**Breeding a "Double Merle" Dog With Vision and/or Hearing Impairments.
Hereditary vs Genetic**

"Double Merle" is defined as a dog having any M Locus allele combination which can delete pigment to white and therefore has the ability to cause vision and/or hearing impairments - this includes m/Mh.

Using the 7 alleles set out in the "langevin et al" research paper there are 28 possible Merle allele combinations.
13 of these combinations have the ability to delete pigment to white and are considered to be "Double Merle".
<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0198536>

These combinations can be compared to a sliding scale - the longer the allele combination then typically the more pigment can be deleted.
Example - Mc+/M and Ma/M do not typically delete as much pigment as M/M, M/Mh or Mh/Mh

When a dog has a vision or hearing impairment due to being "Double Merle", this is associated with the combined Merle pigmentation trait only, which is not an “inherited disease or disorder”. The vision or hearing impairment is not a dominant or recessive trait but directly linked to the combination of Merle alleles and the resulting suppression/death of melanocytes. In this case the impairment is a secondary issue due to Merle "genetics" and not "inherited" from both or either parent – it is the Merle allele inherited from each parent that when combined is the cause.

The impairment will not be passed along to future generations as a trait of either deafness or vision impairment/blindness as the cause is not hereditary, the only genetic trait that will be passed along is one Merle allele.

Let’s use the example of an Ma+/Ma+ - 260/264 stud, Bo – Catahoula.

He is unilaterally deaf (deaf in one ear - sometimes referred to as directionally deaf) due to the white created by his Merle allele combination. This impairment cannot be passed to future generations, as it is not "hereditary", the only thing his offspring will inherit is either Ma+ - 260 bp or Ma+ 264 bp.

Any possible vision or hearing impairments in his offspring depend solely on the Merle allele inherited from the dam. If the dam is for instance m/m or Mc/Mc then there is no possibility of any resulting pups being “Double Merles” and therefore no vision or hearing impairments related to Merle.

If he is bred to an m/Ma female then any resulting Ma/Ma+ (264) could have pigment deleted to white and therefore there is a risk for impairment. This is not new or recent information, this is basic genetics 101. This was known long before any Merle testing was available. Dr. Strains also covers this topic in several of his papers.

**This is the difference between "Hereditary" and “Genetic”.**

The follow linked article is a very good explanation of the differences between Hereditary and Genetic -
**Hereditary vs. Genetic: How Genetics Differs from Heredity**
<https://www.kelseygroup.com/hereditary-vs-genetic/?fbclid=IwAR2Z1-VTDP39bUz5WxDFDSyccG35PgQQkAdRr6bv5xkdnR0tEsl8n1q1Kt0>

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