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## Genetics of Color in Labradors

by Amy Dahl

*gene* is a sequence of base pairs (on a DNA strand) that codes for a particular trait (or set of traits). The DNA of a dog exists in 78 different pieces called *chromosomes* (humans have 46). A close look at the chromosomes shows that they occur as pairs, one member of each of the 39 pairs being supplied by the sire and the other coming from the dam. While the two chromosomes in a pair are not identical, they contain genes for all of the same traits.

This means that each dog has two versions of every gene, one inherited from its sire and one from its dam. They may be identical, or they may be different *alleles* of the gene (any of the variations on a gene). For example, a dog may have inherited the allele that codes for black coat ("B") from its sire, and the allele that codes for chocolate ("b") from its dam. It is useful to have a name for the portion of a chromosome that alternative alleles, like those for black and chocolate, can occupy. We call it a *locus* (Latin form "place"), and so we can refer to the "B" locus as that part of the genetic code that determines black vs. chocolate.

Yellow is determined at a different locus, the "E" locus, and is independent of the alleles present at the "B" locus. Yellow color occurs only when two recessive "e" alleles are present – genotype "ee." The presence of a single dominant "E" allele (genotypes "EE" and "Ee") will ensure a non-yellow coat, which may be black or chocolate depending upon the genes present at the "B" locus.

At least one copy of the "B" allele is needed for dogs to form black pigment, and "BB" and "Bb" dogs will have black or yellow fur with black noses. Dogs having the "bb" genotype have chocolate or yellow fur with brown noses, and must inherit a "b" allele from each parent. Dogs having the "ee" genotype have yellow coats and must inherit an "e" allele from each parent." 🍗

*Excerpted from The Genetics of Color in Labradors, by Amy Frost Dahl, Ph.D.*

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