	yes	no	GG	22	CC
Silky Terrier	Long	yes	no	GG	22	CC
Silky Terrier	Long	yes	no	GG	22	CC
Silky Terrier	Long	yes	no	GG	22	CC
Silky Terrier	Long	yes	no	GG	22	CC
Silky Terrier	Long	yes	no	GG	22	CC
Silky Terrier	Long	yes	no	GT	22	CC
Skye Terrier	Long	yes	no	TT	22	CC
Skye Terrier	Long	yes	no		22	CC
Smooth Fox Terrier	Short	no	no		11	CC
Smooth Fox Terrier	Short	no	no	GG	11	CC
Smooth Fox Terrier	Short	no	no		11	
Soft Coated Wheaten Terrier*	Long	yes	both	TT	12	CC
Soft Coated Wheaten Terrier	Long	yes	both	TT	22	CC
Soft Coated Wheaten Terrier	Long	yes	both	TT	22	CC
Soft Coated Wheaten Terrier	Long	yes	both	TT	22	CC
Soft Coated Wheaten Terrier	Long	yes	both	TT	22	CT
Soft Coated Wheaten Terrier	Long	yes	both	TT	22	CT
Soft Coated Wheaten Terrier	Long	yes	both	TT	22	CT
Soft Coated Wheaten Terrier	Long	yes	both	TT	22	TT
Spinone Italiano	Medium	yes	no	GG	22	CC
Spinone Italiano	Medium	yes	no	GG	22	CC
Staffordshire Bull Terrier	Short	no	no	GG	11	CC
Staffordshire Bull Terrier	Short	no	no	GG	11	CC
Staffordshire Bull Terrier	Short	no	no	GG	11	CC
Staffordshire Bull Terrier	Short	no	no	GG	11	CC
Staffordshire Bull Terrier	Short	no	no	GG	11	CC
Staffordshire Bull Terrier	Short	no	no		11	CC
Standard Poodle	Long	yes	yes	TT	22	TT
Standard Poodle	Long	yes	yes	TT	22	TT
Standard Poodle	Long	yes	yes	TT	22	TT
Standard Poodle	Long	yes	yes	TT	22	TT
Standard Poodle	Long	yes	yes	TT	22	TT
Standard Poodle	Long	yes	yes	TT	22	TT
Standard Poodle	Long	yes	yes	TT	22	TT
Standard Poodle	Long	yes	yes	TT	22	TT
Standard Poodle	Long	yes	yes	TT	22	TT
Standard Poodle	Long	yes	yes	TT	22	TT
Standard Poodle	Long	yes	yes	TT	22	TT
Standard Poodle	Long	yes	yes	TT	22	TT
Standard Poodle	Long	yes	yes	TT	22	TT
Standard Poodle	Long	yes	yes	TT	22	TT

Standard Poodle	Long	yes	yes	TT	22	TT
Standard Poodle	Long	yes	yes	TT	22	TT
Standard Poodle	Long	yes	yes	TT	22	CC
Standard Schnauzer	Medium	yes	no		22	CC
Standard Schnauzer	Medium	yes	no	GG	22	CC
Standard Schnauzer	Medium	yes	no	GG	22	CC
Standard Schnauzer	Medium	yes	no	GG	22	CC
Standard Schnauzer	Medium	yes	no	GG	22	CC
Standard Schnauzer	Medium	yes	no	GG	22	CC
Standard Schnauzer	Medium	yes	no	GG	22	
Sussex Spaniel	Long	no	no	TT	11	CC
Sussex Spaniel	Long	no	no	TT	11	CC
Sussex Spaniel	Long	no	no	TT	11	CC
Sussex Spaniel	Long	no	no	TT	11	CC
Sussex Spaniel	Long	no	no	TT	11	CC
Sussex Spaniel	Long	no	no	TT	11	CC
Sussex Spaniel	Long	no	no	TT	11	CC
Sussex Spaniel	Long	no	no	TT	11	CC
Swedish Vallhund	Medium	no	no	GG	11	CC
Swedish Vallhund	Medium	no	no	GG	11	CC
Swedish Vallhund	Medium	no	no	GG	11	CC
Swedish Vallhund	Medium	no	no	GG	11	CC
Tibetan Mastiff	Medium	no	no	GG	11	CC
Toy Fox Terrier	Short	no	no	GG	11	CC
Toy Fox Terrier	Short	no	no	GG	11	CC
Toy Fox Terrier	Short	no	no	GG	11	CC
Toy Fox Terrier	Short	no	no	GG	11	
Welsh Terrier*	Medium	yes	both	GG	22	TT
Welsh Terrier	Medium	yes	both	GG	22	TT
West Highland White Terrier	Medium	yes	no	GG	22	CC
West Highland White Terrier	Medium	yes	no	GG	22	CC
West Highland White Terrier	Medium	yes	no	GG	22	CC
West Highland White Terrier	Medium	yes	no	GG	22	CC
West Highland White Terrier	Medium	yes	no	GG	22	CC
West Highland White Terrier	Medium	yes	no	GG	22	CC
West Highland White Terrier	Medium	yes	no	GG	22	CC
West Highland White Terrier	Medium	yes	no	GG	22	
West Highland White Terrier	Medium	yes	no	GG	22	
West Highland White Terrier	Medium	yes	no	GT	22	CC
West Highland White Terrier	Medium	yes	no	GT	22	CC
West Highland White Terrier	Medium	yes	no	GT	22	CC
West Highland White Terrier	Medium	yes	no	GT	22	CC
West Highland White Terrier	Medium	yes	no	GT	22	CC
West Highland White Terrier	Medium	yes	no	TT	22	CC
Whippet	Short	no	no	GG	11	CC
Whippet	Short	no	no	GG	11	CC
Whippet	Short	no	no	GG	11	CC
Wire Fox Terrier	Short	yes	both	GG	22	TT
Wire Fox Terrier	Short	yes	both	GG	22	
Wire Fox Terrier	Short	yes	both	GG	22	TT
Wirehaired Pointing Griffon	Short	yes	no		22	
wolf	Short	no	no	GG	11	CC
wolf	Short	no	no	GG	11	CC
wolf	Short	no	no	GG	11	
Yorkshire Terrier	Long	yes	no	GG	22	CC
Yorkshire Terrier	Long	yes	no	GG	22	CC
Yorkshire Terrier	Long	yes	no	GG	22	CC
Yorkshire Terrier	Long	yes	no	GG	22	CC
Yorkshire Terrier	Long	yes	no	GG	22	CC

Yorkshire Terrier	Long	yes	no	GT	22	CC
Yorkshire Terrier	Long	yes	no	GT	22	CC
Yorkshire Terrier	Long	yes	no	GT	22	CC
Yorkshire Terrier	Long	yes	no	GT	22	CC
Yorkshire Terrier	Long	yes	no	GT	22	CC
Yorkshire Terrier	Long	yes	no	TT	22	CC
Yorkshire Terrier	Long	yes	no		22	CC

Samples:

Long	Furnishings	Curly
long	Furnishings	curly
292	298	36

Short	No Furnishings	Non curly
204	406	538

Not fixed for long	Not fixed for curly
27	87

Medium
148

Total Samples	*Total Samples*	*Total Samples*
671	*704*	*661*

a) Hair length is fixed in some breeds (long, medium, short) but others have varieties with different lengths indicated by "varies".
b) Allele T is associated with the long hair phenotype and is recessive.
associated with furnishings and
d) Allele T is associated with the curly hair phenotype and is dominant.
e) Dachshund with the rare "softwire" phenotype: long hair with furnishings.
f) Portuguese Water Dog with improper coat: does not have furnishings.
*) Breeds where at least one of the phenotypes is not fixed. If the phenotype of the individual is known then it is given otherwise it is listed as "varies" (for length) or "both" for furnishings or curl.
- Individual noted in red color indicates dog for which the genotypes do not explain the observed phenotype.

Table S2. List of 80 breeds that make up the CanMap dataset including 903 samples for whole genome association analysis using the multi-breed approach. For each phenotype, the data set was divided into cases and controls based on standard breed description.

Breed	Breed ID	Samples	Length	Furnishings	Curl
Afghan Hound	AFGH	1	long	no	no
Afghan Hound	AFGH	2	long	no	no
Afghan Hound	AFGH	3	long	no	no
Afghan Hound	AFGH	4	long	no	no
Afghan Hound	AFGH	5	long	no	no
Afghan Hound	AFGH	6	long	no	no
Afghan Hound	AFGH	7	long	no	no
Afghan Hound	AFGH	8	long	no	no
Afghan Hound	AFGH	9	long	no	no
Afghan Hound	AFGH	10	long	no	no
Afghan Hound	AFGH	11	long	no	no
Afghan Hound	AFGH	12	long	no	no
Akita	AKIT	13	short	no	n.d.
Akita	AKIT	14	short	no	n.d.
Akita	AKIT	15	short	no	n.d.
Akita	AKIT	16	short	no	n.d.
Akita	AKIT	17	short	no	n.d.
Akita	AKIT	18	short	no	n.d.
Akita	AKIT	19	short	no	n.d.
Akita	AKIT	20	short	no	n.d.
Akita	AKIT	21	short	no	n.d.
Akita	AKIT	22	short	no	n.d.
Akita	AKIT	23	short	no	n.d.
Akita	AKIT	24	short	no	n.d.
Alaskan Malamute	AMAL	25	n.d.	no	no
Alaskan Malamute	AMAL	26	n.d.	no	no
Alaskan Malamute	AMAL	27	n.d.	no	no
Alaskan Malamute	AMAL	28	n.d.	no	no
Alaskan Malamute	AMAL	29	n.d.	no	no
Alaskan Malamute	AMAL	30	n.d.	no	no
Alaskan Malamute	AMAL	31	n.d.	no	no
Alaskan Malamute	AMAL	32	n.d.	no	no
Alaskan Malamute	AMAL	33	n.d.	no	no
Alaskan Malamute	AMAL	34	n.d.	no	no
Alaskan Malamute	AMAL	35	n.d.	no	no
Alaskan Malamute	AMAL	36	n.d.	no	no
American Cocker Spaniel	ACKR	37	long	no	no
American Cocker Spaniel	ACKR	38	long	no	no
American Cocker Spaniel	ACKR	39	long	no	no
American Cocker Spaniel	ACKR	40	long	no	no
American Cocker Spaniel	ACKR	41	long	no	no
American Cocker Spaniel	ACKR	42	long	no	no
American Cocker Spaniel	ACKR	43	long	no	no
American Cocker Spaniel	ACKR	44	long	no	no
American Cocker Spaniel	ACKR	45	long	no	no
American Cocker Spaniel	ACKR	46	long	no	no
American Cocker Spaniel	ACKR	47	long	no	no

American Cocker Spaniel	ACKR	48	long	no	no
American Eskimo Dog	AESK	49	long	no	no
American Eskimo Dog	AESK	50	long	no	no
American Eskimo Dog	AESK	51	long	no	no
American Eskimo Dog	AESK	52	long	no	no
American Eskimo Dog	AESK	53	long	no	no
American Eskimo Dog	AESK	54	long	no	no
American Eskimo Dog	AESK	55	long	no	no
Australian Shepherd	AUSS	56	long	no	no
Australian Shepherd	AUSS	57	long	no	no
Australian Shepherd	AUSS	58	long	no	no
Australian Shepherd	AUSS	59	long	no	no
Australian Shepherd	AUSS	60	long	no	no
Australian Shepherd	AUSS	61	long	no	no
Australian Shepherd	AUSS	62	long	no	no
Australian Shepherd	AUSS	63	long	no	no
Australian Shepherd	AUSS	64	long	no	no
Australian Shepherd	AUSS	65	long	no	no
Australian Shepherd	AUSS	66	long	no	no
Australian Shepherd	AUSS	67	long	no	no
Australian Terrier	AUST	68	n.d.	yes	no
Australian Terrier	AUST	69	n.d.	yes	no
Australian Terrier	AUST	70	n.d.	yes	no
Australian Terrier	AUST	71	n.d.	yes	no
Australian Terrier	AUST	72	n.d.	yes	no
Australian Terrier	AUST	73	n.d.	yes	no
Australian Terrier	AUST	74	n.d.	yes	no
Australian Terrier	AUST	75	n.d.	yes	no
Australian Terrier	AUST	76	n.d.	yes	no
Australian Terrier	AUST	77	n.d.	yes	no
Australian Terrier	AUST	78	n.d.	yes	no
Australian Terrier	AUST	79	n.d.	yes	no
Basenji	BSJI	80	short	no	n.d.
Basenji	BSJI	81	short	no	n.d.
Basenji	BSJI	82	short	no	n.d.
Basenji	BSJI	83	short	no	n.d.
Basenji	BSJI	84	short	no	n.d.
Basenji	BSJI	85	short	no	n.d.
Basenji	BSJI	86	short	no	n.d.
Basenji	BSJI	87	short	no	n.d.
Basenji	BSJI	88	short	no	n.d.
Basenji	BSJI	89	short	no	n.d.
Basenji	BSJI	90	short	no	n.d.
Basenji	BSJI	91	short	no	n.d.
Basset Hound	BASS	92	short	no	n.d.
Basset Hound	BASS	93	short	no	n.d.
Basset Hound	BASS	94	short	no	n.d.
Basset Hound	BASS	95	short	no	n.d.
Basset Hound	BASS	96	short	no	n.d.
Basset Hound	BASS	97	short	no	n.d.
Basset Hound	BASS	98	short	no	n.d.
Basset Hound	BASS	99	short	no	n.d.
Basset Hound	BASS	100	short	no	n.d.
Basset Hound	BASS	101	short	no	n.d.
Basset Hound	BASS	102	short	no	n.d.

Basset Hound	BASS	103	short	no	n.d.
Beagle	BEAG	104	short	no	n.d.
Beagle	BEAG	105	short	no	n.d.
Beagle	BEAG	106	short	no	n.d.
Beagle	BEAG	107	short	no	n.d.
Beagle	BEAG	108	short	no	n.d.
Beagle	BEAG	109	short	no	n.d.
Beagle	BEAG	110	short	no	n.d.
Beagle	BEAG	111	short	no	n.d.
Beagle	BEAG	112	short	no	n.d.
Beagle	BEAG	113	short	no	n.d.
Beagle	BEAG	114	short	no	n.d.
Beagle	BEAG	115	short	no	n.d.
Bernese Mountain Dog	BMD-	116	long	no	no
Bernese Mountain Dog	BMD-	117	long	no	no
Bernese Mountain Dog	BMD-	118	long	no	no
Bernese Mountain Dog	BMD-	119	long	no	no
Bernese Mountain Dog	BMD-	120	long	no	no
Bernese Mountain Dog	BMD-	121	long	no	no
Bernese Mountain Dog	BMD-	122	long	no	no
Bernese Mountain Dog	BMD-	123	long	no	no
Bernese Mountain Dog	BMD-	124	long	no	no
Bernese Mountain Dog	BMD-	125	long	no	no
Bernese Mountain Dog	BMD-	126	long	no	no
Bernese Mountain Dog	BMD-	127	long	no	no
Bloodhound	BLDH	128	short	no	n.d.
Bloodhound	BLDH	129	short	no	n.d.
Bloodhound	BLDH	130	short	no	n.d.
Bloodhound	BLDH	131	short	no	n.d.
Bloodhound	BLDH	132	short	no	n.d.
Bloodhound	BLDH	133	short	no	n.d.
Bloodhound	BLDH	134	short	no	n.d.
Bloodhound	BLDH	135	short	no	n.d.
Bloodhound	BLDH	136	short	no	n.d.
Border Collie	BORD	137	n.d.	no	n.d.
Border Collie	BORD	138	n.d.	no	n.d.
Border Collie	BORD	139	n.d.	no	n.d.
Border Collie	BORD	140	n.d.	no	n.d.
Border Collie	BORD	141	n.d.	no	n.d.
Border Collie	BORD	142	n.d.	no	n.d.
Border Collie	BORD	143	n.d.	no	n.d.
Border Collie	BORD	144	n.d.	no	n.d.
Border Collie	BORD	145	n.d.	no	n.d.
Border Collie	BORD	146	n.d.	no	n.d.
Border Collie	BORD	147	n.d.	no	n.d.
Border Collie	BORD	148	n.d.	no	n.d.
Borzoi	BORZ	149	long	no	no
Borzoi	BORZ	150	long	no	no
Borzoi	BORZ	151	long	no	no
Borzoi	BORZ	152	long	no	no
Borzoi	BORZ	153	long	no	no
Borzoi	BORZ	154	long	no	no
Borzoi	BORZ	155	long	no	no
Borzoi	BORZ	156	long	no	no
Borzoi	BORZ	157	long	no	no

Borzoi	BORZ	158	long	no	no
Borzoi	BORZ	159	long	no	no
Borzoi	BORZ	160	long	no	no
Boston Terrier	BOST	161	short	no	n.d.
Boston Terrier	BOST	162	short	no	n.d.
Boston Terrier	BOST	163	short	no	n.d.
Boston Terrier	BOST	164	short	no	n.d.
Boston Terrier	BOST	165	short	no	n.d.
Boston Terrier	BOST	166	short	no	n.d.
Boxer	BOX-	167	short	no	n.d.
Boxer	BOX-	168	short	no	n.d.
Boxer	BOX-	169	short	no	n.d.
Boxer	BOX-	170	short	no	n.d.
Boxer	BOX-	171	short	no	n.d.
Boxer	BOX-	172	short	no	n.d.
Boxer	BOX-	173	short	no	n.d.
Boxer	BOX-	174	short	no	n.d.
Boxer	BOX-	175	short	no	n.d.
Boxer	BOX-	176	short	no	n.d.
Boxer	BOX-	177	short	no	n.d.
Boxer	BOX-	178	short	no	n.d.
Briard	BRIA	179	long	yes	no
Briard	BRIA	180	long	yes	no
Briard	BRIA	181	long	yes	no
Briard	BRIA	182	long	yes	no
Briard	BRIA	183	long	yes	no
Briard	BRIA	184	long	yes	no
Briard	BRIA	185	long	yes	no
Briard	BRIA	186	long	yes	no
Briard	BRIA	187	long	yes	no
Briard	BRIA	188	long	yes	no
Briard	BRIA	189	long	yes	no
Briard	BRIA	190	long	yes	no
Brittany	BRIT	191	long	no	no
Brittany	BRIT	192	long	no	no
Brittany	BRIT	193	long	no	no
Brittany	BRIT	194	long	no	no
Brittany	BRIT	195	long	no	no
Brittany	BRIT	196	long	no	no
Brittany	BRIT	197	long	no	no
Brittany	BRIT	198	long	no	no
Brittany	BRIT	199	long	no	no
Brittany	BRIT	200	long	no	no
Brittany	BRIT	201	long	no	no
Brittany	BRIT	202	long	no	no
Brussels Griffon	BRUS	203	short	yes	n.d.
Brussels Griffon	BRUS	204	short	n.d.	n.d.
Brussels Griffon	BRUS	205	short	no	n.d.
Brussels Griffon	BRUS	206	short	yes	n.d.
Brussels Griffon	BRUS	207	short	n.d.	n.d.
Brussels Griffon	BRUS	208	short	n.d.	n.d.
Brussels Griffon	BRUS	209	short	n.d.	n.d.
Bull Terrier	BULT	210	short	no	n.d.
Bull Terrier	BULT	211	short	no	n.d.
Bull Terrier	BULT	212	short	no	n.d.

