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

Coat Color and Trait Certificate

Call Name:	Lasso	**Laboratory #:**	324757
Registered Name:	-	**Registration #:**	-
Breed:	French Bulldog	**Certificate Date:**	Oct. 17, 2022
Sex:	Male		
DOB:	Jan. 2022		

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

Coat Color/Trait Test	Gene	Genotype	Interpretation
A Locus (Agouti)	*ASIP*	a^t/a	Tricolor, black and tan (carries bicolor/solid)
B Locus (Brown)	*TYRP1*	B/b	Black coat, nose and foot pads (carries one copy of brown)
Co Locus (Cocoa, French Bulldog Type)	*HPS3*	CO/co	Black coat, nose and foot pads (carries one copy of cocoa)
Cu Locus (Curly Hair)	*KRT71*	Cu/Cu	Straight coat
D Locus (Dilute)	*MLPH*	d/d	Dilute (carries two copies of dilute)
E Locus - e (Apricot/Cream/Red/Yellow, Common Variant Found in Many Breeds)	*MC1R*	E/e	Black (carries yellow/red)
I Locus (Intensity)	*MFSD12*	i/i	Reduced intensity, likely light shades or white
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*	Sh/Sh	Shorthaired (does not carry long hair)
L Locus (Long Hair/Fluffy) - Lh^4 (Afghan Hound, Eurasier, French Bulldog Type)	*FGF5*	Sh/Sh	Shorthaired (does not carry long hair)
M Locus (Merle)	*PMEL*	m/m	Non merle
S Locus (White Spotting, Parti, or Piebald)	*MITF*	S/s^p	Limited white spotting, flash, parti, or piebald (carrier)

Interpretation:

This dog carries one copy of $\mathbf{a^t}$ and one copy of **a** 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 $\mathbf{a^t}$ to 50% of its offspring and **a** to 50% of its offspring.

This dog carries one copy of one of the b 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 50% of its offspring and one copy of **b** to 50% of its offspring. This

dog can produce b/b offspring if bred to a dog that is also a carrier of a b mutation (B/b or b/b). Depending on the breed, b/b dogs may be referred to as brown, chocolate, liver or red.

This dog carries one copy 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 50% of its offspring and one copy of **co** (cocoa) to 50% of its offspring. This dog can produce co/co (cocoa) offspring if bred to a dog that is also a carrier of co (cocoa) (CO/co or co/co).

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 two copies of the same d mutation and has a D locus genotype of **d/d** which results in the "dilution" or lightening of the pigments that produce the dog's coat color. This dog will pass one copy of **d** to 100% 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 one copy of **E** and one copy 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 **E** on to 50% of its offspring and **e** to 50% of its offspring, which can produce a yellow/red coat (including shades of white, cream, yellow, apricot or red) if inherited with another copy of **e**.

This dog carries two copies of the i mutation and has an I locus genotype of **i/i** which results in the extreme lightening of the light, phaeomelanin pigments that produce the dog's coat color in e/e dogs. This dog will pass one copy of **i** to 100% 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 $\mathbf{k^y}$ 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 **Sh** at both the Lh^1 and Lh^4 loci making the overall L locus genotype of this dog **Sh/Sh**. 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^1 and Lh^4 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 **Sh** on 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 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.

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.