

Coat Colour: B-Locus (Brown Coat Colour)

Applicable Breeds: Numerous including Australian Shepherd, Border Collie, Brittany, Cardigan Welsh Corgi, Cocker Spaniel, Curly-Coated Retriever, Dachshund, Dalmatian, Doberman Pinscher, English Setter, English Springer Spaniel, Field Spaniel, Flat-coated retriever, German Long-haired Pointer, German Shepherd, German Short-haired Pointer, German Wire-haired Pointer, Large Munsterlander, Labrador Retriever, Pomeranian, Poodle, Portuguese Water Dog, Small Munsterlander, Weimaraner

There are several genes which are responsible for the determination of coat colour. At the present time Animal DNA Diagnostics Ltd can test for two of the major loci – the E-Locus, which can result in yellow-red hair colour, and the B-Locus, which can result in brown hair. Both of these can be carried as “hidden” genes and become visible in future generations. It is these “hidden” genes which DNA testing can reveal, enabling breeders to predict the likely coat colour outcomes with specified breeding combinations. Please study the Inheritance Chart (B-Locus and E-Locus) below to identify probable outcomes from different mating combinations.

The B-Locus is responsible for brown coloured hair, which is sometimes also described as chocolate or liver. The B-Locus is also responsible for nose colour. The B variant (which produces black hair) is dominant over the b variant (which produces brown hair).

Any dog with at least one copy of B, and which is not ee at the E-Locus, will have black coat colour; those with two copies of b will have brown coat colour. There are three known b variants, and all three will be tested for by Animal DNA Diagnostics Ltd.

Any dog with at least one B gene will have black nose and paw pads, while those with two b genes will have brown nose and paw pads. The B-Locus does not have any influence over dogs with yellow/red hair, but will determine nose colour in these dogs (brown if bb, whereas black if B or BB).

This test is particularly useful for breeders:

- To identify black dogs with hidden copies of b, i.e. hidden brown genes.

This test will be reported as:

BB : is black* and carries two copies of the black gene

Bb : is black* but carries a hidden brown gene

bb : is brown* and carries two brown genes

* in dogs which are not ee at the E-locus

Typical Breeding Outcomes:

Please study the Inheritance Chart (B-Locus and E-Locus) to identify probable outcomes from different mating combinations.

BB (black) X BB (black) = 100% BB (black)

BB (black) X Bb (black) = 50% BB (black), 50% Bb (black)

Bb (black) X Bb (black) = 25% BB (black), 50% Bb (black), 25% bb (brown)

Bb (black) X bb (brown) = 50% Bb (black), 50% bb (brown)

bb (brown) X bb (brown) = 100% bb (brown)

References

Schmutz SM, Berryere TG, Goldfinch AD (2002) TYRP1 and MC1R genotypes and their effects on coat color in dogs, *Mammalian Genome* 13: 380-387

Dog coat colour inheritance (B-Locus and E-Locus)

| | | Sire | | | | | | | | |
|------------|------------------------|-----------------------|---|--|--|---|--|--|--|--|
| | | BBEE Black | BBEe Black | BbEE Black | BbEe Black | BBee Yellow | Bbee Yellow | bbee Yellow | bbEE Brown | bbEe Brown |
| Dam | BBEE Black | All black | All black | All black | All black | All black | All black | All black | All black | All black |
| | BBEe Black | All black | $\frac{3}{4}$ black $\frac{1}{4}$ yellow | All black | $\frac{3}{4}$ black $\frac{1}{4}$ yellow | $\frac{1}{2}$ black $\frac{1}{2}$ yellow | $\frac{1}{2}$ black $\frac{1}{2}$ yellow | $\frac{1}{2}$ black $\frac{1}{2}$ yellow | All black | $\frac{3}{4}$ black $\frac{1}{4}$ yellow |
| | BbEE Black | All black | All black | $\frac{3}{4}$ black $\frac{1}{4}$ brown | $\frac{3}{4}$ black $\frac{1}{4}$ brown | All black | $\frac{3}{4}$ black $\frac{1}{4}$ brown | $\frac{1}{2}$ black $\frac{1}{2}$ brown | $\frac{1}{2}$ black $\frac{1}{2}$ brown | $\frac{1}{2}$ black $\frac{1}{2}$ brown |
| | BbEe Black | All black | $\frac{3}{4}$ black $\frac{1}{4}$ yellow | $\frac{3}{4}$ black $\frac{1}{4}$ brown | $\frac{9}{16}$ black $\frac{1}{4}$ yellow $\frac{3}{16}$ brown | $\frac{1}{2}$ black $\frac{1}{2}$ yellow | $\frac{3}{8}$ black $\frac{1}{2}$ yellow $\frac{1}{8}$ brown | $\frac{1}{4}$ black $\frac{1}{2}$ yellow $\frac{1}{4}$ brown | $\frac{1}{2}$ black $\frac{1}{2}$ brown | $\frac{3}{8}$ black $\frac{1}{4}$ yellow $\frac{3}{8}$ brown |
| | BBee Yellow | All black | $\frac{1}{2}$ black $\frac{1}{2}$ yellow | All black | $\frac{1}{2}$ black $\frac{1}{2}$ yellow | All yellow | All yellow | All yellow | All black | $\frac{1}{2}$ black $\frac{1}{2}$ yellow |
| | Bbee Yellow | All black | $\frac{1}{2}$ black $\frac{1}{2}$ yellow | $\frac{3}{4}$ black $\frac{1}{4}$ brown | $\frac{3}{8}$ black $\frac{1}{2}$ yellow $\frac{1}{8}$ brown | All yellow | All yellow | All yellow | $\frac{1}{2}$ black $\frac{1}{2}$ brown | $\frac{1}{4}$ black $\frac{1}{2}$ yellow $\frac{1}{4}$ brown |
| | bbee Yellow | All black | $\frac{1}{2}$ black $\frac{1}{2}$ yellow | $\frac{1}{2}$ black $\frac{1}{2}$ brown | $\frac{1}{4}$ black $\frac{1}{2}$ yellow $\frac{1}{4}$ brown | All yellow | All yellow | All yellow | All brown | $\frac{1}{2}$ brown $\frac{1}{2}$ yellow |
| | bbEE Brown | All black | All black | $\frac{1}{2}$ black $\frac{1}{2}$ brown | $\frac{1}{2}$ black $\frac{1}{2}$ brown | All black | $\frac{1}{2}$ black $\frac{1}{2}$ brown | All brown | All brown | All brown |
| | bbEe Brown | All black | $\frac{3}{4}$ black $\frac{1}{4}$ yellow | $\frac{1}{2}$ black $\frac{1}{2}$ brown | $\frac{3}{8}$ black $\frac{1}{4}$ yellow $\frac{3}{8}$ brown | $\frac{1}{2}$ black $\frac{1}{2}$ yellow | $\frac{1}{4}$ black $\frac{1}{2}$ yellow $\frac{1}{4}$ brown | $\frac{1}{2}$ brown $\frac{1}{2}$ yellow | All brown | $\frac{3}{4}$ brown $\frac{1}{4}$ yellow |

Use this chart to identify the likely proportions of colours in litters from parents already tested for the E-Locus and B-Locus.

These proportions are average expectations and are subject to variation due to chance.

Note: "Brown" is referred to as chocolate or liver in some breeds, while "Yellow" is referred to as red, apricot, lemon or cream.

Yellow dogs can have either brown or black noses depending upon the B-Locus: BB and Bb dogs will have black noses, while bb dogs will have brown noses.