Bulldog	BULD	213	short	no	n.d.
Bulldog	BULD	214	short	no	n.d.
Bulldog	BULD	215	short	no	n.d.
Bulldog	BULD	216	short	no	n.d.
Bulldog	BULD	217	short	no	n.d.
Bulldog	BULD	218	short	no	n.d.
Bulldog	BULD	219	short	no	n.d.
Bulldog	BULD	220	short	no	n.d.
Bulldog	BULD	221	short	no	n.d.
Bulldog	BULD	222	short	no	n.d.
Bulldog	BULD	223	short	no	n.d.
Bullmastiff	BULM	224	short	no	n.d.
Bullmastiff	BULM	225	short	no	n.d.
Bullmastiff	BULM	226	short	no	n.d.
Bullmastiff	BULM	227	short	no	n.d.
Bullmastiff	BULM	228	short	no	n.d.
Bullmastiff	BULM	229	short	no	n.d.
Bullmastiff	BULM	230	short	no	n.d.
Bullmastiff	BULM	231	short	no	n.d.
Bullmastiff	BULM	232	short	no	n.d.
Bullmastiff	BULM	233	short	no	n.d.
Bullmastiff	BULM	234	short	no	n.d.
Bullmastiff	BULM	235	short	no	n.d.
Cairn Terrier	CAIR	236	n.d.	yes	no
Cairn Terrier	CAIR	237	n.d.	yes	no
Cairn Terrier	CAIR	238	n.d.	yes	no
Cairn Terrier	CAIR	239	n.d.	yes	no
Cairn Terrier	CAIR	240	n.d.	yes	no
Cairn Terrier	CAIR	241	n.d.	yes	no
Cairn Terrier	CAIR	242	n.d.	yes	no
Cairn Terrier	CAIR	243	n.d.	yes	no
Cairn Terrier	CAIR	244	n.d.	yes	no
Cairn Terrier	CAIR	245	n.d.	yes	no
Cairn Terrier	CAIR	246	n.d.	yes	no
Cairn Terrier	CAIR	247	n.d.	yes	no
Cardigan Welsh Corgi	CARD	248	n.d.	no	no
Cardigan Welsh Corgi	CARD	249	n.d.	no	no
Cardigan Welsh Corgi	CARD	250	n.d.	no	no
Cardigan Welsh Corgi	CARD	251	n.d.	no	no
Cardigan Welsh Corgi	CARD	252	n.d.	no	no
Cardigan Welsh Corgi	CARD	253	n.d.	no	no
Cardigan Welsh Corgi	CARD	254	n.d.	no	no
Cardigan Welsh Corgi	CARD	255	n.d.	no	no
Cardigan Welsh Corgi	CARD	256	n.d.	no	no
Cardigan Welsh Corgi	CARD	257	n.d.	no	no
Cardigan Welsh Corgi	CARD	258	n.d.	no	no
Cardigan Welsh Corgi	CARD	259	n.d.	no	no
Cavalier King Charles Spanie	CKCS	260	long	no	no
Cavalier King Charles Spanie	CKCS	261	long	no	no
Cavalier King Charles Spanie	CKCS	262	long	no	no
Cavalier King Charles Spanie	CKCS	263	long	no	no
Cavalier King Charles Spanie	CKCS	264	long	no	no
Cavalier King Charles Spanie	CKCS	265	long	no	no
Cavalier King Charles Spanie	CKCS	266	long	no	no
Cavalier King Charles Spanie	CKCS	267	long	no	no

Cavalier King Charles Spanie	CKCS	268	long	no	no
Cavalier King Charles Spanie	CKCS	269	long	no	no
Cavalier King Charles Spanie	CKCS	270	long	no	no
Cavalier King Charles Spanie	CKCS	271	long	no	no
Chihuahua	CHIH	272	n.d.	no	n.d.
Chihuahua	CHIH	273	long	no	n.d.
Chihuahua	CHIH	274	long	no	n.d.
Chihuahua	CHIH	275	n.d.	no	n.d.
Chihuahua	CHIH	276	long	no	n.d.
Chihuahua	CHIH	277	short	no	n.d.
Chihuahua	CHIH	278	short	no	n.d.
Chihuahua	CHIH	279	n.d.	no	n.d.
Chihuahua	CHIH	280	n.d.	no	n.d.
Chinese Shar-Pei	SHAR	281	short	no	n.d.
Chinese Shar-Pei	SHAR	282	short	no	n.d.
Chinese Shar-Pei	SHAR	283	short	no	n.d.
Chinese Shar-Pei	SHAR	284	short	no	n.d.
Chinese Shar-Pei	SHAR	285	short	no	n.d.
Chinese Shar-Pei	SHAR	286	short	no	n.d.
Chinese Shar-Pei	SHAR	287	short	no	n.d.
Chinese Shar-Pei	SHAR	288	short	no	n.d.
Chinese Shar-Pei	SHAR	289	short	no	n.d.
Chinese Shar-Pei	SHAR	290	short	no	n.d.
Chinese Shar-Pei	SHAR	291	short	no	n.d.
Chinese Shar-Pei	SHAR	292	short	no	n.d.
Chow Chow	CHOW	293	n.d.	no	no
Chow Chow	CHOW	294	n.d.	no	no
Chow Chow	CHOW	295	n.d.	no	no
Chow Chow	CHOW	296	n.d.	no	no
Chow Chow	CHOW	297	n.d.	no	no
Chow Chow	CHOW	298	n.d.	no	no
Chow Chow	CHOW	299	n.d.	no	no
Chow Chow	CHOW	300	n.d.	no	no
Chow Chow	CHOW	301	n.d.	no	no
Chow Chow	CHOW	302	n.d.	no	no
Chow Chow	CHOW	303	n.d.	no	no
Chow Chow	CHOW	304	n.d.	no	no
Collie	COLL	305	long	no	n.d.
Collie	COLL	306	long	no	n.d.
Collie	COLL	307	long	no	n.d.
Collie	COLL	308	n.d.	no	n.d.
Collie	COLL	309	long	no	n.d.
Collie	COLL	310	n.d.	no	n.d.
Collie	COLL	311	n.d.	no	n.d.
Collie	COLL	312	n.d.	no	n.d.
Collie	COLL	313	n.d.	no	n.d.
Collie	COLL	314	n.d.	no	n.d.
Collie	COLL	315	n.d.	no	n.d.
Collie	COLL	316	n.d.	no	n.d.
Dachshund	DACH	317	n.d.	n.d.	n.d.
Dachshund	DACH	318	short	n.d.	n.d.
Dachshund	DACH	319	short	n.d.	n.d.
Dachshund	DACH	320	short	n.d.	n.d.
Dachshund	DACH	321	n.d.	n.d.	n.d.
Dachshund	DACH	322	n.d.	n.d.	n.d.

Dachshund	DACH	323	long	n.d.	n.d.
Dachshund	DACH	324	long	n.d.	n.d.
Dachshund	DACH	325	n.d.	n.d.	n.d.
Dachshund	DACH	326	short	n.d.	n.d.
Dachshund	DACH	327	long	n.d.	n.d.
Dachshund	DACH	328	long	n.d.	n.d.
Doberman Pinscher	DOBP	329	short	no	n.d.
Doberman Pinscher	DOBP	330	short	no	n.d.
Doberman Pinscher	DOBP	331	short	no	n.d.
Doberman Pinscher	DOBP	332	short	no	n.d.
Doberman Pinscher	DOBP	333	short	no	n.d.
Doberman Pinscher	DOBP	334	short	no	n.d.
Doberman Pinscher	DOBP	335	short	no	n.d.
Doberman Pinscher	DOBP	336	short	no	n.d.
Doberman Pinscher	DOBP	337	short	no	n.d.
Doberman Pinscher	DOBP	338	short	no	n.d.
Doberman Pinscher	DOBP	339	short	no	n.d.
Doberman Pinscher	DOBP	340	short	no	n.d.
English Cocker Spaniel	ECKR	341	long	no	no
English Cocker Spaniel	ECKR	342	long	no	no
English Cocker Spaniel	ECKR	343	long	no	no
English Cocker Spaniel	ECKR	344	long	no	no
English Cocker Spaniel	ECKR	345	long	no	no
English Cocker Spaniel	ECKR	346	long	no	no
English Springer Spaniel	ESSP	347	long	no	no
English Springer Spaniel	ESSP	348	long	no	no
English Springer Spaniel	ESSP	349	long	no	no
English Springer Spaniel	ESSP	350	long	no	no
English Springer Spaniel	ESSP	351	long	no	no
English Springer Spaniel	ESSP	352	long	no	no
English Springer Spaniel	ESSP	353	long	no	no
English Springer Spaniel	ESSP	354	long	no	no
English Springer Spaniel	ESSP	355	long	no	no
English Springer Spaniel	ESSP	356	long	no	no
English Springer Spaniel	ESSP	357	long	no	no
English Springer Spaniel	ESSP	358	long	no	no
Flat-coated Retriever	FCR-	359	long	no	no
Flat-coated Retriever	FCR-	360	long	no	no
Flat-coated Retriever	FCR-	361	long	no	no
Flat-coated Retriever	FCR-	362	long	no	no
Flat-coated Retriever	FCR-	363	long	no	no
Flat-coated Retriever	FCR-	364	long	no	no
Flat-coated Retriever	FCR-	365	long	no	no
Flat-coated Retriever	FCR-	366	long	no	no
Flat-coated Retriever	FCR-	367	long	no	no
Flat-coated Retriever	FCR-	368	long	no	no
Flat-coated Retriever	FCR-	369	long	no	no
Flat-coated Retriever	FCR-	370	long	no	no
French Bulldog	FBUL	371	short	no	n.d.
French Bulldog	FBUL	372	short	no	n.d.
French Bulldog	FBUL	373	short	no	n.d.
French Bulldog	FBUL	374	short	no	n.d.
French Bulldog	FBUL	375	short	no	n.d.
French Bulldog	FBUL	376	short	no	n.d.
French Bulldog	FBUL	377	short	no	n.d.

French Bulldog	FBUL	378	short	no	n.d.
French Bulldog	FBUL	379	short	no	n.d.
French Bulldog	FBUL	380	short	no	n.d.
French Bulldog	FBUL	381	short	no	n.d.
French Bulldog	FBUL	382	short	no	n.d.
German Shepherd Dog	GSD-	383	n.d.	no	no
German Shepherd Dog	GSD-	384	n.d.	no	no
German Shepherd Dog	GSD-	385	n.d.	no	no
German Shepherd Dog	GSD-	386	n.d.	no	no
German Shepherd Dog	GSD-	387	n.d.	no	no
German Shepherd Dog	GSD-	388	n.d.	no	no
German Shepherd Dog	GSD-	389	n.d.	no	no
German Shepherd Dog	GSD-	390	n.d.	no	no
German Shepherd Dog	GSD-	391	n.d.	no	no
German Shepherd Dog	GSD-	392	n.d.	no	no
German Shepherd Dog	GSD-	393	n.d.	no	no
German Shepherd Dog	GSD-	394	n.d.	no	no
German Short-haired Pointer	GSHP	395	short	no	n.d.
German Short-haired Pointer	GSHP	396	short	no	n.d.
German Short-haired Pointer	GSHP	397	short	no	n.d.
German Short-haired Pointer	GSHP	398	short	no	n.d.
German Short-haired Pointer	GSHP	399	short	no	n.d.
German Short-haired Pointer	GSHP	400	short	no	n.d.
German Short-haired Pointer	GSHP	401	short	no	n.d.
German Short-haired Pointer	GSHP	402	short	no	n.d.
German Short-haired Pointer	GSHP	403	short	no	n.d.
German Short-haired Pointer	GSHP	404	short	no	n.d.
German Short-haired Pointer	GSHP	405	short	no	n.d.
Giant Schnauzer	GSNZ	406	n.d.	yes	no
Giant Schnauzer	GSNZ	407	n.d.	yes	no
Giant Schnauzer	GSNZ	408	n.d.	yes	no
Giant Schnauzer	GSNZ	409	n.d.	yes	no
Giant Schnauzer	GSNZ	410	n.d.	yes	no
Giant Schnauzer	GSNZ	411	n.d.	yes	no
Giant Schnauzer	GSNZ	412	n.d.	yes	no
Giant Schnauzer	GSNZ	413	n.d.	yes	no
Giant Schnauzer	GSNZ	414	n.d.	yes	no
Giant Schnauzer	GSNZ	415	n.d.	yes	no
Giant Schnauzer	GSNZ	416	n.d.	yes	no
Giant Schnauzer	GSNZ	417	n.d.	yes	no
Glen of Imaal Terrier	GLEN	418	n.d.	yes	no
Glen of Imaal Terrier	GLEN	419	n.d.	yes	no
Glen of Imaal Terrier	GLEN	420	n.d.	yes	no
Glen of Imaal Terrier	GLEN	421	n.d.	yes	no
Glen of Imaal Terrier	GLEN	422	n.d.	yes	no
Glen of Imaal Terrier	GLEN	423	n.d.	yes	no
Glen of Imaal Terrier	GLEN	424	n.d.	yes	no
Glen of Imaal Terrier	GLEN	425	n.d.	yes	no
Glen of Imaal Terrier	GLEN	426	n.d.	yes	no
Glen of Imaal Terrier	GLEN	427	n.d.	yes	no
Glen of Imaal Terrier	GLEN	428	n.d.	yes	no
Glen of Imaal Terrier	GLEN	429	n.d.	yes	no
Golden Retriever	GOLD	430	long	no	no
Golden Retriever	GOLD	431	long	no	no
Golden Retriever	GOLD	432	long	no	no

Golden Retriever	GOLD	433	long	no	no
Golden Retriever	GOLD	434	long	no	no
Golden Retriever	GOLD	435	long	no	no
Golden Retriever	GOLD	436	long	no	no
Golden Retriever	GOLD	437	long	no	no
Golden Retriever	GOLD	438	long	no	no
Golden Retriever	GOLD	439	long	no	no
Golden Retriever	GOLD	440	long	no	no
Golden Retriever	GOLD	441	long	no	no
Great Dane	DANE	442	short	no	n.d.
Great Dane	DANE	443	short	no	n.d.
Great Dane	DANE	444	short	no	n.d.
Great Dane	DANE	445	short	no	n.d.
Great Dane	DANE	446	short	no	n.d.
Great Dane	DANE	447	short	no	n.d.
Great Dane	DANE	448	short	no	n.d.
Great Dane	DANE	449	short	no	n.d.
Great Dane	DANE	450	short	no	n.d.
Great Dane	DANE	451	short	no	n.d.
Great Dane	DANE	452	short	no	n.d.
Great Dane	DANE	453	short	no	n.d.
Greyhound	GREY	454	short	no	n.d.
Greyhound	GREY	455	short	no	n.d.
Greyhound	GREY	456	short	no	n.d.
Greyhound	GREY	457	short	no	n.d.
Greyhound	GREY	458	short	no	n.d.
Greyhound	GREY	459	short	no	n.d.
Greyhound	GREY	460	short	no	n.d.
Greyhound	GREY	461	short	no	n.d.
Greyhound	GREY	462	short	no	n.d.
Greyhound	GREY	463	short	no	n.d.
Greyhound	GREY	464	short	no	n.d.
Greyhound	GREY	465	short	no	n.d.
Havanese	HAVA	466	long	yes	n.d.
Havanese	HAVA	467	long	yes	n.d.
Havanese	HAVA	468	long	yes	n.d.
Havanese	HAVA	469	long	yes	n.d.
Havanese	HAVA	470	long	yes	n.d.
Havanese	HAVA	471	long	yes	n.d.
Havanese	HAVA	472	long	yes	n.d.
Havanese	HAVA	473	long	yes	n.d.
Havanese	HAVA	474	long	yes	n.d.
Havanese	HAVA	475	long	yes	n.d.
Havanese	HAVA	476	long	yes	n.d.
Ibizan Hound	IBIZ	477	short	no	n.d.
Ibizan Hound	IBIZ	478	short	no	n.d.
Ibizan Hound	IBIZ	479	short	no	n.d.
Ibizan Hound	IBIZ	480	short	no	n.d.
Ibizan Hound	IBIZ	481	short	no	n.d.
Ibizan Hound	IBIZ	482	short	no	n.d.
Ibizan Hound	IBIZ	483	short	no	n.d.
Ibizan Hound	IBIZ	484	short	no	n.d.
Ibizan Hound	IBIZ	485	short	no	n.d.
Ibizan Hound	IBIZ	486	short	no	n.d.
Ibizan Hound	IBIZ	487	short	no	n.d.

