Paw Print Genetics
A division of Genetic Veterinary Sciences, Inc.

Coat Color and Trait Certificate

Call Name:	HOPE	**Laboratory #:**	94187
Registered Name:	TANASI'S REBELLIONS ARE BUILT ON HOPE	**Registration #:**	DN49562303
		Microchip #:	956000005077182
Breed:	Australian Shepherd	**Certificate Date:**	June 22, 2018
Sex:	Female		
DOB:	March 2017		

This canine's DNA showed the following genotype(s):

Coat Color/Trait Test	Gene	Genotype	Interpretation
A Locus (Agouti)	*ASIP*	a^t/a^t	Tricolor, black and tan
B Locus (Brown)	*TYRP1*	B/b or b/b	Carries brown and may have brown or black coat, nose and foot pads
D Locus (Dilute)	*MLPH*	D/D	Non dilute
E Locus (Yellow/Red)	*MC1R*	E/E	Black
E^g Locus (Grizzle, Afghan Hound Type)	*MC1R*	N/N	No grizzle
E^m Locus (Melanistic Mask)	*MC1R*	E^m/N	Melanistic mask (carrier)
H Locus (Harlequin, Great Dane Type)	*PSMB7*	h/h	No harlequin
K Locus (Dominant Black)	*CBD103*	k^y/k^y	Agouti expression allowed
M Locus (Merle)	*PMEL*	m/m	Non merle
S Locus (White Spotting, Parti, or Piebald)	*MITF*	S/S	No white spotting, flash, parti, or piebald
SD Locus (Shedding)	*MC5R*	SD/SD	High shedding
T Locus (Natural Bobtail)	*T*	t/T	Bobtail

Interpretation:

This dog carries two copies of **a^t** which results in tan points and can also present as a black and tan or tricolor coat color. However, this dog's coat color is also dependent on the E, K, and B genes. The tan point coat color is only expressed if the dog is also E/E or E/e at the E locus and k^y/k^y at the K locus. This dog will pass on **a^t** to 100% of its offspring.

The overall B locus genotype for a dog is determined by the combination of genotypes present at the b^c, b^d, and b^s loci. The b^c, b^d, and b^s variants confer brown when at least one of these DNA changes is present on both genes of the dog at the B locus. This dog carries one copy of **B** and one copy of **b** at the b^c, b^d, and b^s loci. The presence of these variants on a single copy of the gene cannot be excluded. Thus, due to the particular combination of variants detected, the overall B locus genotype of this dog is **B/b** or **b/b** and cannot be determined without additional testing of parental samples. Therefore, this dog carries brown and may have brown or black coat, nose and foot pads.

If any two of the variants each occur on separate copies of the B locus, the dog will be brown (**b/b**). However, if these variants occur on the same copy of the gene, the dog will be black (**B/b**). Therefore, the final B locus genotype for this dog can be inferred by evaluating the color of this dog's nose. If this dog's nose is brown, the final B locus genotype of this dog is **b/b** and this dog will pass on **b** to 100% of its offspring. If this dog's nose is black, the final B locus genotype of this dog is **B/b** and this dog will pass on **b** to 50% of its offspring. If this dog is B/b it can produce offspring with a black or brown coat, nose and foot pads. However, this dog's coat color is also dependent on the E, K, and A genes.

This dog carries two copies of **D** which does not result in the "dilution" or lightening of the black and yellow/red pigments that produce the dog's coat color. The base coat color of this dog will be primarily determined by the E, K, A, and B genes. This dog will pass on **D** to 100% of its offspring.

This dog carries two copies of **E** which allows for the production of black pigment. However, this dog's coat color is also dependent on the K, A, and B genes. This dog will pass on **E** to 100% of its offspring.

This dog carries two copies of **N** which does not result in a grizzle coat color pattern. This dog will pass on **N** to 100% of its offspring.

This dog carries one copy of $\mathbf{E^m}$ and one copy of **N** which results in a melanistic mask on the muzzle of the dog. However, a melanistic mask may be unrecognizable on a dog with a dark coat color. This dog will pass on $\mathbf{E^m}$ to 50% of its offspring and **N** to 50% of its offspring.

This dog carries two copies of **h** and will not have a harlequin coat color. The dog will pass on **h** to 100% of its offspring.

This dog carries two copies of $\mathbf{k^y}$ which allows for the expression of the agouti gene (A locus) which can result in a variety of coat colors including sable/fawn, tricolor, tan points, black or brown. However, this dog's coat color is dependent on its genotypes at the E, A and B genes. This dog will pass on $\mathbf{k^y}$ to 100% of its offspring.

This dog carries two copies of **m**, the non-merle, wild-type allele of the *PMEL* gene, and, therefore, does not have a merle coat color/pattern. This dog will pass on one copy of the **m** allele to 100% of its offspring.

This dog carries two copies of **S** which results in a solid coat with no white spotting, flash, parti, or piebald coat color. This dog will pass on one copy of **S** to 100% of its offspring.

This dog carries two copies of **SD** which has been associated with higher shedding. However, the overall degree of shedding for this dog is dependent on the combination of this dog's genotypes at the SD and IC loci. This dog will pass **SD** on to 100% of its offspring.

This dog carries one copy of the dominant **T** allele and one copy of the recessive **t** allele which produces a natural bobtail. This dog will pass on the **T** allele to 50% of its offspring and the **t** allele to 50% of its offspring**.**

Paw Print Genetics® has genetic counseling available to you at no additional charge to answer any questions about these test results, their implications and potential outcomes in breeding this dog.

Christina J Ramirez, PhD, DVM, DACVP
Medical Director

Casey R Carl, DVM
Associate Medical Director

Normal results do not exclude inherited mutations not tested in these or other genes that may cause medical problems or may be passed on to offspring. These tests were developed and their performance determined by Paw Print Genetics®. This laboratory has established and verified the tests' accuracy and precision. Because all tests performed are DNA-based, rare genomic variations may interfere with the performance of some tests producing false results. If you think these results are in error, please contact the laboratory immediately for further evaluation. In the event of a valid dispute of results claim, Paw Print Genetics will do its best to resolve such a claim to the customer's satisfaction. If no resolution is possible after investigation by Paw Print Genetics with the cooperation of the customer, the extent of the customer's sole remedy is a refund of the fee paid. In no event shall Paw Print Genetics be liable for indirect, consequential or incidental damages of any kind. Any claim must be asserted within 60 days of the report of the test results.