



Boxer Color Genetics

Coat Color & Marking Pattern Explained

Part I — Coat Color Inheritance

Boxers possess two inherent coat colors: fawn and brindle. Fawn coats range from light fawn to a darker mahogany fawn. Brindles, often mistaken for a standalone color, is actually a pattern of dark stripes overlaid on a fawn base coat. The intensity of that striping varies considerably from dog to dog — some brindles show only a few well-defined stripes, while others, sometimes called reverse brindles, are so heavily striped that the fawn underneath is barely visible, leading some to believe there are “black” boxers.

Each Boxer carries exactly two coat color genes — one passed down from the Sire and one from the Dam. Brindle (B) is the dominant gene, meaning a single copy is all it takes for a dog to display a brindle coat.

Gene Key	Phenotype
b = fawn gene (recessive)	bb → Fawn
B = brindle gene (dominant)	Bb or BB → Brindle

Note: A dog carrying one brindle gene (Bb) and one carrying two (BB) are visually indistinguishable — both look brindle. The only reliable evidence that a brindle dog is actually a Bb (single brindle) is the appearance of a fawn puppy in its offspring.

Cross 1: Fawn × Fawn (bb × bb)

	b	b
b	bb Fawn	bb Fawn
b	bb Fawn	bb Fawn
Result: 100% Fawn — pairing two fawn dogs guarantees fawn offspring regardless of ancestry		

Cross 2: Fawn × Double Brindle (bb × BB)

	B	B
b	Bb Single Brindle	Bb Single Brindle
b	Bb Single Brindle	Bb Single Brindle
Result: 100% Single Brindle (Bb) — every puppy is brindle but secretly carries one fawn gene		

Cross 3: Fawn × Single Brindle (bb × Bb)

	B	b
b	Bb Single Brindle	bb Fawn
b	Bb Single Brindle	bb Fawn
Result: 50% Fawn (bb) · 50% Single Brindle (Bb) — equal chance of either color		

Cross 4: Single Brindle × Single Brindle (Bb × Bb)

	B	b
B	BB Dbl Brindle	Bb Single Brindle
b	Bb Single Brindle	bb Fawn
Result: 25% Fawn · 50% Single Brindle · 25% Double Brindle — three-quarters appear brindle		

Cross 5: Single Brindle × Double Brindle (Bb × BB)

	B	B
B	BB Dbl Brindle	BB Dbl Brindle
b	Bb Single Brindle	Bb Single Brindle
Result: 100% Brindle — half will be single carriers (Bb), half will be double (BB)		

Cross 6: Double Brindle × Double Brindle (BB × BB)

	B	B
B	BB Dbl Brindle	BB Dbl Brindle
B	BB Dbl Brindle	BB Dbl Brindle
Result: 100% Double Brindle (BB) — fawn offspring are genetically impossible from this pairing		

Part II — White Modifying Gene Inheritance

Beyond coat color, Boxers display one of three distinct marking patterns: Classic (sometimes called solid/plain), flashy (white markings on the face, chest, neck, and/or legs), or white (where white covers the majority of the body). Like coat color, marking patterns are governed by just two genes — the solid gene (S) and the white gene (Sw or S-Locus). Unlike the brindle/fawn pair, however, neither marking gene dominates the other. The “white genes” are referred to as modifiers. When a dog inherits one of each (SSw), the result is a flashy puppy (heterozygous for the S-Locus gene).

Genotype	Pattern	Notes
SS	Plain	Two solid color genes
SSw	Flashy	One of each — blend effect
SwSw	White	Two white genes — full white coat

Keep in mind that a White Boxer is not a separate color — it is always either fawn or brindle beneath the white coat, which may simply cover the entire body. Also, because modifiers influence how marking genes express themselves, two genetically flashy dogs (both SSw) can look phenotypically different from one another. Breeders who wish to avoid producing white puppies can do so with certainty by breeding to a genetically plain boxer (Genetically testing negative for the S-Locus gene).

Cross 1: Plain × Plain (SS × SS)

	S	S
S	SS Plain	SS Plain
S	SS Plain	SS Plain
Result: 100% Plain — the only cross that completely eliminates both flashy and white outcomes		

Cross 2: Plain × Flashy (SS × SSw)

	S	Sw
S	SS Plain	SSw Flashy
S	SS Plain	SSw Flashy
Result: 50% Plain · 50% Flashy — white puppies cannot arise when one parent is genetically plain		

Cross 3: Flashy × Flashy (SSw × SSw)

	S	Sw
S	SS Plain	SSw Flashy
Sw	SSw Flashy	SwSw White
Result: 25% Plain · 50% Flashy · 25% White — white puppies are a statistical possibility		

* Cross 4: Plain × White (SS × SwSw)

	Sw	Sw
S	SSw Flashy	SSw Flashy
S	SSw Flashy	SSw Flashy
Result: 100% Flashy — an ideal pairing for breeders seeking flashy puppies with no risk of whites		

* Cross 5: Flashy × White (SSw × SwSw)

	Sw	Sw
S	SSw Flashy	SSw Flashy
Sw	SwSw White	SwSw White
Result: 50% Flashy · 50% White — half of all puppies expected to be white		

* Cross 6: White × White (SwSw × SwSw)

	Sw	Sw
Sw	SwSw White	SwSw White
Sw	SwSw White	SwSw White
Result: 100% White — no other marking outcome is genetically possible		

** As a side note, keep in mind that American Boxer Club does not condone breeding white boxers, but they are still eligible to be registered with American Kennel Club. They are invariably a pure-bred boxer, possessing the same genotype as their littermates, aside from color.*

Key Takeaways for Breeders

- Because brindle (B) is dominant, just one copy of that gene is sufficient to produce a brindle-coated dog.
- A fawn dog must carry two copies of the recessive fawn gene (bb). When both parents are fawn, every puppy in the litter will also be fawn — brindle offspring are simply not possible.
- There is no visible difference between a single brindle (Bb) and a double brindle (BB). Genotype can only be inferred if a brindle dog goes on to produce a fawn puppy, confirming it must be Bb.
- Purebred Boxers do not carry a gene for solid black. What may appear black is always a very heavily striped reverse brindle.
- The solid (S) and white (Sw) marking genes are co-equal — neither overrides the other. A dog inheriting one of each displays the intermediate flashy pattern.
- Pairing any genetically plain dog (SS) with any other Boxer makes it impossible to produce white puppies, regardless of the other parent's marking genotype.
- White is a marking pattern, not a coat color. Every white Boxer carries either a fawn or brindle coat underneath — the white simply masks it.
- Punnett square percentages represent statistical probabilities across many litters. Any individual litter may deviate from the expected ratios by chance.

References

<https://americanboxerclub.org/wp-content/uploads/2023/10/2019-genetic-research-coat-color.pdf>

<https://americanboxerclub.org/coat-colors-in-boxers/>

<https://animalgenetics.com/dog-tests/canine-pattern-tests/9-slocus/>

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