Ibizan Hound	IBIZ	488	short	no	n.d.
Irish Water Spaniel	IWSP	489	long	no	yes
Irish Water Spaniel	IWSP	490	long	no	yes
Irish Water Spaniel	IWSP	491	long	no	yes
Irish Water Spaniel	IWSP	492	long	no	yes
Irish Water Spaniel	IWSP	493	long	no	yes
Irish Water Spaniel	IWSP	494	long	no	yes
Irish Water Spaniel	IWSP	495	long	no	yes
Irish Water Spaniel	IWSP	496	long	no	yes
Irish Water Spaniel	IWSP	497	long	no	yes
Irish Water Spaniel	IWSP	498	long	no	yes
Irish Water Spaniel	IWSP	499	long	no	yes
Irish Water Spaniel	IWSP	500	long	no	yes
Irish Wolfhound	IWOF	501	short	yes	no
Irish Wolfhound	IWOF	502	short	yes	no
Irish Wolfhound	IWOF	503	short	yes	no
Irish Wolfhound	IWOF	504	short	yes	no
Irish Wolfhound	IWOF	505	short	yes	no
Irish Wolfhound	IWOF	506	short	yes	no
Irish Wolfhound	IWOF	507	short	yes	no
Irish Wolfhound	IWOF	508	short	yes	no
Irish Wolfhound	IWOF	509	short	yes	no
Irish Wolfhound	IWOF	510	short	yes	no
Irish Wolfhound	IWOF	511	short	yes	no
Irish Wolfhound	IWOF	512	short	yes	no
Irish Wolfhound	IWOF	513	short	yes	no
Italian Greyhound	ITGY	514	short	no	n.d.
Italian Greyhound	ITGY	515	short	no	n.d.
Italian Greyhound	ITGY	516	short	no	n.d.
Italian Greyhound	ITGY	517	short	no	n.d.
Italian Greyhound	ITGY	518	short	no	n.d.
Italian Greyhound	ITGY	519	short	no	n.d.
Italian Greyhound	ITGY	520	short	no	n.d.
Italian Greyhound	ITGY	521	short	no	n.d.
Italian Greyhound	ITGY	522	short	no	n.d.
Italian Greyhound	ITGY	523	short	no	n.d.
Italian Greyhound	ITGY	524	short	no	n.d.
Italian Greyhound	ITGY	525	short	no	n.d.
Jack Russell Terrier	JACK	526	short	n.d.	n.d.
Jack Russell Terrier	JACK	527	short	n.d.	n.d.
Jack Russell Terrier	JACK	528	short	n.d.	n.d.
Jack Russell Terrier	JACK	529	short	n.d.	n.d.
Jack Russell Terrier	JACK	530	short	n.d.	n.d.
Jack Russell Terrier	JACK	531	short	n.d.	n.d.
Jack Russell Terrier	JACK	532	short	n.d.	n.d.
Jack Russell Terrier	JACK	533	short	n.d.	n.d.
Jack Russell Terrier	JACK	534	short	n.d.	n.d.
Jack Russell Terrier	JACK	535	short	n.d.	n.d.
Jack Russell Terrier	JACK	536	short	n.d.	n.d.
Jack Russell Terrier	JACK	537	short	n.d.	n.d.
Kuvasz	KUVZ	538	n.d.	no	yes
Kuvasz	KUVZ	539	n.d.	no	yes
Kuvasz	KUVZ	540	n.d.	no	yes
Kuvasz	KUVZ	541	n.d.	no	yes
Kuvasz	KUVZ	542	n.d.	no	yes

Kuvasz	KUVZ	543	n.d.	no	yes
Kuvasz	KUVZ	544	n.d.	no	yes
Kuvasz	KUVZ	545	n.d.	no	yes
Kuvasz	KUVZ	546	n.d.	no	yes
Kuvasz	KUVZ	547	n.d.	no	yes
Kuvasz	KUVZ	548	n.d.	no	yes
Kuvasz	KUVZ	549	n.d.	no	yes
Labrador Retriever	LAB-	550	short	no	n.d.
Labrador Retriever	LAB-	551	short	no	n.d.
Labrador Retriever	LAB-	552	short	no	n.d.
Labrador Retriever	LAB-	553	short	no	n.d.
Labrador Retriever	LAB-	554	short	no	n.d.
Labrador Retriever	LAB-	555	short	no	n.d.
Labrador Retriever	LAB-	556	short	no	n.d.
Labrador Retriever	LAB-	557	short	no	n.d.
Labrador Retriever	LAB-	558	short	no	n.d.
Labrador Retriever	LAB-	559	short	no	n.d.
Labrador Retriever	LAB-	560	short	no	n.d.
Labrador Retriever	LAB-	561	short	no	n.d.
Mastiff	MAST	562	short	no	n.d.
Mastiff	MAST	563	short	no	n.d.
Mastiff	MAST	564	short	no	n.d.
Mastiff	MAST	565	short	no	n.d.
Mastiff	MAST	566	short	no	n.d.
Mastiff	MAST	567	short	no	n.d.
Mastiff	MAST	568	short	no	n.d.
Mastiff	MAST	569	short	no	n.d.
Mastiff	MAST	570	short	no	n.d.
Mastiff	MAST	571	short	no	n.d.
Mastiff	MAST	572	short	no	n.d.
Mastiff	MAST	573	short	no	n.d.
Miniature Bull Terrier	MBLT	574	short	no	n.d.
Miniature Bull Terrier	MBLT	575	short	no	n.d.
Miniature Bull Terrier	MBLT	576	short	no	n.d.
Miniature Bull Terrier	MBLT	577	short	no	n.d.
Miniature Bull Terrier	MBLT	578	short	no	n.d.
Miniature Bull Terrier	MBLT	579	short	no	n.d.
Miniature Bull Terrier	MBLT	580	short	no	n.d.
Miniature Bull Terrier	MBLT	581	short	no	n.d.
Miniature Bull Terrier	MBLT	582	short	no	n.d.
Miniature Bull Terrier	MBLT	583	short	no	n.d.
Miniature Bull Terrier	MBLT	584	short	no	n.d.
Miniature Bull Terrier	MBLT	585	short	no	n.d.
Miniature Pinscher	MPIN	586	short	no	n.d.
Miniature Pinscher	MPIN	587	short	no	n.d.
Miniature Pinscher	MPIN	588	short	no	n.d.
Miniature Pinscher	MPIN	589	short	no	n.d.
Miniature Pinscher	MPIN	590	short	no	n.d.
Miniature Pinscher	MPIN	591	short	no	n.d.
Miniature Pinscher	MPIN	592	short	no	n.d.
Miniature Pinscher	MPIN	593	short	no	n.d.
Miniature Pinscher	MPIN	594	short	no	n.d.
Miniature Pinscher	MPIN	595	short	no	n.d.
Miniature Pinscher	MPIN	596	short	no	n.d.
Miniature Pinscher	MPIN	597	short	no	n.d.

Newfoundland	NEWF	598	long	no	no
Newfoundland	NEWF	599	long	no	no
Newfoundland	NEWF	600	long	no	no
Newfoundland	NEWF	601	long	no	no
Newfoundland	NEWF	602	long	no	no
Newfoundland	NEWF	603	long	no	no
Newfoundland	NEWF	604	long	no	no
Newfoundland	NEWF	605	long	no	no
Newfoundland	NEWF	606	long	no	no
Newfoundland	NEWF	607	long	no	no
Newfoundland	NEWF	608	long	no	no
Newfoundland	NEWF	609	long	no	no
Norwich Terrier	NOWT	610	short	yes	n.d.
Norwich Terrier	NOWT	611	short	yes	n.d.
Norwich Terrier	NOWT	612	short	yes	n.d.
Norwich Terrier	NOWT	613	short	yes	n.d.
Norwich Terrier	NOWT	614	short	yes	n.d.
Norwich Terrier	NOWT	615	short	yes	n.d.
Norwich Terrier	NOWT	616	short	yes	n.d.
Norwich Terrier	NOWT	617	short	yes	n.d.
Norwich Terrier	NOWT	618	short	yes	n.d.
Norwich Terrier	NOWT	619	short	yes	n.d.
Old English Sheepdog	OES-	620	long	yes	no
Old English Sheepdog	OES-	621	long	yes	no
Old English Sheepdog	OES-	622	long	yes	no
Old English Sheepdog	OES-	623	long	yes	no
Old English Sheepdog	OES-	624	long	yes	no
Old English Sheepdog	OES-	625	long	yes	no
Old English Sheepdog	OES-	626	long	yes	no
Old English Sheepdog	OES-	627	long	yes	no
Old English Sheepdog	OES-	628	long	yes	no
Old English Sheepdog	OES-	629	long	yes	no
Old English Sheepdog	OES-	630	long	yes	no
Old English Sheepdog	OES-	631	long	yes	no
Papillon	PAPI	632	long	no	no
Papillon	PAPI	633	long	no	no
Papillon	PAPI	634	long	no	no
Papillon	PAPI	635	long	no	no
Papillon	PAPI	636	long	no	no
Papillon	PAPI	637	long	no	no
Papillon	PAPI	638	long	no	no
Papillon	PAPI	639	long	no	no
Papillon	PAPI	640	long	no	no
Papillon	PAPI	641	long	no	no
Papillon	PAPI	642	long	no	no
Papillon	PAPI	643	long	no	no
Pekingese	PEKE	644	long	no	no
Pekingese	PEKE	645	long	no	no
Pekingese	PEKE	646	long	no	no
Pekingese	PEKE	647	long	no	no
Pekingese	PEKE	648	long	no	no
Pekingese	PEKE	649	long	no	no
Pekingese	PEKE	650	long	no	no
Pekingese	PEKE	651	long	no	no
Pekingese	PEKE	652	long	no	no

Pekingese	PEKE	653	long	no	no
Pekingese	PEKE	654	long	no	no
Pekingese	PEKE	655	long	no	no
Pembroke Welsh Corgi	PEMB	656	n.d.	no	no
Pembroke Welsh Corgi	PEMB	657	n.d.	no	no
Pembroke Welsh Corgi	PEMB	658	n.d.	no	no
Pembroke Welsh Corgi	PEMB	659	n.d.	no	no
Pembroke Welsh Corgi	PEMB	660	n.d.	no	no
Pembroke Welsh Corgi	PEMB	661	n.d.	no	no
Pembroke Welsh Corgi	PEMB	662	n.d.	no	no
Pembroke Welsh Corgi	PEMB	663	n.d.	no	no
Pembroke Welsh Corgi	PEMB	664	n.d.	no	no
Pembroke Welsh Corgi	PEMB	665	n.d.	no	no
Pembroke Welsh Corgi	PEMB	666	n.d.	no	no
Pembroke Welsh Corgi	PEMB	667	n.d.	no	no
Petit Basset Griffon Vendeen	PBGV	668	short	yes	no
Petit Basset Griffon Vendeen	PBGV	669	short	yes	no
Petit Basset Griffon Vendeen	PBGV	670	short	yes	no
Petit Basset Griffon Vendeen	PBGV	671	short	yes	no
Petit Basset Griffon Vendeen	PBGV	672	short	yes	no
Petit Basset Griffon Vendeen	PBGV	673	short	yes	no
Petit Basset Griffon Vendeen	PBGV	674	short	yes	no
Petit Basset Griffon Vendeen	PBGV	675	short	yes	no
Petit Basset Griffon Vendeen	PBGV	676	short	yes	no
Petit Basset Griffon Vendeen	PBGV	677	short	yes	no
Petit Basset Griffon Vendeen	PBGV	678	short	yes	no
Petit Basset Griffon Vendeen	PBGV	679	short	yes	no
Pomeranian	POM-	680	long	no	no
Pomeranian	POM-	681	long	no	no
Pomeranian	POM-	682	long	no	no
Pomeranian	POM-	683	long	no	no
Pomeranian	POM-	684	long	no	no
Pomeranian	POM-	685	long	no	no
Pomeranian	POM-	686	long	no	no
Pomeranian	POM-	687	long	no	no
Pomeranian	POM-	688	long	no	no
Pomeranian	POM-	689	long	no	no
Pomeranian	POM-	690	long	no	no
Pomeranian	POM-	691	long	no	no
Portuguese Water Dog	PTWD	692	long	yes	yes
Portuguese Water Dog	PTWD	693	long	yes	yes
Portuguese Water Dog	PTWD	694	long	yes	yes
Portuguese Water Dog	PTWD	695	long	yes	yes
Portuguese Water Dog	PTWD	696	long	yes	yes
Portuguese Water Dog	PTWD	697	long	yes	yes
Portuguese Water Dog	PTWD	698	long	yes	yes
Portuguese Water Dog	PTWD	699	long	yes	yes
Portuguese Water Dog	PTWD	700	long	yes	yes
Portuguese Water Dog	PTWD	701	long	yes	yes
Portuguese Water Dog	PTWD	702	long	yes	yes
Portuguese Water Dog	PTWD	703	long	yes	yes
Pug	PUG	704	short	no	n.d.
Pug	PUG	705	short	no	n.d.
Pug	PUG	706	short	no	n.d.
Pug	PUG	707	short	no	n.d.

Pug	PUG	708	short	no	n.d.
Pug	PUG	709	short	no	n.d.
Pug	PUG	710	short	no	n.d.
Pug	PUG	711	short	no	n.d.
Pug	PUG	712	short	no	n.d.
Pug	PUG	713	short	no	n.d.
Pug	PUG	714	short	no	n.d.
Pug	PUG	715	short	no	n.d.
Rottweiler	ROTT	716	short	no	n.d.
Rottweiler	ROTT	717	short	no	n.d.
Rottweiler	ROTT	718	short	no	n.d.
Rottweiler	ROTT	719	short	no	n.d.
Rottweiler	ROTT	720	short	no	n.d.
Rottweiler	ROTT	721	short	no	n.d.
Rottweiler	ROTT	722	short	no	n.d.
Rottweiler	ROTT	723	short	no	n.d.
Rottweiler	ROTT	724	short	no	n.d.
Rottweiler	ROTT	725	short	no	n.d.
Rottweiler	ROTT	726	short	no	n.d.
Rottweiler	ROTT	727	short	no	n.d.
Saint Bernard	STBD	728	n.d.	no	n.d.
Saint Bernard	STBD	729	n.d.	no	n.d.
Saint Bernard	STBD	730	n.d.	no	n.d.
Saint Bernard	STBD	731	n.d.	no	n.d.
Saint Bernard	STBD	732	n.d.	no	n.d.
Saint Bernard	STBD	733	n.d.	no	n.d.
Saint Bernard	STBD	734	n.d.	no	n.d.
Saint Bernard	STBD	735	n.d.	no	n.d.
Saint Bernard	STBD	736	n.d.	no	n.d.
Saint Bernard	STBD	737	n.d.	no	n.d.
Saint Bernard	STBD	738	n.d.	no	n.d.
Saint Bernard	STBD	739	n.d.	no	n.d.
Saluki	SALU	740	n.d.	no	n.d.
Saluki	SALU	741	n.d.	no	n.d.
Saluki	SALU	742	n.d.	no	n.d.
Saluki	SALU	743	n.d.	no	n.d.
Saluki	SALU	744	n.d.	no	n.d.
Saluki	SALU	745	n.d.	no	n.d.
Saluki	SALU	746	n.d.	no	n.d.
Saluki	SALU	747	n.d.	no	n.d.
Saluki	SALU	748	n.d.	no	n.d.
Saluki	SALU	749	n.d.	no	n.d.
Saluki	SALU	750	n.d.	no	n.d.
Saluki	SALU	751	n.d.	no	n.d.
Samoyed	SAMO	752	long	no	no
Samoyed	SAMO	753	long	no	no
Samoyed	SAMO	754	long	no	no
Samoyed	SAMO	755	long	no	no
Samoyed	SAMO	756	long	no	no
Samoyed	SAMO	757	long	no	no
Scottish Deerhound	DEER	758	short	yes	no
Scottish Deerhound	DEER	759	short	yes	no
Scottish Deerhound	DEER	760	short	yes	no
Scottish Deerhound	DEER	761	short	yes	no
Scottish Deerhound	DEER	762	short	yes	no

Scottish Deerhound	DEER	763	short	yes	no
Scottish Deerhound	DEER	764	short	yes	no
Scottish Deerhound	DEER	765	short	yes	no
Scottish Deerhound	DEER	766	short	yes	no
Scottish Deerhound	DEER	767	short	yes	no
Scottish Deerhound	DEER	768	short	yes	no
Scottish Deerhound	DEER	769	short	yes	no
Scottish Terrier	SCOT	770	n.d.	yes	no
Scottish Terrier	SCOT	771	n.d.	yes	no
Scottish Terrier	SCOT	772	n.d.	yes	no
Scottish Terrier	SCOT	773	n.d.	yes	no
Scottish Terrier	SCOT	774	n.d.	yes	no
Scottish Terrier	SCOT	775	n.d.	yes	no
Scottish Terrier	SCOT	776	n.d.	yes	no
Scottish Terrier	SCOT	777	n.d.	yes	no
Scottish Terrier	SCOT	778	n.d.	yes	no
Scottish Terrier	SCOT	779	n.d.	yes	no
Scottish Terrier	SCOT	780	n.d.	yes	no
Scottish Terrier	SCOT	781	n.d.	yes	no
Shetland Sheepdog	SSHP	782	long	no	no
Shetland Sheepdog	SSHP	783	long	no	no
Shetland Sheepdog	SSHP	784	long	no	no
Shetland Sheepdog	SSHP	785	long	no	no
Shetland Sheepdog	SSHP	786	long	no	no
Shetland Sheepdog	SSHP	787	long	no	no
Shetland Sheepdog	SSHP	788	long	no	no
Shetland Sheepdog	SSHP	789	long	no	no
Shetland Sheepdog	SSHP	790	long	no	no
Shetland Sheepdog	SSHP	791	long	no	no
Shetland Sheepdog	SSHP	792	long	no	no
Shetland Sheepdog	SSHP	793	long	no	no
Shih Tzu	SHIH	794	long	yes	no
Shih Tzu	SHIH	795	long	yes	no
Shih Tzu	SHIH	796	long	yes	no
Shih Tzu	SHIH	797	long	yes	no
Shih Tzu	SHIH	798	long	yes	no
Shih Tzu	SHIH	799	long	yes	no
Shih Tzu	SHIH	800	long	yes	no
Shih Tzu	SHIH	801	long	yes	no
Shih Tzu	SHIH	802	long	yes	no
Shih Tzu	SHIH	803	long	yes	no
Shih Tzu	SHIH	804	long	yes	no
Shih Tzu	SHIH	805	long	yes	no
Siberian Husky	HUSK	806	n.d.	no	no
Siberian Husky	HUSK	807	n.d.	no	no
Siberian Husky	HUSK	808	n.d.	no	no
Siberian Husky	HUSK	809	n.d.	no	no
Siberian Husky	HUSK	810	n.d.	no	no
Siberian Husky	HUSK	811	n.d.	no	no
Siberian Husky	HUSK	812	n.d.	no	no
Siberian Husky	HUSK	813	n.d.	no	no
Siberian Husky	HUSK	814	n.d.	no	no
Siberian Husky	HUSK	815	n.d.	no	no
Siberian Husky	HUSK	816	n.d.	no	no
Siberian Husky	HUSK	817	n.d.	no	no

