

# Color and Pattern Inheritance of the Deutsch Kurzhaar

by Jeff Martin



This article is to outline the genetics behind color and pattern inheritance of the DK breed in easy to understand terms.

In 2018 the DKV registered some 1193 puppies of which 27.33% were brown, 43.75% were braunschimmel or brown ticked, 6.79% were solid black, 20.96% were Swarzschimmel or black ticked while only 1.17% were predominantly white without ticking.

Schimmel dogs, whether brown or black are known as roan or ticked in English speaking countries and it is ticked that I will use to denote them in the rest of this article. Within this group you can have dogs almost white as in hellbraunschimmel through to dogs with so little white hair ticking that they appear almost as solid in color and all can have additional patching. From a genetic standpoint their inheritance of ticking is exactly the same.

There are two alleles or positions on a chromosome that determine color. In every dog one allele is contributed by its sire and one by its dam.

The color **black is dominant to brown in all cases**, that is a puppy that has a black parent will have this same color if it inherits the dominant black gene from that parent. We will refer to this gene with a capital “B” to denote it as dominant while brown will be represented as “b” in minor case.

Again, there are two allele positions that control pattern inheritance and one is contributed by each parent. A **solid colored dog (whether black or brown) will be dominant over a ticked dog in all cases** if the puppy inherited the solid gene from the solid parent.

For both color and pattern each having two genes determining the outcome there is the situation of **homozygous and heterozygous**.

Homozygous refers to the two genes determining either color or pattern being the exact same gene, while heterozygous refers to the two genes being different.

In the case of homozygous black, the dog has inherited both dominant black genes with one from each parent which were both black. Both parents must be black to possibly each contribute this color and end up with a dog of homozygous “BB”. Conversely a brown dog must carry the homozygous recessive “bb” to show this coloring.

Schimmel or ticked dogs must carry the recessive “ss” genes as a single dominant “S” from either parent would result in a solid coloring.

Armed with the above knowledge lets look at some possible breeding outcomes. You can determine what genes the dog possesses just by looking at it, say in the case of black BUT you will have to look at its parents to determine if one was brown proving he is carrying brown on his second allele. Once this is done for each parent calculate the sires genes in combination with each of the dams two genes to determine color, then do the same with pattern and you can determine likely percentages of color and pattern outcomes in the puppies.

**Example 1:** is two solid brown dogs as parents which were themselves bred from a solid brown sire and brown ticked mother. They must each be “bb” for color and “Ss” for pattern. When these are bred its easy to determine the outcome in the progeny by determining the possible combinations of genes you know are carried from each parent. In this example all puppies must be brown or “bb” for color but for pattern 25% will be ticked “ss” while 50% will be heterozygous like the parents “Ss” and the remaining 25% will be “SS”.

This last 25% are known as dominant solids as no matter what they are bred to will contribute the solid gene “S” every time resulting in a solid pattern in 100% of its puppies.

This same situation occurs when two black dogs’ whether solid or ticked are bred, 25% of the progeny will inherit the dominant “BB” one from each parent and can only produce black puppies.

In the case of solid coloring its fairly easy to determine what is a heterozygous solid black or brown dog or homozygous solid and potentially dominant for solid patterning, just by looking at the dog itself. **True dominant solids have zero white hair** while heterozygous solids commonly have a white forechest or white hairs on their feet.

**Example 2:** Lets look at what appears to be a more complicated situation. A potential sire is black ticked but comes from a black sire and brown mother. He must be “Bb” for color and is ticked so therefore must be homozygous “ss” for pattern. He is bred to a solid brown female who was herself bred from a solid brown sire and brown ticked mother. She must therefore be “bb” for color and “Ss” for pattern.

Looking at all the possible outcomes for color 50% will be black and 50% brown. Then turning to pattern 50% will be solid while 50% will be ticked. This litter can produce all the colors and patterns, that is black ticked, solid black, brown ticked and solid brown.

**Color and pattern** as I've stated, are each determined by two alleles BUT **are inherited independently to each other**. The exact number of puppies of each of the above color/pattern combinations is impossible to determine accurately.

I hope this sheds some light on the subject, these inheritance rules about what is dominant, or recessive are set in stone. If you get a puppy that contravenes them "your daddy isn't your daddy".

Waidmanshiel