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

Coat Color and Trait Certificate

Call Name:	Tooin	**Laboratory #:**	394245
Registered Name:	-	**Registration #:**	-
Breed:	French Bulldog	**Certificate Date:**	April 18, 2023
Sex:	Male		
DOB:	Dec. 2022		

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	Black coat, nose and foot pads (does not carry brown)
Co Locus (Cocoa, French Bulldog Type)	*HPS3*	CO/CO	Black coat, nose and foot pads (does not carry cocoa)
Cu Locus (Curly Hair)	*KRT71*	Cu/Cu	Straight coat
D Locus (Dilute)	*MLPH*	D/d	Non-dilute (carries one copy of dilute)
E Locus - E^m (Melanistic Mask)	*MC1R*	N/N	No melanistic mask
E Locus - e (Apricot/Cream/Red/Yellow, Common Variant Found in Many Breeds)	*MC1R*	E/E	Black
I Locus (Intensity)	*MFSD12*	I/i	Normal intensity (carrier)
IC Locus (Improper Coat/Furnishings)	*RSPO2*	IC/IC	No furnishings, improper coat
K Locus (Dominant Black)	*CBD103*	k^y/k^y	Agouti expression allowed
L Locus (Long Hair/Fluffy) - Lh^1 (Common Variant Found in Many Breeds)	*FGF5*	Lh/Lh	Longhaired (carries two copies of long hair)
L Locus (Long Hair/Fluffy) - Lh^4 (Afghan Hound, Eurasier, French Bulldog Type)	*FGF5*	Sh/Sh	Shorthaired (does not carry long hair)
S Locus (White Spotting, Parti, or Piebald)	*MITF*	S/s^p	Limited white spotting, flash, parti, or piebald (carrier)
SD Locus (Shedding)	*MC5R*	sd/sd	Low shedding

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.

This dog does not carry any copies of the b^a, b^c, b^d or b^s mutations and has a B locus genotype of **B/B**. Thus, this dog typically will have a black coat, nose, and foot pads. However, this dog's coat color is dependent on the genotypes of many other genes. This dog will pass one copy of **B** to 100% of its offspring and cannot produce b/b dogs.

This dog does not carry any copies of the co (cocoa) mutation and has a Co Locus genotype of **CO/CO**. Thus, this dog typically will have a black coat, nose, and foot pads. However, this dog's coat color is dependent on the genotypes of many other genes including the B Locus (Brown). This dog will pass one copy of **CO** to 100% of its offspring and cannot produce co/co (cocoa) dogs.

This dog carries two copies of **Cu** which results in a straight coat. However, the overall coat type of this dog is dependent on the combination of this dog's genotypes at the L, Cu, and IC loci. This dog will pass **Cu** on to 100% of its offspring.

This dog carries one copy of either the d^1 or d^2 mutation and has a D locus genotype of **D/d** which does not result in the "dilution" or lightening of the pigments that produce the dog's coat color. This dog will pass one copy of **D** to 50% of its offspring and one copy of **d** to 50% of its offspring. This dog can produce d/d offspring if bred to a dog that is also a carrier of a d mutation (D/d or d/d).

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 melanistic mask on the muzzle of the dog. This dog will pass on **N** to 100% of its offspring.

This dog carries one copy of the i mutation and has an I locus genotype of **I/i** which does not result in the lightening of the light, phaeomelanin pigments that produce the dog's coat color in an e/e dog. This dog will pass one copy of **I** to 50% of its offspring and one copy of **i** to 50% of its offspring. This dog can produce i/i offspring if bred to a dog that is also a carrier of an i mutation (I/i or i/i).

This dog carries two copies of **IC** and will therefore have no furnishings (improper coat). This dog does not carry the mutation for weak furnishings. However, the overall coat type of this dog is dependent on the combination of this dog's genotypes at the L, Cu, and IC loci. This dog will pass **IC** (improper coat) to 100% of its offspring and can produce puppies with improper coat if bred with a dog that carries one or two copies of the mutation for improper coat.

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 $\mathbf{Lh^1}$ making the overall L locus genotype of this dog **Lh/Lh**. The overall L locus genotype for a dog is determined by the combination of the genotypes at the Lh^1 and Lh^4 loci. The Lh variants confer long hair when at least one of these changes is present on both genes of the dog at the L Locus. If the dog has one or no copies of Lh, the dog will have a short coat. However, the overall coat type of this dog is dependent on the combination of this dog's genotypes at the L, Cu, and IC loci. This dog will pass $\mathbf{Lh^1}$ on to 100% of its offspring.

This dog carries one copy of **S** and one copy of $\mathbf{s^p}$ which results in limited white spotting, flash, parti, or piebald coat color due to the co-dominance of **S** and $\mathbf{s^p}$. This dog will pass on one copy of **S** to 50% of its offspring and one copy of $\mathbf{s^p}$ to 50% of its offspring.

This dog carries two copies of **sd** which has been associated with lower 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.

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.

Blake C Ballif, PhD
Laboratory & Scientific Director

Christina J Ramirez, PhD, DVM, DACVP
Medical Director

Paw Print Genetics® performed the testing on the dog listed on this certificate. The genes/traits reported here were selected by the client. Normal results do not exclude inherited mutations not tested in these or other genes that may cause variation in traits, medical problems or may be passed on to offspring. The results included in this report relate only to the items tested using the sample provided. These tests were developed and their performance determined by Paw Print Genetics This laboratory has established and verified the test(s)' accuracy and precision with >99.9% sensitivity and specificity. The presence of mosaicism may not be detected by this test. Non-paternity may lead to unexpected results. This is not a breed identification test. Because all tests performed are DNA-based, rare genomic variations may interfere with the performance of some tests producing false results. If you think any 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.