Staffordshire Bull Terrier	STAF	818	short	no	n.d.
Staffordshire Bull Terrier	STAF	819	short	no	n.d.
Staffordshire Bull Terrier	STAF	820	short	no	n.d.
Staffordshire Bull Terrier	STAF	821	short	no	n.d.
Staffordshire Bull Terrier	STAF	822	short	no	n.d.
Staffordshire Bull Terrier	STAF	823	short	no	n.d.
Staffordshire Bull Terrier	STAF	824	short	no	n.d.
Staffordshire Bull Terrier	STAF	825	short	no	n.d.
Staffordshire Bull Terrier	STAF	826	short	no	n.d.
Staffordshire Bull Terrier	STAF	827	short	no	n.d.
Staffordshire Bull Terrier	STAF	828	short	no	n.d.
Staffordshire Bull Terrier	STAF	829	short	no	n.d.
Standard Poodle	SPOO	830	long	yes	yes
Standard Poodle	SPOO	831	long	yes	yes
Standard Poodle	SPOO	832	long	yes	yes
Standard Poodle	SPOO	833	long	yes	yes
Standard Poodle	SPOO	834	long	yes	yes
Standard Poodle	SPOO	835	long	yes	yes
Standard Poodle	SPOO	836	long	yes	yes
Standard Poodle	SPOO	837	long	yes	yes
Standard Poodle	SPOO	838	long	yes	yes
Standard Poodle	SPOO	839	long	yes	yes
Standard Poodle	SPOO	840	long	yes	yes
Standard Poodle	SPOO	841	long	yes	yes
Standard Poodle	SPOO	842	long	yes	yes
Standard Schnauzer	SSNZ	843	n.d.	yes	n.d.
Standard Schnauzer	SSNZ	844	n.d.	yes	n.d.
Standard Schnauzer	SSNZ	845	n.d.	yes	n.d.
Standard Schnauzer	SSNZ	846	n.d.	yes	n.d.
Standard Schnauzer	SSNZ	847	n.d.	yes	n.d.
Standard Schnauzer	SSNZ	848	n.d.	yes	n.d.
Standard Schnauzer	SSNZ	849	n.d.	yes	n.d.
Standard Schnauzer	SSNZ	850	n.d.	yes	n.d.
Standard Schnauzer	SSNZ	851	n.d.	yes	n.d.
Standard Schnauzer	SSNZ	852	n.d.	yes	n.d.
Standard Schnauzer	SSNZ	853	n.d.	yes	n.d.
Standard Schnauzer	SSNZ	854	n.d.	yes	n.d.
Sussex Spaniel	SUSX	855	long	no	no
Sussex Spaniel	SUSX	856	long	no	no
Sussex Spaniel	SUSX	857	long	no	no
Sussex Spaniel	SUSX	858	long	no	no
Sussex Spaniel	SUSX	859	long	no	no
Toy Poodle	TPOO	860	long	yes	yes
Toy Poodle	TPOO	861	long	yes	yes
Toy Poodle	TPOO	862	long	yes	yes
Toy Poodle	TPOO	863	long	yes	yes
Toy Poodle	TPOO	864	long	yes	yes
Toy Poodle	TPOO	865	long	yes	yes
Toy Poodle	TPOO	866	long	yes	yes
Toy Poodle	TPOO	867	long	yes	yes
Toy Poodle	TPOO	868	long	yes	yes
Toy Poodle	TPOO	869	long	yes	yes
Toy Poodle	TPOO	870	long	yes	yes
Toy Poodle	TPOO	871	long	yes	yes
West Highland White Terrier	WHWT	872	n.d.	yes	no

West Highland White Terrier	WHWT	873	n.d.	yes	no
West Highland White Terrier	WHWT	874	n.d.	yes	no
West Highland White Terrier	WHWT	875	n.d.	yes	no
West Highland White Terrier	WHWT	876	n.d.	yes	no
West Highland White Terrier	WHWT	877	n.d.	yes	no
West Highland White Terrier	WHWT	878	n.d.	yes	no
West Highland White Terrier	WHWT	879	n.d.	yes	no
West Highland White Terrier	WHWT	880	n.d.	yes	no
West Highland White Terrier	WHWT	881	n.d.	yes	no
West Highland White Terrier	WHWT	882	n.d.	yes	no
West Highland White Terrier	WHWT	883	n.d.	yes	no
Whippet	WHIP	884	short	no	n.d.
Whippet	WHIP	885	short	no	n.d.
Whippet	WHIP	886	short	no	n.d.
Whippet	WHIP	887	short	no	n.d.
Whippet	WHIP	888	short	no	n.d.
Whippet	WHIP	889	short	no	n.d.
Whippet	WHIP	890	short	no	n.d.
Whippet	WHIP	891	short	no	n.d.
Whippet	WHIP	892	short	no	n.d.
Whippet	WHIP	893	short	no	n.d.
Whippet	WHIP	894	short	no	n.d.
Whippet	WHIP	895	short	no	n.d.
Yorkshire Terrier	YORK	896	long	yes	no
Yorkshire Terrier	YORK	897	long	yes	no
Yorkshire Terrier	YORK	898	long	yes	no
Yorkshire Terrier	YORK	899	long	yes	no
Yorkshire Terrier	YORK	900	long	yes	no
Yorkshire Terrier	YORK	901	long	yes	no
Yorkshire Terrier	YORK	902	long	yes	no
Yorkshire Terrier	YORK	903	long	yes	no

n.d. = not determined

Table S3. Positions of 88 SNPs displayed in Figure S1 and their genotypes in 354 dogs including 177 furnished (cases) and 176 not furnished (control) dogs. Single marker chi-squared association values calculated using PLINK are listed in the last two columns of the table.

SNP Name	Position	Allele A	Allele B	P	-log(pValue)
BICF2G630604415_0_13_10184498	10184498	G	A	0.0002251	3.647624505
BICF2G630604421_0_13_10210339	10210339	C	G	0.006795	2.167810539
BICF2G630604446_0_13_10271463	10271463	A	G	0.0000245	4.611188587
BICF2P516222_0_13_10319767	10319767	G	A	8.06E-28	27.09393446
BICF2G630604569_0_13_10370797	10370797	T	C	2.71E-28	27.56719099
BICF2P444295_0_13_10418295	10418295	G	A	0.1449	0.838931615
BICF2G630604713_0_13_10472259	10472259	C	T	1.54E-32	31.81360878
BICF2G630604732_0_13_10529932	10529932	T	G	3.82E-19	18.41805034
BICF2P583203_0_13_10584164	10584164	G	A	3.82E-19	18.41805034
BICF2S23741099_0_13_10825211	10825211	C	A	5.76E-10	9.239276028
BICF2G630604851_0_13_10877143	10877143	T	C	0.000000587	6.23128792
BICF2S22915896_0_13_10934049	10934049	C	T	4.09E-12	11.38848911
BICF2P927359_0_13_10987746	10987746	G	A	0.00000123	5.910094889
BICF2G630604960_0_13_11047731	11047731	T	C	6.72E-20	19.17295398
BICF2P1055154_0_13_11095120	11095120	T	C	2.74E-73	72.56288391
BICF2P419989_0_13_11188617	11188617	C	T	6.18E-46	45.2090818
BICF2S23143988_0_13_11239983	11239983	T	A	0.001757	2.755228239
BICF2P608842_0_13_11290414	11290414	A	T	1.17E-53	52.93107239
BICF2S23121702_0_13_11385898	11385898	T	C	3.28E-57	56.48465611
BICF2P1371290_0_13_11425908	11425908	A	G	3.83E-77	76.41680123
BICF2P988970_0_13_11436404	11436404	A	G	2.22E-56	55.65403846
BICF2P1402544_0_13_11446935	11446935	G	T	2.53E-56	55.59636481
BICF2G630605108_0_13_11466809	11466809	C	T	2.75E-20	19.56082526
BICF2G630605112_0_13_11473971	11473971	A	G	0.0000201	4.697669071
BICF2G630605124_0_13_11489529	11489529	A	C	0.0000012	5.920456993
BICF2G630605143_0_13_11509194	11509194	A	G	4.17E-14	13.37944756
BICF2P1280802_0_13_11519570	11519570	C	A	1.6E-54	53.79642323
BICF2P1045468_0_13_11540956	11540956	G	A	7.91E-49	48.10160395
BICF2G630605204_0_13_11550445	11550445	C	G	7.57E-21	20.12096149
BICF2G630605224_0_13_11560727	11560727	T	C	2.83E-21	20.54867419
BICF2G630605234_0_13_11570084	11570084	T	C	1.97E-22	21.70487291
BICF2S23055611_0_13_11582228	11582228	A	C	6.4E-55	54.19395576
BICF2G630605270_0_13_11593074	11593074	T	G	1.03E-23	22.98547946
BICF2P132342_0_13_11594577	11594577	A	G	1.45E-90	89.83983171
BICF2S2363741_0_13_11601025	11601025	G	T	7.78E-40	39.10924375
BICF2G630605286_0_13_11603410	11603410	C	T	5.83E-79	78.23403358
BICF2G630605291_0_13_11606035	11606035	G	A	1.07E-21	20.96899572
BICF2G630605295_0_13_11607365	11607365	A	T	1.64E-22	21.7862167
BICF2G630605297_0_13_11610207	11610207	A	G	1.73E-19	18.76120144
BICF2G630605298_0_13_11612397	11612397	G	A	1.28E-19	18.89448982
BICF2S23527822_0_13_11616021	11616021	G	T	3.61E-15	14.4424928
BICF2G630605308_0_13_11627783	11627783	T	C	1.25E-91	90.90170246
BICF2P356700_0_13_11631883	11631883	T	C	7.83E-54	53.10634918
BICF2G630605315_0_13_11639136	11639136	A	G	1.84E-35	34.73589084
BICF2G630605316_0_13_11642032	11642032	A	C	9.31E-17	16.0309104
BICF2G630605319_0_13_11643744	11643744	A	G	5.41E-38	37.2672043
BICF2P49670_0_13_11651644	11651644	T	C	6.78E-66	65.16851416
BICF2G630605333_0_13_11655718	11655718	C	T	1.03E-26	25.98842956
BICF2G630605338_0_13_11657091	11657091	G	T	1.72E-19	18.76346274
BICF2G630605339_0_13_11659792	11659792	C	T	4.42E-103	102.354676
BICF2P1204105_0_13_11676852	11676852	A	G	2.15E-115	114.6683703

BICF2P112526_0_13_11678731	11678731	T	C	1.34E-106	105.8722475
BICF2G630605343_0_13_11692587	11692587	G	A	8.63E-20	19.06403953
BICF2G630605344_0_13_11695899	11695899	C	A	8.24E-20	19.08428366
BICF2G630605346_0_13_11704806	11704806	A	G	0.0000473	4.325138859
BICF2P346044_0_13_11718198	11718198	C	T	3.04E-18	17.51755521
BICF2P182472_0_13_11728003	11728003	T	C	2.84E-21	20.54622314
BICF2P1265004_0_13_11734027	11734027	T	G	3.07E-87	86.51229614
BICF2G630605353_0_13_11739013	11739013	C	T	7.31E-23	22.13626089
BICF2G630605356_0_13_11777117	11777117	C	T	6.66E-51	50.17659099
BICF2G630605357_0_13_11790465	11790465	G	C	9.07E-34	33.04248849
BICF2G630605358_0_13_11794326	11794326	T	C	3.7E-47	46.43238556
BICF2G630605361_0_13_11804719	11804719	G	A	0.3924	0.406271001
BICF2G630605369_0_13_11811625	11811625	C	T	1.24E-12	11.90517962
BICF2G630605370_0_13_11818138	11818138	A	G	2.09E-10	9.68006156
BICF2G630605371_0_13_11827722	11827722	C	G	1.06E-23	22.97633608
BICF2G630605383_0_13_11837508	11837508	C	G	5.93E-12	11.22731165
BICF2S23654432_0_13_11885247	11885247	A	C	5.91E-30	29.22826557
BICF2G630605405_0_13_11920014	11920014	G	A	0.000041	4.387110231
BICF2G630605438_0_13_11989716	11989716	G	C	2.63E-15	14.58004425
BICF2G630605447_0_13_12005781	12005781	C	G	3.52E-13	12.45308736
BICF2G630605453_0_13_12034912	12034912	G	A	3.15E-17	16.50182734
BICF2G630605475_0_13_12059723	12059723	A	G	1.98E-11	10.70399333
BICF2G630605500_0_13_12086712	12086712	T	G	1.64E-09	8.785156152
BICF2P343968_0_13_12116115	12116115	T	C	2.29E-78	77.64016452
BICF2G630605532_0_13_12161770	12161770	A	G	1.36E-09	8.866780543
BICF2P1107565_0_13_12216540	12216540	C	T	8.61E-71	70.06509774
BICF2P435808_0_13_12260184	12260184	A	G	1.6E-67	66.79533749
BICF2P1307230_0_13_12285257	12285257	T	A	5.83E-77	76.23455498
BICF2S23246595_0_13_12311382	12311382	C	T	0.6975	0.156455788
BICF2P290626_0_13_12337980	12337980	A	T	2.3E-72	71.638839
BICF2P1228772_0_13_12385331	12385331	C	G	1.33E-71	70.87712908
BICF2P766060_0_13_12418144	12418144	A	G	8.91E-19	18.05036608
BICF2S24116507_0_13_12493666	12493666	G	T	4.13E-25	24.38373459
BICF2P928407_0_13_12517909	12517909	G	A	7.11E-27	26.14831368
BICF2S22957965_0_13_12547841	12547841	G	T	6.66E-12	11.17665621
BICF2G630605730_0_13_12572947	12572947	C	G	6.59E-22	21.18137827
BICF2S2373535_0_13_12586193	12586193	A	G	8.61E-09	8.064845553

Table S4. Primers sequences and genomic positions for amplicons used in SNP discovery at all three loci.

chr	start	product size	primer name*	forward primer	reverse primer
13	11627595	830	SQ7056	ATGAGTCAGCCATCGGTGTT	GGAAAAGTGTCCAGGGAGAA
13	11633956	694	SQ7057	TCAAGAAGAGAGGCAATAACAGG	TGCTTCATCGTTAAAAAGTCAG
13	11634548	676	SQ7058	TGGCTAAAGAAAACTTCCACAA	AAATTACCATCATGAGACCATGC
13	11634594	210	SQ7242	GCATGAAAAGATCATCTCAGAAAC	ATTATGAGAATACTATTGCTATGAGATAAGAAG
13	11634735	152	SQ7240	GCAAATCCTAAAGTAGTATACAACATTCATATATG	ATTGGCAAAACTACCTCTCCAC
13	11634745	150	SQ7241	AAGTAGTATACAACATTCATATATGGCTTC	CACCTTGCATTGGCAAAACTAC
13	11635126	599	SQ7059	TTGGCTCCAAGAAGACCTGT	TGTGTAACAAGTCATCCCCAAT
13	11635608	821	SQ7060	ATGTCAAGGGGCAACAAAAC	TTCCCCCATTGTAGGAAAGA
13	11636338	804	SQ7061	TTGCTCCTGGGCTCTTTCTA	GATGGTGGAAGCAAAGAGGA
13	11637060	777	SQ7062	CCTGAAGACCTGGCAATAGG	TCTGCAAATGCTTGTTAACTGTC
13	11637772	784	SQ7063	TTTGTTTGGGATGGAAAACC	AAACCCGAGGACCATTTGAT
13	11645671	597	SQ7064	TCAGGTCTAGCCTGGAGAGG	GGACTGGTTGGGAAGATTGA
13	11646158	593	SQ7065	GTGCCCAGCAAAATGTCTTT	TGCTCTCACATCCTCTTCCA
13	11657328	585	SQ7066	GCAGTCCAGGAAATCTCACAG	TCCATGGTAGGAACTCACCAC
13	11657840	494	SQ7067	ACGGAACTGGGAGAAATGC	ACCTCTGTGGCTTGGCTCT
13	11658294	692	SQ7068	CCGCATGGAACGATCTAACT	GTTTGAAAGTGGCCTTCAGC
13	11658907	843	SQ7069	GCAGATATATGGGTTTAGCTTTGC	ATCCATGCTGCTCCAGAAAT
13	11659741	886	SQ7070	AGCATGGATCCTGCAACTTT	CGGACTTTGGGTATCTTGGA
13	11660312	595	SQ7071	TCAGGCTGGAAACATAATGC	TTAAATTTTCGGCCAACTGC
13	11660835	788	SQ7072	TTGCAGAAGTCCAATTACACAAA	CCCAGCCCTGATTTTCCTAT
13	11661156	300	SQ7073	GCTCTACACTCAGCAGGAAGTC	CATCCCAAACTCCTCTCTTCTT
13	11661488	820	SQ7074	GTGATGCCAGCCTCTGAAAT	TTCTTTGGCCAATGCTTTTC
13	11662225	682	SQ7075	TCCATACACATGTTGGTCCTG	GCTTATGATAGGCAGAGTGCAT
13	11665512	681	SQ7076	GGCTTGGGAGTTTTACTGTCA	TCAAGGATTGCAGGGATACA
13	11666110	769	SQ7077	CAGCCAAGCTGAGAAGGAAT	TTGCTGTCCTGTGTGTCTCA
13	11666774	700	SQ7078	CATCACAAACCTTGTGTATTTGG	TCTCTAGTCATTTCAGTGGCAAA
13	11667369	695	SQ7079	CCTCAACGTTTTAGTTTGTAGCC	AGACTCCTTTTTATTTGGAATCCT
13	11670458	697	SQ7080	GCATGGACAAGCTAGTTTTGAA	GCCTAATTTGAACCATTCCTTTT
13	11670840	827	SQ7081	TCCCCCTATTCCCAACTCTC	CCCTCTGATGAAATGGTAAAACA
13	11675064	829	SQ7082	CAAAGACAGCCAAGCGTATG	CCTAGCACACAGTGGAGAGC
13	11682548	834	SQ7083	AAAACATCAAATGAGGATGCAA	TTCTACAAATGAAACATTAATGAACAC
13	11683290	498	SQ7084	GGGATTATGGTCATAACTGCTTTC	TTGTGCCTAAAAACAAACCTGA
13	11683681	530	SQ7085	CCACGTTGCTGAAGAGGAAT	GACGTTTGTTTGCCTCCATT
13	11684155	700	SQ7086	AGCCACAGAGCTGAAAAGC	CAAATGAGCTTTCTAAAGTGAGATT
13	11684827	767	SQ7087	AGAAATCTCACTTTAGAAAGCTCATT	TGGGGGCATTCAGAATTAAA
13	11684834	694	SQ6939	CAGGCTTTTAGCTGTTGAATCTT	TCACTTTAGAAAGCTCATTTGTCC
13	11684890	538	SQ6942	TCCAAAAGGGGACTACAGGTC	TGAGGTATCATGAAAACGAACC
13	11685511	832	SQ7088	CAACAGCTAAAAGCCTGTAGAAGA	TGAAGGTTTGCAGAGAACACA
13	11686227	785	SQ7089	TCTGGTGACTTTAGTAGGGTGTCA	GCTGAATTCTTTAGGCGTCA
13	11686555	845	SQ7090	GGCACTCATCAAAATGCACA	CGATGGAGCTAACCGGTAAAT
13	11686905	627	SQ6938	AGGGCTCTAGGCTGGAATGT	ACCATGCCAGCCCTTAAATA
13	11686905	627	SQ7091	ACCATGCCAGCCCTTAAATA	AGGGCTCTAGGCTGGAATGT
13	11687063	395	SQ6941	TGAGATGGCATTAGGAAACAAA	CCAATTTGTTTTTAGGTTGAACA
13	11705602	658	SQ6937	GCCTGCCTCTCTGGTCTAAC	CAAGCTGTGTTTCAGATGATTG
13	11705760	376	SQ6940	TCGAGAAGGACAAGAGACACC	TTTTTCGGTCCAAATTTTCAA
13	11706174	819	SQ7092	CCCACCCCCAAAAATAGATTA	CATTTTTATTGTGTTTGGTGCTACA
13	11711208	493	SQ7093	ATCCAAGGGAGTCCCACAC	TGTCAGTCAAGGTTCAAGCAA
13	11711681	594	SQ7094	TGCTTGAACCTTGACTGACAAT	TCTGGATCTCAGCAGGCTTT
13	11712163	490	SQ7095	TCAAGCATGCAGGTGAATAAA	TGGGATAAAATGTGAGTAACTGGA
13	11714629	697	SQ7096	CAGCACACACTCATCCCAAA	AGGGGAGACTTTTTCTACAGGA
13	11716636	738	SQ7097	AAACACACCCCAGCATGATT	GGTGATTTGCTTTTGGCTTC
13	11727491	599	SQ7098	CAGTTTCCCATATGGAATTTAGAA	GCAGCACTGCAGTTTTCAGA
13	11731866	838	SQ7099	GGGGGAAATGAAAGAATCAAA	AAATATTGGTGGCGATGAGG

13	11735521	553	SQ7100	GAAAGAAGAGAAAGATGGAGAGAGA	CGCTGTTCTGCAACACCTT
13	11736024	600	SQ7101	GGGGACATCGAACAGAAGAG	TGAAGCAACTGAATCCAAGTTTT
13	11753994	465	SQ7102	CCACTGCTGGAGGAAGACTC	GGCTGGATAGGCTGGAAGAT
13	11776896	693	SQ7103	AGCCAGCTGCAACTCCTAAG	CAGGAAAAGCAGGCAATAGG
13	11777385	700	SQ7104	TCATTTGACCACTCATGTTTCA	GGGGGAATCAGATCTATTTTCTG
13	11778008	788	SQ7105	CCCAACCCCACATAAGAGAG	TTGCATTTGCTGTCAGAGGT
13	11787032	699	SQ7106	TAGGATTCACGGGGAGCAG	TCCCCCATTTTTCTCATCTG
13	11787659	634	SQ7107	TGTAGGAATATGGACATGCAACA	TCTCCTGTGATGTTTAACTTTGC
13	11788163	567	SQ7108	ACGCAGCAGTTTTTCAACCT	GGCCCAGATATGTAATTGGTG
13	11788694	400	SQ7109	TCCAACCACTAGAAACACCAA	TGTCTAAACAGTGACAGTTGGAA
13	11789066	846	SQ7110	CCGAGTTCCAACTGTCACTG	TGTTGCGCATACCAAACAAT
13	11789536	809	SQ7111	TGCTCCACAGTGAAGGTTTG	CAAACCAACCTTTCGGATTT
13	11792215	598	SQ7802	CGAGCCCAGAAAAGACCGTGTTC	ATTGATTGTAAAGCACCTTCCCCTCCTC
13	11792710	589	SQ7803	GGAGGGAGGGGCGCGAAC	AGTGGCATAGGGACCTCGAGAGTGAGT
13	11793261	534	SQ7804	CGCGCGACCGCACTCACT	GTCTAGGAGAGGCCACCAGTCAGATCCT
13	11793441	507	SQ7805	CGGGATGCTTCTATAAGTAGGTGGTGCT	TTGATTTCAGCCGTGCTAACAGATCTTC
27	5524829	669	SQ7535	CGTTCCATGCTCACTGATCTAC	ACTCGCGGACTCTTTGAAGATA
27	5525263	812	SQ7534	TGAGTGGGGATGGAGTTTTTAC	GACAGTGGGAGGCATTTTCTAT
27	5526013	593	SQ7533	GGAAGTCCTACTCAAGCACAGG	CTGCCCAGGTCAGTTTTATGTT
27	5526490	601	SQ7787	CTTTGTAGATGTGCCGAATGAAAG	GTGGTAGGATTATTGGCTCAGG
27	5526966	619	SQ7788	GATAGCAAAGATCACAGGTTCCTC	CCGGAGATAGAAAGTTGGTTATGA
27	5527304	683	SQ7532	AAATGTAACCTGCACCGTTCTT	CTTCCCCTCTCCTTATCTGTCC
27	5527872	589	SQ7594	CCTGTACGCGTGGTCAGAG	GTGTCCTATCATCGGTAGAGTTGAC
27	5528215	587	SQ7595	ACGCTAAGTTCCTGCTCTCAAG	CTCTAAGGCACCACTGTCGTC
27	5528263	493	SQ7789	GAGGACAACAGCAGATGAAGC	GCTACCTGTTAGCACCAAGAGTG
27	5528901	388	SQ7596	AAACACCAACGTTTCTTCCTATATTC	CCAGCTTCAGGCTCAGGA
27	5529167	471	SQ7597	CGACTGTGCCCTGAAGGA	GAAATTATAATCCTATTTTGCAGGTGAG
27	5529466	475	SQ7682	GAGCTCAGCTGCTGCTCCCTGT	GCCAGGGAAGTCTCAGAAGACAGTAACA
27	5529828	600	SQ7683	CGAATTCTGGCTGGTTGGGAAAG	GGTCCTTGAGGTCTCCCACTCGT
27	5530280	398	SQ7598	GTCATCAGCAGTGGTGGAAG	GAGGAGACAGAGAGGCGATG
27	5530546	689	SQ7684	CACCCTGGCGTTGTCTGCTGT	GTTTCTCTGGTGTCCTGAGGATGCTG
27	5530978	588	SQ7608	ACTTTGCAAAACAACACCCTTATT	AGAGATAGATCAAGCTCCCCTCACT
27	5531412	641	SQ7790	CTATATTCTTCCCACGGCCTATC	CAAACCTATTGTGATGGTGTGATT
27	5531911	653	SQ7791	CTTGTTGAGAAGAGATCGGAATG	GGTGTGAGTGTAACAGGTTAGTGG
27	5532232	590	SQ7599	CTGATGGGCCTTCTGATCC	GTTTCTCTAAAGGCTGTTTCAGGTT
27	5532678	592	SQ7610	CCAGGACCAGAAAACCCTTAG	CTAACCCAAATTTCCATGTACACCT
27	5533104	696	SQ7628	GACTGTACTCTTGCTTTAGGACTCAAT	ATAAATACATGAGTTTACTCCCCCAAAT
27	5533581	655	SQ7792	ATTTCCACATGTGATTGAGATGAT	GTTGTTTTTCCTTTTGCTGTTGAG
27	5533718	563	SQ7527	CCCAGGAGTTAATGCTCATAGG	AAAAAGAAAAAGTCCGTTAAAGTCC
27	5534134	600	SQ7686	GCAGAATGAGAGAAAACATTTGCAGATCA	CAGTCCTGCGTGTAACTCTATGAGCAACT
27	5534242	487	SQ7793	AAAACGTGAGCAAAGGACTTTAAC	CTGCGTGTAACTCTATGAGCAACT
27	5534595	597	SQ7611	AAAAACAATGGAAAATAAAAAGTGCT	CATTAGTGGCACACAGGTGACT
27	5535113	568	SQ7612	TCCCAGCTCTCTCTCTCTTAAATAAATA	CTGGGACTCAATGCAAAGAAG
27	5535550	554	SQ7613	ACCTCTTGGGTCATTTTGGAG	GGAGCATCTCCTCTGAGCTTT
27	5536014	283	SQ7600	CCTCATACTCCTGGATCCACAC	CAAGCAGAGCCACTCATCTG
27	5536115	499	SQ7687	CTGAGTGAGGAGGAAGCCGCTCT	ATGTGGCTGCTGTGTGGGTAGGAGT
27	5536477	287	SQ7601	CTGAGCTGACGTCATCCAAATAAC	AAGGACTCTCTAGCTGGACCAAG
27	5536624	476	SQ7794	CAAGCTGTATCGCTCAGGTTCTAT	TAGCTTTTTGGAAGTTTTTGCTTC
27	5536682	397	SQ7757	TGCCCTATAACATCCTAGAACATACACAGCTT	TTCTACATTTGTGATGATCCGTTGGACA
27	5536875	451	SQ7614	GATCCAGATTCCCTTCTCCTCT	GATTTTATTTATTTATTCACGAGAGACG
27	5537208	616	SQ7615	TCCCTGGTCCTAGGATTGAGT	AAGGGTGGGCCCAGGTAG
27	5537730	397	SQ7602	GAACCCTGGCTCTGTCCTC	AGTAGGAAGCACTTCTCAAACATTAGAC
27	5537876	498	SQ7603	AACAACATTGGGTGTTCCATTC	GTCAAGTAGAAGCTAGGGATCGAC
27	5538231	595	SQ7604	CTGGGATCTCTGGGAACATC	GACTGCTCTGTCCACTGCTG
27	5538729	571	SQ7605	CTGAAGACAGGTACAGGGGAAG	CTCAGTTTTCCCTTGTCAGGAG
27	5539280	446	SQ7607	CCTGACAAGGGAAAACTGAGAC	ACGTGTCACTCCTCCCAGAG
27	5539899	396	SQ7617	GAACAAAGGGGCTCTTTCC	AGTCAAGAGCTTAATTCATGGGTTT
27	5540226	459	SQ7616	CTAGCTCAGCATAGAGAAAATGACTT	CAAACATGCTCCCAGCAAAG
27	5540501	498	SQ7672	GGGGGCAGCTCATCCTCCTACC	ACAAATCACCCCGATGAAAGAAGACAC

27	5540731	543	SQ7523	GGGCATCCATCAGGTCAC	CTCCTGATCCATCCAGTCAAAT
27	5540829	673	SQ7520	AGATCAAGGCGCTGAACAAC	CAAGGGGTAGGCTATTATCTGC
27	5541381	696	SQ7519	CATCACTTACCGGCAATGTCT	AGGTTGTCTTCCCTGTTGTCAT
27	5542023	600	SQ7518	AATCCCAGCCAGTTTTCTGAG	CCTCTTTCCAAGGTCCAACG
27	5542421	430	SQ7673	TTCCCTTCTTCAGAATGGTCAGCTTTTC	CTCCCACTTGGTCTCCAGCACCT
27	5542692	392	SQ7674	GTTGTGAGGGGCAAAGGAGAAAATG	CTGCAGAAGGAGCTCAGAGGGAAAG
27	5542930	598	SQ7618	AGCAGCTGGAGACGCTGT	ACATGGAGACTGAGTTTGGTTAAAA
27	5543440	581	SQ7516	GAGATTTCCCATAGAACGTTGG	AGCCCCTGTGTGTCATCCT
27	5543715	497	SQ7795	GTACGAGGAAGAAATCAACAGGAG	GAGATAGCTGCCCTTTTCTCTCT
27	5543985	400	SQ7619	ATAGTGAAGAACGGCAGAGGAT	TAGAGACACTTGAAGAATTTGATCTCCT
27	5544311	572	SQ7509	TATGCCAATAAGGTGGAGCTG	CAGGGCGATCTCCTCGTACT
27	5544715	595	SQ7620	TCTGATAGTCAAGTCCTGAGACCA	AACTCATTTCCCCTCCAATTATG
27	5545230	498	SQ7515	TGAGAATGTGAAGAAGCAGGTG	GGCCTCTTATCAGTCATTTCATC
27	5545582	596	SQ7511	CCAGCCTGTCCCTTTTCC	TATGCCTGGCACTACCCTCAG
27	5545971	600	SQ7514	CAAGCTGGTGAGTGTCAGAGC	CCACCTCCTCCCTTCACAC
27	5546361	500	SQ7675	TGGTACGTAGGTGGCCAAGTAAATGTCT	TAGGTGGCGATCTCCATGTCCAG
27	5546638	500	SQ7676	CAGTTTTCCAGCTTCTGTGATTCCCTGT	GTAGTAATGGGGTGGGCAGTATGCGTAG
27	5546950	700	SQ7513	AGAAAGCTTAGCAGGGTCTCCT	GGGCCTGATGTAGGTTTCTTTT
27	5547377	599	SQ7677	CTTGTGCCAAAGAAGCCCTGGAATTT	ACCCATGGGAGCAGGGAGACAG
27	5547863	599	SQ7621	AGAGCAACAAACTTTGAGGTCAC	CTCAGGGGCCATCCTCTAC
27	5548154	600	SQ7679	CTCAGCGGGACTGAGAATTAAACCAGAG	GGGAGACAGCTGGGGACGTG
27	5548627	572	SQ7622	GGCAGCGACTACAGGGATAC	CTCCTCTTCTCTGCTTCTGGATAC
27	5549125	598	SQ7680	GCTCATTCCGAGTAGGACCAAGTACGA	AAAGGCCCAGGCCTCTGAGCA
27	5549678	600	SQ7623	GTGTTTATTCAACCCTTTCCTCAC	ATGTGGCTCTTTTTGCTCTTG
27	5549992	472	SQ7796	GCCTGAGGATCTTACAAGATGAAA	GGAGGTGGGAGGGTTCTTC
27	5550279	497	SQ7624	CTACCTGCTGCCTCTGCTACCT	GTGACCTCACGTCCACCCTAC
27	5550526	597	SQ7627	GTTTTCTAGAGCAGCAGATCAAGGT	CTGTTAGGTGTAAGCTTCCTCAGTG
27	5551025	497	SQ7625	GAACGAGGGAGCGGAGAT	GCCAGGCACGAGAGTACAA
27	5551404	735	SQ7797	GAAAAGGTGGTGCACATGAGT	GAGGGTGGGAACGCACAG
27	5552086	596	SQ7691	GGTGTGGGAACCATGTGCCTCT	ACCATTGTCTGGAGAAAGGACCGTACC
27	5552632	498	SQ7689	CGGTCGTGCGAGTGGGTCTT	CTGTTTATGGCTCCGTCTTCGTCCTT
27	5552946	684	SQ7690	CCCGGTCAGCTGTGGGCTTATC	AGTTGGGAAGACGCCCTCGGTTAC
27	5553341	698	SQ7626	CTTTTAGGACAGGTGGGACAAG	CCCTATATCTGATTGGAAATCCTAACT
27	5553945	608	SQ7798	GTGAGGGAGCTCTGAGCAAGT	CGACAGAGAGAGGGTAGTGAACTC
27	5554364	676	SQ7799	TTTAGAAAATCATCAGGACGACAA	ACACATCTGCAGAGACTACGAAAG
27	5554785	487	SQ7500	ACTCTTGTATTTGAGCCCGTGT	CACCGCCATCAAAGTTGG
32	7421004	288	SQ7498	GTCTTGAAAAGCAAACCAAACC	CAGCAGGGAAGACAATCATGTA
32	7424265	348	SQ7499	TTCAGGCCCAGGTCATTAGTAT	AAACAGGGAGCAAACTGATAGC
32	7426001	587	SQ7536	GCTACCAATCAGAAGTAGCAAGC	TGTCATTTTAGCTAGATGTCCTTGA
32	7427716	486	SQ7494	TGTGCTACATTGGTAGGTGTCA	GTCAAAAGCAATTCTCCCAGAC
32	7429127	600	SQ7537	CGTCATACATGTTAAATTCCATACTTT	AACAACAACAAAACCCAACCA
32	7432230	396	SQ7497	TTTGGCCAGTAAATTCTGTTCC	AGAAATTTTCCTGGGAGAAAGC
32	7437440	500	SQ7495	CCAAAATTGGTGTTCAAGTCTC	GCAAGTCCATAATGCCACCTAT
32	7438516	545	SQ7538	CAAAATTTTTATCATTTTCAGCATTC	AGCTCTGCATGCCTAATTTCTC
32	7439334	245	SQ7493	TTTTCCAGGTATATTTGCATTGG	TGAACATGGTCATTTTGAACTC
32	7441928	498	SQ7539	CCAGTTTTGACCATGTTACCTGT	AAGCAACAGCAGGAAAGAAGC
32	7443430	399	SQ7492	TTTCTCTCCACATTAGTTTCCTGA	TCTTTGACTGACGTATTTTCAGTG
32	7444580	500	SQ7540	AAACTAAACTTTGCAACTCAACTCT	CAATTACTGCTGATACTGCTTTTG
32	7444969	580	SQ7541	GGTTCTGAAGCTAAGAACTCTGG	ATCCTTCCTCCCCCTGAAG
32	7445356	500	SQ7542	GCCACCATCTCTGCTCTTTC	TCCCTTCCTCTCCCCATAAC
32	7447569	477	SQ7490	ACAAACCAGAATCAACCCAAAT	TCACTGTGATTGGGAAAATCAG
32	7447879	493	SQ7491	TGCTTGAATAAGTTTGCATTCC	AATATTTCCAAGGCAGGATAACA
32	7451755	471	SQ7487	CCTAACTTTACGCCATCAGGAC	TCTGATACTGGGCTTTTCTTTTT
32	7455083	400	SQ7486	TTCATGGAAGAGGAAGGTTGTT	ACATTTCTGACACTGTACATCCAAT
32	7455380	397	SQ7543	TTGTAACAAAGACGTTTCATTTCC	GCAGAAGGATTAGGGGAAGG
32	7458227	350	SQ7544	GGAATGTTTGTTTTTGTTTGTCCT	CAGATGACACATGGAGAAATGA
32	7458428	497	SQ7485	TTCACTCACTGGTAGAACACATGAT	AGGGCCTCACTCTCCTCATT
32	7461931	450	SQ7480	CTGCTTCCAAACCTCTCTATCTGT	GACTTTTACAAAGGTTACTCCCTCTG
32	7462255	458	SQ7481	TAGTTTTATACAGGTTGGCCAGGT	CATCTTCAAAATGTGTGCAGAATC

32	7462629	355	SQ7482	ATGAGAGGTGATGATGGCTTAAA	GTTTGTTTCTCTCTTCTACCCCACT
32	7462819	363	SQ7483	ATCTGTCCTCCTTCCTACCTACAAT	TCCAAGATATATAGAAATCCATACCA
32	7463035	458	SQ7484	GGTAACAGCCCCAGCTAGAA	ACCACTTTGAGTACATTGGTGGTAT
32	7464676	468	SQ7488	TTTTCCTTTCTTAATTCCCATCACT	AGATTGAAGTTTTCATTTCATTTGG
32	7467470	372	SQ7479	ATCAAATAACTTTTGGAACAAATGG	CGAAGTGTGTTCAGTGGTAAGAGT
32	7467783	471	SQ7477	TTCCTCTCACAGTCAAGAAAAGTCT	ATACCTCAACGATAAAGCTCATTTG
32	7468091	393	SQ7478	TACTCTCAGAACAGTGATTCCCCTA	GTCCTGAGGTTATAGAGCTCTTCCT
32	7468324	361	SQ7476	AGTCACAAAAGACCCACTTCTACTG	CTTAAGTCCATGTTCTTTCCAGGAC
32	7469233	422	SQ7475	CCAGAGATTTGGCTCCACTAAG	ATGGCAAATTTCTCTCGTGTCT
32	7469233	500	SQ7546	CCAGAGATTTGGCTCCACTAAG	ACCACCTCAGGCTCACCTC
32	7469586	597	SQ7548	TAGACTTTTGGGAGTCCTGTCG	CGACCACTTCTCCTCTGGTTAC
32	7469834	597	SQ7547	ACCTGCCCTTGGAACCTG	GCTGAACAGTGAAAGAAGACGA
32	7470144	600	SQ7549	TTCCGATGATCCCAGAAGTAAC	GAGGTGCACTCAGACTTCCTCT
32	7470683	554	SQ7550	GAACACAGGGCTCTTCCTAAAA	TTTCCTGAGTGAATGATTGTGG
32	7471153	392	SQ7474	GACAGCTTTGTCACAGAACCAAG	GGATTGGAAATATTCCATGACTACA
32	7471377	400	SQ7473	CCAGGACAGCATCTTACATAGTG	CCTGACTTGCATTCTTGGAA
32	7471643	365	SQ7317	TCAGCTTATGTGAATCGACCTT	GTCTGGGCACCAGCACAC
32	7471931	299	SQ7472	GCTAATCCTTCCTGCCAAGG	CAGGAGGAGGCTGCTGTG
32	7472055	150	SQ7471	CTTCCCGTAAGGAAAAGCAAAT	GTCTCTGCTTTATTCAGCAGCTAAG
32	7472184	233	SQ7465	GCTGCTGAATAAAGCAGAGACC	AGCACCCAAGGTCCAGGT
32	7472184	387	SQ7466	GCTGCTGAATAAAGCAGAGACC	GCTCGAGCGTACGAATCC
32	7472305	266	SQ7582	CTCTGAAGTGCTGGGAGTCTC	GCTCGAGCGTACGAATCC
32	7472393	178	SQ7467	GAGGGGACCTGGACCTTG	GCTCGAGCGTACGAATCC
32	7472715	150	SQ7469	CACTCGCCGTCTCCCATC	TATACCGCCGGTGACCTC
32	7472715	357	SQ7346	CACTCGCCGTCTCCCATC	GAGGAGGGACAAGCTCATTCTT
32	7472856	597	SQ7318	GGCGGTATAAATATCCCAGGAC	GCTTAGGACGCGCTCTGC
32	7472924	575	SQ7319	CTCTCCTCCCCGAGGCTAT	CCAGGGTGCAAAACAACC
32	7473016	379	SQ7580	CCCTACAAGATGCGCTTAGAG	GAGCCATTGACTTTGCCATC
32	7473215	397	SQ7579	GTCTTCCTCTTCTTCCTCCGTCT	GAATCGCCTTTCCTCTTACCC
32	7473399	387	SQ7563	GAAGCCAATATGTTAAGTAAGTTGCTC	CTCAAGAGAAAATGCTAGTCTCAGTAAA
32	7473591	599	SQ7565	GGGTAAGAGGAAAGGCGATT	AACTTTTCCTTGATTGTCCTTGG
32	7473800	630	SQ7552	CCCTTTTCCTTGTCCATAACTG	AGATCGTCTCCCCATCAGC
32	7473971	243	SQ7564	ACATGTATGTATATTCGAGGGGAGA	CTCTGAGTTCCTTCCAAAATAAAGAAC
32	7473971	685	SQ7567	ACATGTATGTATATTCGAGGGGAGAC	GAAGCGAAGCAAGTCAAGTACAC
32	7474180	197	SQ7577	AGGAAAAGTTCTTTATTTTGGAAGG	GATAGGCCGGGAAGACTAGG
32	7474292	238	SQ7568	AGCTTTCTCTTTAGCTCTCTCTCTTCTC	GAGGTCTGTCTGCTGGATCAAC
32	7474383	244	SQ7566	CCCTGATTGCTCTCACTGC	CTACCAGGCTGACACACGAC
32	7474815	321	SQ7575	TGCCTCCCTGCCTAGTCC	CTCTGGTGTCTGATGGAGTAAAGAG
32	7474893	397	SQ7760	ATCGGGGACCCCCTGCGAGT	CAACCTGCAGCTTTTGCATCTAACTTTG
32	7474936	200	SQ7569	GAGGAGCCTCTCTCCAGGT	CTCTGGTGTCTGATGGAGTAAAGAG
32	7475390	392	SQ7762	GCCAGACTCATTCCCAAGATATTCACCT	CAAGCTTGATGATGATGCAGGTAGCC
32	7475629	600	SQ7556	CAGCATCTAAGTAAAACCTCCTTAAC	TCCTCTATGGTCCTCTTTGGTC
32	7476134	500	SQ7557	GTCATGGGCTGTTGGTTAGAG	GAGTGTATCTGCAATGAGCTTGA
32	7476492	744	SQ7558	AAGCACACCCTGGTCATAGATT	TCTTCCATTTGATGTTTTCTATTCA
32	7480884	400	SQ7322	CTCCCTCTGCCTATATTTCTGC	CGTATTCCTACAATCCCCTGAG
32	7481140	336	SQ7323	TCACAGCTATAAAGAATGAAAAGAATC	TTTTAAAAACCCAAGAAATCATTAAG
32	7482983	365	SQ7324	TTGGTTTGTTTAGGGTGAGTACC	GCTTCAGTGAGTGACAAGAGCA
32	7483205	499	SQ7325	TAAGGATGGCTGGCTGAAATAA	AGCCTTTTAAGTGACAATGCAA
32	7485973	582	SQ7326	GAGGCAAAGATTTCTTCAATCA	CCTTAGAGGGCAGGTAGAATTT
32	7491727	596	SQ7327	CTATGCTACCTCAAGGGCAGAC	TGCTTTAAAATACCGTGTGCAT
32	7492047	573	SQ7328	TTTTACGAGGCAATTGTTCCTT	CTTGTTGAGCGCCACGTA
32	7492338	594	SQ7329	CAAACGTCTTTGCAAAAGAGAA	GTGTTGTTTTCGCTCTTCTGG
32	7492678	565	SQ7330	ACTTCCTGCCAAGGTTCAAG	GCATCAAAATATTCTTTGGAAACC
32	7492948	585	SQ7331	AAACACAAAGAACCGTTTGGAT	GTGCCGTTGAAGAGGATTTAAG
32	7493222	599	SQ7332	TTCCAAAGAATATTTTGATGCAGA	AGGGCAGGGTGGGTAGATAA
32	7493538	492	SQ7333	GCTTAGGTCTATGCATGTGTGC	ATTTTTGACAATGGGACTCGAT

* Primers that were used to re-sequence the exons of the three genes are highlighted in pink.

Table S5: Polymorphisms found from sequencing in and around *RSPO2* , the positions of SNPs discovered, and their genotypes in % in dogs with and without furnishings. Primers used to obtain the sequences from which the SNPs were discovered are listed in Table S4. Only the deletion at position 11634766 is perfectly associated with the dominant phenotype.

						Cases		Controls	
Primer Name	Position	Allele A	Allele B	count A[a]	count B[a]	%AA	%(AB+BB)	%AA	%(AB+BB)
SQ7056	11627783	C	T	29	25	100	0	7	93
SQ7057	11634029	A	G	12	2	100	0	75	25
SQ7058	11634766	DEL	INS	334	298	0	100	100	0
SQ7058	11634923	T	C	651	99	97	3	63	37
SQ7058	11634989	T	G	77	667	0	100	11	89
SQ7058	11635006	T	C	668	80	97	3	71	29
SQ7058	11635059	T	C	727	21	100	0	91	9
SQ7060	11635851	T	C	168	594	1	99	30	70
SQ7060	11635863	T	C	662	100	97	3	64	36
SQ7060	11635955	G	C	89	673	0	100	14	86
SQ7060	11636011	G	A	671	77	98	2	72	28
SQ7060	11636075	G	A	372	400	1	99	88	12
SQ7061	11636793	T	A	37	11	100	0	20	80
SQ7062	11637304	G	A	15	1	100	0	75	25
SQ7062	11637535	C	T	14	2	100	0	75	25
SQ7062	11637610	C	T	14	2	100	0	75	25
SQ7063	11638093	G	A	8	34	0	100	22	78
SQ7063	11638434	G	A	13	1	100	0	67	33
SQ7069	11659275	T	C	1	13	0	100	0	100
SQ7069	11659430	T	C	5	9	0	100	50	50
SQ7070	11660194	A	G	27	29	0	100	93	7
SQ7074	11661682	A	G	11	5	100	0	25	75
SQ7074	11661778	A	G	10	6	100	0	25	75
SQ7074	11661960[b]	T	C	31	29	100	0	0	100
SQ7075	11662380	T	G	4	8	0	100	67	33
SQ7076	11665702	T	C	13	1	100	0	67	33
SQ7076	11666005	T	C	28	32	0	100	87	13
SQ7077	11666247	T	C	45	11	100	0	38	62
SQ7077	11666379	GGGAGG	CGGGGGGG	45	9	100	0	50	50
SQ7078	11667011	T	G	2	10	0	100	33	67
SQ7080	11670855	+	-	15	123	0	100	19	81
SQ7080	11670883	+	-	105	41	87	13	40	60
SQ7081	11671222	A	G	5	11	0	100	50	50
SQ7083	11683136	+	-	5	11	0	100	50	50
SQ7085	11684089	T	C	15	1	100	0	75	25
SQ7086	11684366	T	C	4	8	0	100	67	33
SQ7086	11684698	+	-	10	4	100	0	50	50
SQ7087	11684906	T	C	26	716	0	100	3	97
SQ7087	11685055	A	G	611	139	96	4	51	49
SQ7087	11685279	+	-	11	5	100	0	25	75
SQ7087	11685363	+	-	10	4	100	0	33	67
SQ7088	11685608	T	C	5	9	0	100	50	50

SQ7093	11711400	+	-	11	5	100	0	25	75
SQ7094	11712030	G	A	6	10	0	100	75	25
SQ7095	11712492	T	C	10	4	100	0	33	67
SQ7098	11728003	T	C	6	10	25	75	25	75
SQ7099	11732315	T	G	13	3	100	0	50	50
SQ7101	11736251	T	A	8	8	50	50	25	75
SQ7101	11736540	T	C	11	5	100	0	25	75
SQ7109	11788888	CC	GT	11	3	33	67	100	0
SQ7111	11790228	A	G	5	9	33	67	25	75
SQ7802	11792301	T	A	8	6	33	67	50	50
SQ7802	11792702	G	A	10	4	100	0	50	50
SQ7804	11793473	T	A	4	10	25	75	33	67
SQ7805	11793747	G	C	12	2	67	33	100	0

a) SNP discovery was done in a set of 8 dogs, 4 cases and 4 controls. Additional dogs were genotyped at the best associated variants to find the most likely causative variant.

b) Three controls are heterozygous, not in accord with the expected dominant inheritance of the trait.

Table S6: Positions of 41 SNPs shown in Figure S3 and their genotypes in 491 dogs including 293 long hair (case) and 197 short hair (control) dogs. Single marker chi-squared association values calculated using PLINK are listed in the last two columns of the table.

SNPs Name	Position	Allele A	Allele B	P	-log(pValue)
BICF2G630601674	6793199	T	G	0.09735	1.011664044
BICF2P970788	6841989	A	G	0.52	0.283996656
BICF2P1172266	6892257	G	C	0.4439	0.352714855
BICF2S23149334	6940786	C	T	4.38E-17	16.35892269
BICF2P842830	6993895	C	G	0.03067	1.513286224
BICF2G630601460	7045859	A	G	5.56E-05	4.255237763
BICF2G630601377	7095045	A	C	7.34E-21	20.13424478
BICF2S23530750	7144649	G	A	1.33E-09	8.876148359
BICF2P1011631	7196941	G	T	0.838	0.076755981
BICF2G630601206	7247220	C	T	9.15E-15	14.03881629
BICF2G630601167	7297214	A	G	1.13E-26	25.94692156
BICF2G630601051	7344661	A	C	0.307	0.512861625
BICF2G630601004	7375965	C	T	2.11E-23	22.67633546
BICF2P1450971	7398185	A	C	3.95E-44	43.40296334
BICF2P715701	7420804	T	C	1.29E-37	36.88806572
BICF2G630600864	7471305	T	C	3.94E-79	78.40417322
BICF2G630600863	7472206	G	A	2.96E-82	81.52826835
SNP-SL	7473337	G	T	7.68E-157	156.1147519
BICF2G630600857	7477172	A	G	4.37E-74	73.35951856
BICF2G630600849	7479580	C	T	5.85E-18	17.23254728
BICF2G630600848	7482867	A	G	3.48E-27	26.45829598
BICF2G630600847	7483659	C	A	5.85E-08	7.232992636
BICF2G630600842	7487725	T	C	2.10E-21	20.67716073
BICF2G630600841	7488555	A	C	1.48E-18	17.83003183
BICF2P257161	7490570	C	T	3.40E-10	9.468265691
BICF2G630600840	7490779	G	A	5.37E-07	6.269783159
BICF2G630600839	7492364	C	G	0.02377	1.623970818
BICF2G630600838	7495748	A	G	0.0006782	3.168642215
BICF2G630600828	7547610	G	T	2.40E-14	13.61960784
BICF2G630600792	7598402	G	A	2.10E-14	13.67695426
BICF2P629393	7644742	G	A	0.4852	0.314079208
BICF2G630600757	7673046	C	A	4.87E-42	41.31238187
BICF2S2311078	7696578	C	T	3.69E-06	5.432738308
BICF2G630600742	7749679	A	G	2.23E-22	21.65091683
BICF2G630600698	7796456	T	C	6.04E-16	15.21896306
BICF2P1079945	7844234	A	C	5.26E-19	18.27876663
BICF2S2434904	7892560	T	C	4.30E-08	7.366531544
BICF2G630600463	7986139	A	G	3.03E-10	9.519274621
BICF2G630600443	8035292	A	T	1.54E-13	12.8113527
BICF2S2347352	8085793	G	A	1.16E-06	5.934420285
BICF2P1287140	8133439	T	C	2.37E-07	6.624702262

Table S7: SNP genotypes obtained from sequences on CFA32, the fur length locus. Positions of SNPs discovered in this study as well as there genotypes in long and short-haired dogs. Primers used to obtain the sequences from which the SNPs were discovered are listed in the table S4. Only one SNP, position 7,473,337, is perfectly associated with the phenotype in this dataset.

				1	2	3	4	5	6	7	8	9	10
				HAVANESE	AM. ESKIMO	STD. POODLE	DACHSHUND[d]	ENTLEBUCHER	DACHSHUND	DACHSHUND	COLLIE	BOSTON TERRIER	PUG
	MARKERS	position	distance	LONG				SHORT					
	SQ7498	7421159	3263	AA	AT		AT	AA	TT	TT	TT	TT	TT
	SQ7499	7424422	17622	GG	TG	TG		GG	TT	TT	TT	TT	TT
	SQ7539	7442044	1474	CC	CC	CT	CT	CT	TT	TT	TT	TT	TT
	SQ7492	7443518	48	CC	CC	TC	CC	CC	CC	CC	CC	CC	CC
	SQ7492	7443566	4165	GG	GG	GG	GT	GG	GT	GG	GG	TT	TT
	SQ7490	7447731	28	AA	AA	AA	AG	AA	AG	AA	AA	GG	GG
	SQ7490	7447759	15	CC	CC	CC	CT	CC	CT	CC	CC	TT	TT
	SQ7490	7447774	0	GG	GG	GG	GG	GT	GG	GG	GG	GG	GG
	SQ7490	7447774	81	TT	TT	TT	CT	TT	CT	TT	TT	CC	CC
	SQ7490	7447855	14	AA	AA	AA	AT	AA	AT	AA	AA	TT	TT
	SQ7490	7447869	200	CT	TT	CT	CT	CT	CT	TT	TT	CC	CC
	SQ7491	7448069	162	AA	AA	AA	GA	GA	GA	AA	AA	GG	GG
	SQ7491	7448231	3778	TT	TT	TT	GT	TT	GT	TT	TT	GG	GG
	SQ7487	7452009	4	AA	AA	AA	GA	GA	GA	AA	AA	GG	GG
	SQ7487	7452013	3576	CC	CC	CC	GC	GC	GC	CC	CC	GG	GG
	SQ7543	7455589	1727	CC	CC	CT	CT	CT	CT	CC	CC	TT	TT
	AFFY[a]	7457316	1313										
	SQ7544/7485	7458629	3455	TT	AT	AT	AT	TT	TT	TT	TT	TT	TT
	SQ7480	7462084	353	TT	CT	CT	CT	TT	TT	TT	TT	TT	TT
	SQ7481	7462437	91	TT	CT	CT	CT	TT	TT	TT	TT	TT	TT
	SQ7481	7462528	45	GG	GA	GA	GA	GA	GG	GG	GG	GG	GG
	SQ7481	7462573	315	TT	CT	CT	CT	TT	TT	TT	TT	TT	TT
	SQ7483	7462888	45	TT	CT	CT	CT	CT	TT	TT	TT	TT	TT
	SQ7483	7462933	73	GG	GA	GA	GA	GG	GG	GG	GG	GG	GG
	SQ7483	7463006	74	GG	GA	GA	GA	GA	GG	GG	GG	GG	GG
	SQ7483	7463080	18	CC	CT	CT	CT	CC	CC	CC	CC	CC	CC
	SQ7483	7463098	1739	GG	GC	GC	GC	GG	GG	GG	GG	GG	GG
	SQ7488	7464837	2786	GG	AG	AG	AG	AG	GG	GG	GG	GG	GG
	SQ7479	7467623	60	GG	GA	GA	GA	GA	GG	GG	GG	GG	GG
	SQ7479	7467683	293	AA	AC	AC	AC	AC	AA	AA	AA	AA	AA
	SQ7477	7467976	56	AA	AG	AG	AG	AG	AA	AA	AA	AA	AA
	SQ7477	7468032	90	TT	CT	CT	CT	CC	TT	TT	TT	TT	TT
	SQ7477	7468122	385	GG	GC	GC	GC	GG	GG	GG	GG	GG	GG
	SQ7476	7468507	39	TT	CT	CT	CT	CT	TT	TT	TT	TT	TT
	SQ7476	7468546	780	GG	GA	AA	GA	GA	GG	GG	GG	GG	GG
	SQ7546	7469326	92	AA	AG	AG	AG	AG	AA	AA	AA	AA	AA
	SQ7546	7469418	220	CC	CG	CC	GC	GC	GG	GG	GG	GG	GG
	SQ7548	7469638	370	TT	CT	CT	CT	TT	TT	TT	TT	TT	TT
	SQ7547	7470008	237	TT	CT	CC	CC	CT	CC	CC	CC	CC	CC
	SQ7547*[c]	7470245	467	GG	GG	GG	GG	GG	AA	AA	AA	AA	AA

SEQUENCED REGION	SQ7550	7470712	281		CC	CC	CC	CT	CC	CC	CC	CC	CC	
	SQ7550	7470993	312		CC	CC	CC	CT	CC	CC	CC	CC	CC	
	SQ7474	7471305	650	CC	CC	CT	CC	CC	TT	TT	TT	TT	TT	
	SQ7472	7471955	113	CC		CG	CC	CC	CC	CC	CC	CC	CC	
	SQ7472	7472068	43	AA	AA	CA	AA	AA	AA	AA	AA		AA	
	SQ7472	7472111	95	GG	GG	GG	GA	GA	GG	GG	GG		GG	
	SQ7472	7472206	98	GG	AA	AA	AA	AA	GG	GG	GG	GG	GG	
	SQ7465-SQ7466	7472304	192	AA	AA	AA	AA	GG	AA	AA	AA	AA	AA	Homozygous region
	SQ7466-SQ7582	7472496	388	CC		CC	CC	CC	CC	CC	CC	CC	CC	
	SQ7346-SQ7318	7472884	2	CC	CC	CC	CT	TT	CC	CC	CC	CC	CC	
	SQ7346-SQ7318	7472886	12	AA	AA	AA	AC	CC	AA	AA	AA	AA	AA	
	SQ7346*[c]	7472898	305	GG	GG	GG	GG	GG	AA	AA	AA	AA	AA	
	SQ7580*[c]	7473203	134	-/-	-/-	-/-	+/-	-/-	+/+	+/+	+/+	+/+	+/+	
	SQ7319[e]	7473337	1145	TT	TT	TT	TT	GG	GG	GG	GG	GG	GG	
	SQ7567	7474482	397	+/+	+/+	+/+	+/-	-/-	+/-	-/-	-/-	+/+	+/+	
	SQ7575	7474879	88	CC		CC	CC	CT	CC	CC	CC	CC	CC	
	SQ7575R	7474967	104	GG	GG	GT	GT	TT	TT	TT	TT	GG	GG	
	SQ7575-SQ7569	7475071	32	TT	TT	CT	CT	CT	CC	CC	CC	TT	TT	
	SQ7575-SQ7569	7475103	407	-/-	-/-	+/-	+/-	+/-	+/+	+/+	+/+	-/-	-/-	
	SQ7762	7475510	35	CC	CC	CT	CT	CC				CC	CC	
	SQ7762	7475545	110	CC	CC	CT	CT	CC				CC	CC	
	SQ7556	7475655	201	CC	CC	CC	CC	CC	CC	CC	CC	CC	CC	
	SQ7556	7475856	27	AA	AA	AA	AA	AA	CC	CC	CC	AA	AA	
	SQ7556	7475883	47	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	
	SQ7556	7475930	1242	CC	CC	CT	CT	CC	TT	TT	TT	CC	CC	
	SNPlex[b]	7477172												

a) The upper and lower boundaries of the homozygous region identified in the whole genome scan.

b) The lower boundaries of the homozygous region identified in the SNPlex fine Mapping (Applied Biosystems).

c) Additional dogs were genotyped at positions marked with an * in order to verify the association: SQ7547 - one long haired dog had the short genotype and 4 short-haired dogs had the long genotype, SQ7346 - 5 short-haired dogs including a wolf had the long genotype.

d) Long hair is not fixed in the dachshund, therefore we did not include this dog when identifying a homozygous region in which to search for the mutation.

e) SNP showing the strongest association in both the SNPlex and sequencing datasets.

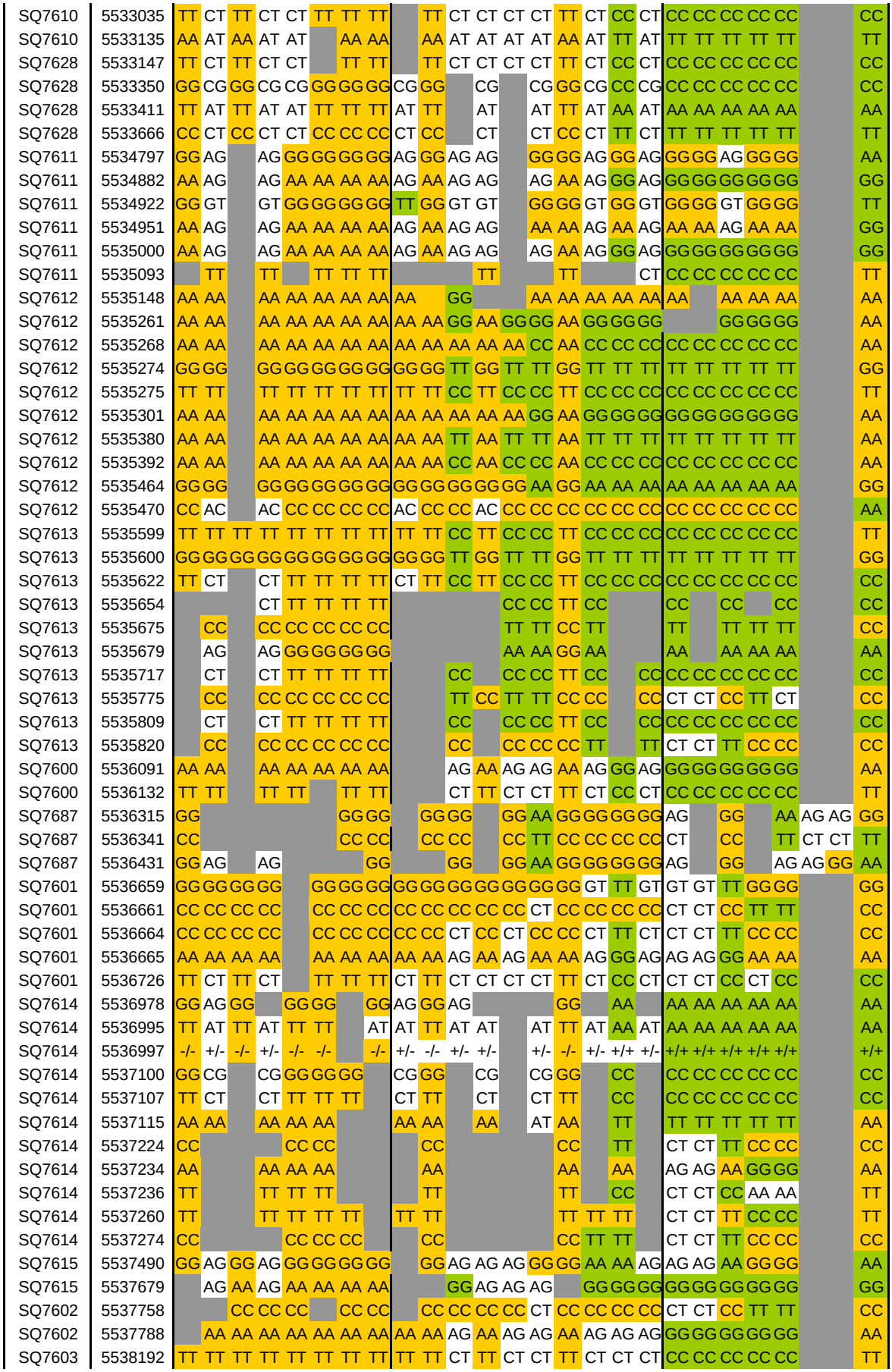
Table S8. Positions of 59 SNPs shown in Figure S4 and there genotypes in 668 dogs including 91curly haired (cases) and 577 not curly haired (control) dogs. Single marker chi-squared association values calculated using PLINK are listed in the last two columns of the table.

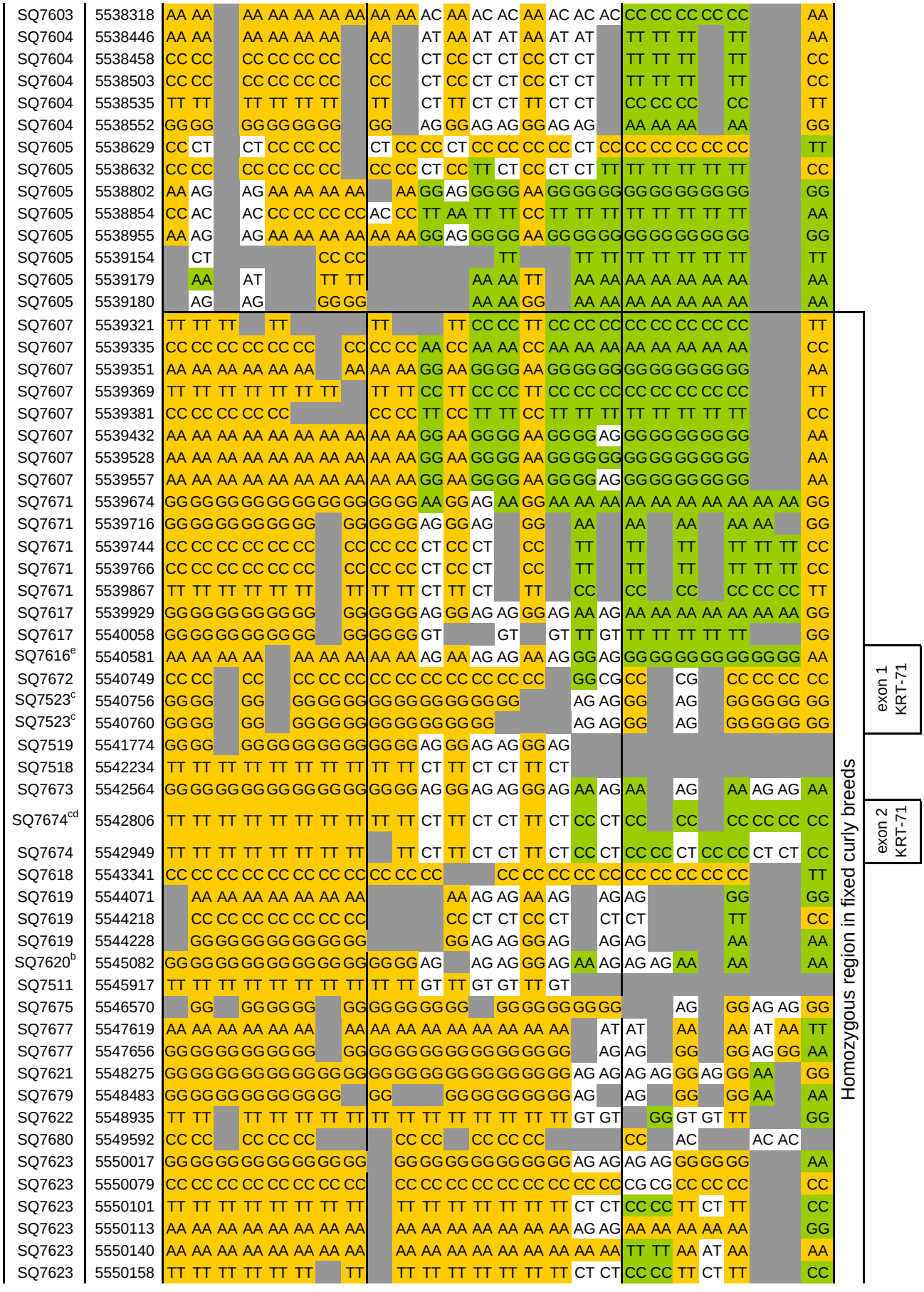
SNPs Name	Position	Allele A	Allele B	P	-log(pValue)
BICF2G630138039	4967176	C	T	1.05E-09	8.977571629
BICF2G630138044	4978651	A	G	0.3755	0.425390059
BICF2G630138050	4993849	C	G	0.3821	0.417822962
BICF2P87330	5017959	A	G	0.6222	0.206069993
BICF2P1026912	5052085	A	G	7.65E-05	4.116338565
BICF2G630138105	5077862	G	A	0.5261	0.278931698
BICF2G630138120	5100098	C	T	0.01113	1.953504836
BICF2S23160960	5148729	C	T	4.49E-13	12.34794715
BICF2P508051	5174490	T	C	0.8627	0.064140202
BICF2P961848	5187936	C	T	0.3448	0.462432743
BICF2P371124	5194293	T	C	3.19E-26	25.49634548
BICF2P420175	5202833	C	T	1.36E-16	15.86774031
BICF2P1077589	5222024	A	G	0.05563	1.25469094
BICF2G630138171	5247225	G	A	1.22E-05	4.914352712
BICF2G630138178	5270376	G	A	0.03225	1.491470281
BICF2G630138191	5291199	T	A	1.62E-06	5.790484985
BICF2S23530490	5299987	A	G	9.47E-05	4.023604163
BICF2G630138213	5310323	T	C	2.77E-06	5.556893543
BICF2G630138253	5323552	T	C	4.66E-09	8.331241458
BICF2P58381	5332310	T	G	0.5375	0.269621531
BICF2P232376	5343650	A	G	0.001275	2.894489815
BICF2P763738	5353368	C	T	4.96E-09	8.30434324
BICF2G630138293	5363891	C	G	0.2444	0.611898798
BICF2G630138320	5374209	T	A	1.79E-09	8.747389659
BICF2P1408366	5384201	G	A	1.82E-11	10.74088416
BICF2G630138348	5405901	A	G	0.002788	2.554707231
BICF2P320026	5418384	C	T	0.2079	0.682145511
BICF2G630138386	5440913	A	G	1.56E-10	9.808269607
BICF2G630138391	5451880	T	C	0.02685	1.57105571
BICF2G630138397	5458251	A	G	1.10E-14	13.95939766
BICF2P29801	5466995	C	G	3.77E-35	34.42331319
BICF2S23244185	5471341	A	G	1.81E-07	6.742561433
BICF2G630138405	5480346	A	G	1.46E-08	7.835349784
BICF2G630138408	5492190	C	T	0.0001808	3.742801574
BICF2P442907	5501761	G	T	1.39E-23	22.8569852
BICF2G630138435	5525002	T	C	8.00E-08	7.0970186
BICF2P981269	5541113	C	T	4.59E-37	36.33847126
BICF2P1254298	5545082	G	A	4.31E-79	78.36542198

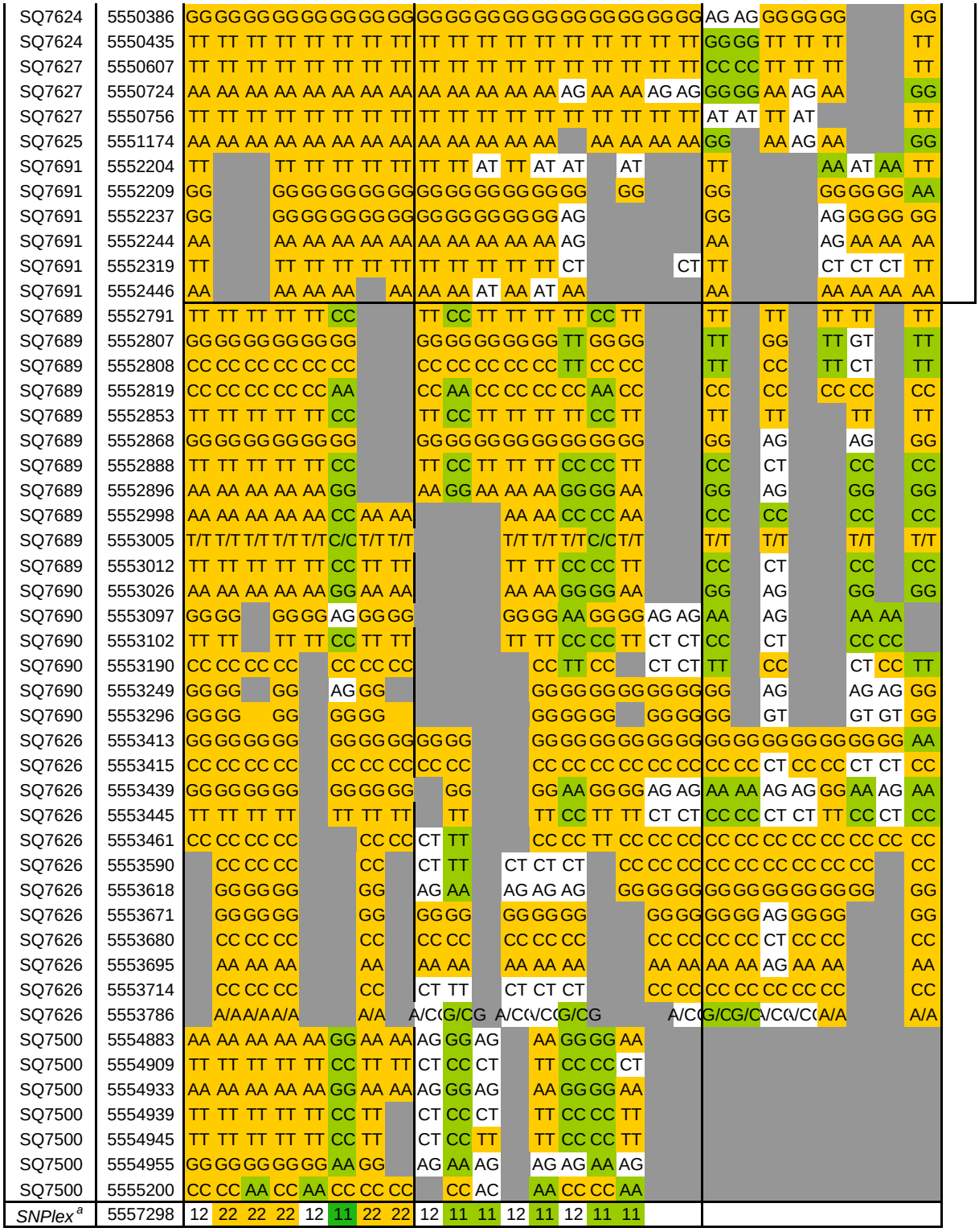
BICF2S2368146	5557298	C	T	7.30E-19	18.13643924
BICF2P711220	5568947	T	C	0.1158	0.936291441
BICF2S23655220	5580558	C	T	0.006047	2.218460031
BICF2P1084655	5591240	C	T	0.0001292	3.888737486
BICF2P1454069	5603613	A	G	4.43E-14	13.35398859
BICF2P413442	5650118	C	T	0.0546	1.262807357
BICF2P962829	5661580	C	T	9.15E-10	9.038626372
BICF2P457635	5692701	T	C	6.83E-20	19.16589734
BICF2S2439986	5713467	C	G	1.94E-05	4.711974465
BICF2G630138453	5747820	G	A	9.70E-13	12.0133626
BICF2G630138465	5757842	G	A	0.0005478	3.261377972
BICF2P590169	5778762	G	A	1.22E-11	10.91435271
BICF2G630138606	5821450	T	G	0.1898	0.721703792
BICF2S23628012	5844312	A	G	0.02501	1.601886308
BICF2G630138666	5876191	T	C	0.19	0.721246399
BICF2P501052	5885754	A	T	4.06E-16	15.39179499
BICF2G630138694	5906561	C	T	1.76E-09	8.755722879
BICF2P708810	5917014	G	A	1.31E-09	8.881735274
BICF2G630138732	5947669	C	A	1.98E-12	11.7044329
BICF2G630138744	5959581	G	C	9.85E-07	6.006475597
BICF2P651167	5969708	G	A	5.25E-12	11.28008894

Table S9: SNPs genotyped from sequencing within the region on CFA27 associated with curly fur. Shown are the positions of 200 SNPs discovered around the SNPlex homozygous region as well as their genotypes in curly and non-curly haired dogs. Orange highlights the homozygous major allele in cases, green is the homozygous minor allele in cases, white is heterozygous and gray indicates no data. Primers used to obtain the sequences from which the SNPs were discovered are listed in Table S4.

		Irish Water Spaniel	Irish Water Spaniel	Irish Water Spaniel	Irish Water Spaniel	Std. Poodle	Std. Poodle	Std. Poodle	Std. Poodle	Portuguese Water Dog	Portuguese Water Dog	Portuguese Water Dog	Portuguese Water Dog	Kuvasz	Kuvasz	Kuvasz	Kuvasz	Soft Coated Wheaten Terrier	Soft Coated Wheaten Terrier	Dachshund	Dachshund	Dachshund	Dachshund	Dachshund	Dachshund	Dachshund	Dachshund
Markers	Position	Fixed curly breeds								Non fixed curly breeds										Non curly breeds							
SQ7535[a]	5525002	CC	CC		CC	CC	TT	CC	CC	CT	TT	TT	CT	TT	TT	TT	CT										
SQ7533	5526163	CC	CC	TT	CC	CT	TT	CC	CC	CT	TT	CT		CT	TT	TT	CT										
SQ7533	5526414	GG	GG	CC	GG	CG	CC	GG	GG	CG	CC	CG	CG	CG	CC	CC	CG										
SQ7533	5526435	AA	AA	CC	AA	AC	CC	AA	AA	AC	CC	AC	AC	AC	CC	CC	AC										
SQ7532	5527752	CT	TT	TT	CT	CT	TT	TT	TT	TT	TT	CT	TT	CT	TT	TT	TT										
SQ7532	5527827	CC	CC	CC	CC	CT	CC	CC	CC	CC	CC	CT	CC	CT	CC	CC	CC										
SQ7594	5528122	TT	TT		TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	CT	TT	TT			TT
SQ7594	5528329	GT	GT		TT	GG	TT	GG	GG	TT	TT	TT	TT	TT	TT	TT	GT		TT	GT		GT	TT				TT
SQ7594	5528386	AG	GG		AG	AG	GG	GG	GG	GG	GG	AG	GG	AG	GG	GG	GG	AA	AA	AG	AG	GG	AA	AG			GG
SQ7681	5528910	CC	CC	CC	AC	CC	CC		CC	AC	CC	CC	AC	CC	AC		CC	CC	CC	CC	CC	CT	CC	CC	CC	CC	AA
SQ7681	5528970	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	CT	TT	TT	CT	TT	CT	CT	TT	CT	TT	TT	TT	CC
SQ7681	5528975	CT	CC	CC	TT	CC	CC	CC	CC	CC	CC	CT	CC	CT	CC	CC	CC	CT	TT	CC	CC	CC	CT	CT	CC	CC	CC
SQ7596	5529246	CC	CC	CC	CC	CC	CC	CC	CC	CC	CC	CC	CC	CC	CC	CC	CC	CC	CC	TT	TT	CC	CC	CC			
SQ7596	5529258	AG	GG	GG	AA	GG	GG	GG	GG	GG	GG	AG	GG	GG	GG	GG	GG	AG	AA	GG	GG	GG	AG	AG			
SQ7597	5529449	AA	AA		GG	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA		GG	AA	AA	AA		AA			GG
SQ7597	5529524	GG	GG		AG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG		GG	GG	GG	GG		GG	AG	GG	AA
SQ7683	5530270	CC	CC		CC	CC	CC				CC	CT	CC			CC	CC	CT		CC		CC		TT	CC	CT	CC
SQ7598	5530291	TT	TT		TT	TT	TT		TT		TT		TT	CT		TT	TT	CC	TT	TT	TT	TT	TT	CC	TT	CT	TT
SQ7598	5530558	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	CG	GG	CG		GG	GG	CG	CG	GG	GG	GG	CG	CC			GG
SQ7598	5530624	GG	GG	GG	GG	GG	GG	GG	GG	GG	GG	AG	GG	AG	GG	GG	GG		GG	GG		GG	AG	AA	GG	GG	GG
SQ7608	5531233	AA	AA	AA	AA	AA	AA	AA		AA	AA	AG	AA	AG	AA	AA	AA	AG	AG	AA	AA	AA	AG	GG			AA
SQ7608	5531249	CC	CC	CC	CC	CC	CC	CC		CC	CC	CG	CC	CG	CC	CC	CC	CG	CG	CC	CC	CC	CG	GG			CC
SQ7608	5531284	AA	AA	AA	AA	AA	AA	AA		AA	AA	AG	AA	AG	AA	AA	AA	AG	AG	AA	AA	AA	AG	GG			AA
SQ7608	5531323	TT	TT	TT	TT	TT	TT	TT		TT	TT	CT	TT	CT	TT	TT	TT	CT	CT	TT	TT	TT	CT	CC			TT
SQ7608	5531332	GG	GG	GG	GG	GG	GG	GG		GG	GG	AG	GG	AG	GG	GG	GG	AG	AG	GG	GG	GG	AG	AA			GG
SQ7608	5531393	AA	AA	AA	AA	AA	AA	AA		AA	AA	AG	AA	AG	AA	AA	AA	AG	AG	AA	AA	AA	AG	GG			AA
SQ7608	5531468	GG	GG	GG	GG	GG	GG	GG		GG	GG	AG	GG	AG	GG	GG	GG	AG	AG	GG	GG	GG	AG	AA			GG
SQ7608	5531486	GG	AG	GG	AG	GG	GG	GG		AG	GG	AG	AG	AG	GG	GG	GG	AG	AG	GG	GG	GG	AG	AA			AA
SQ7608	5531493	AA	AG	AA	AG	AA	AA	AA		AG	AA	AG	AG	AG	AA	AA	AA	AG	AG	AA	AA	AA	AG	GG			GG
SQ7599	5532254				CT				CC				CT					TT	CT		TT	TT					TT
SQ7599	5532361				CG			GG	GG	CG	GG	CG	CG	CG		GG	CG	CC	CG		CC	CC	CC	CC			CC
SQ7599	5532481		AG		AG			AA	AA	AG	AA	AG	AG	AG	AG		AG	GG	AG		GG	GG	GG	GG			GG
SQ7610	5532831	GG	AG	GG	AG	AG		GG	GG		GG	AG	AG	AG	AG	GG	AG	AA	AG	AA	AA	AA	AA	AA			AA
SQ7610	5533022	AA	AG	AA	AG	AG	AA	AA	AA		AA	AG	AG	AG	AG	AA	AG	GG	AG	GG	GG	GG	GG	GG			GG
SQ7610	5533027	CC	AC	CC	AC	AC	CC	CC	CC		CC	AC	AC	AC	AC	CC	AC	AA	AC	AA	AA	AA	AA	AA			AA
SQ7610	5533029	GG	AG	GG	AG	AG	GG	GG	GG		GG	AG	AG	AG	AG	GG	AG	AA	AG	AA	AA	AA	AA	AA			AA
SQ7610	5533034	TT	AT	TT	AT	AT	TT	TT	TT		TT	AT	AT	AT	AT	TT	AT	AA	AT	AA	AA	AA	AA	AA			AA




SQ7603 5538318
SQ7604 5538446
SQ7604 5538458
SQ7604 5538503
SQ7604 5538535
SQ7604 5538552
SQ7605 5538629
SQ7605 5538632
SQ7605 5538802
SQ7605 5538854
SQ7605 5538955
SQ7605 5539154
SQ7605 5539179
SQ7605 5539180
SQ7607 5539321
SQ7607 5539335
SQ7607 5539351
SQ7607 5539369
SQ7607 5539381
SQ7607 5539432
SQ7607 5539528
SQ7607 5539557
SQ7671 5539674
SQ7671 5539716
SQ7671 5539744
SQ7671 5539766
SQ7671 5539867
SQ7617 5539929
SQ7617 5540058
SQ7616e 5540581
SQ7672 5540749
SQ7523c 5540756
SQ7523c 5540760
SQ7519 5541774
SQ7518 5542234
SQ7673 5542564
SQ7674cd 5542806
SQ7674 5542949
SQ7618 5543341
SQ7619 5544071
SQ7619 5544218
SQ7619 5544228
SQ7620b 5545082
SQ7511 5545917
SQ7675 5546570
SQ7677 5547619
SQ7677 5547656
SQ7621 5548275
SQ7679 5548483
SQ7622 5548935
SQ7680 5549592
SQ7623 5550017
SQ7623 5550079
SQ7623 5550101
SQ7623 5550113
SQ7623 5550140
SQ7623 5550158
exon 1 KRT-71
exon 2 KRT-71
Homozygous region in fixed curly breeds



a) SNPs that represent the boundaries of the homozygous regions in the SNPlex data.
b) SNPs genotyped using the SNPlex system (Applied Biosystems).
c) The type of these SNP correspond to a NON_Synonymous_coding
d) SNP showing the strongest association based on this data and the sequencing of 661 additional dogs.
e) Excluded SNP after sequencing on the 661 additional dogs.

Table S10. Combinations of genotypes create seven different coat phenotypes.

PHENOTYPE	*FGF5*	*RSPO2*	*KRT71*
Short	GG or GT	11	CC or CT *
Wire	GG or GT	22 or 12	CC
Wire and Curly	GG or GT	22 or 12	TT or CT
Long	TT	11	CC
Long with Furnishings	TT	22 or 12	CC
Curly	TT	11	TT or CT
Curly with Furnishings	TT	22 or 12	TT or CT

* The TT genotype was never found in this combination, even though it would likely also display a short phenotype.

Supplemental References

1. T. Maniatis, E. F. Fritsch, J. Sambrook, *Molecular cloning: A laboratory manual*. (Cold Spring Harbor Laboratory Press, N.Y., ed. 1st, 1982).
2. N. Rabbee, T. P. Speed, *Bioinformatics* **22**, 7 (2006).
3. S. Purcell *et al.*, *Am. J. Hum. Genet.* **81**, 559 (2007).
4. A. K. Wong, M. W. Neff, *Anim Genet*, (Mar 20, 2009).
5. M. W. Neff *et al.*, *Genetics* **151**, 803 (Feb, 1999).
6. K. Lange, D. Weeks, M. Boehnke, *Genet Epidemiol* **5**, 471 (1988).
7. American Kennel Club, *The Complete Dog Book*. (Howell Book House, New York, NY, ed. 19th Edition Revised, 1998).
8. K. Lindblad-Toh *et al.*, *Nature* **438**, 803 (Dec 8, 2005).
9. S. Rozen, H. Skaletsky, *Methods Mol Biol* **132**, 365 (2000).
10. B. Ewing, P. Green, *Genome Res* **8**, 186 (1998).
11. D. Gordon, C. Abajian, P. Green, *Genome Res* **8**, 195 (1998).
12. D. A. Nickerson, V. O. Tobe, S. L. Taylor, *Nucleic Acids Res* **25**, 2745 (1997).
13. M. Kawano *et al.*, *J Invest Dermatol* **124**, 877 (May, 2005).
14. L. J. Maccoux, D. N. Clements, F. Salway, P. J. Day, *BMC Mol Biol* **8**, 62 (2007).
15. S. H. Wood, D. N. Clements, N. A. McEwan, T. Nuttall, S. D. Carter, *Vet Immunol Immunopathol* **126**, 392 (Dec 15, 2008).