

RED AND WHITE COLORING OF CATTLE: WHAT MAKES THEM DESIGNATED AS “RED”

As more and more breeders (black and white Holstein in particular) are looking at the genetic advances that red and white cattle are making today, many are starting breed their own animals with the goal of bringing this recessive trait into their herds. The main question though from a registered cattle perspective is, “What makes my animal actually red in color?” The answer is simple but yet complex at the same time. Many different combinations can occur when an animal is given the recessive trait through their parents.

For the Red & White Dairy Cattle Association (RWDCA) the below chart shows the specific Haplotype & Genotype (determined through genomic testing, please see list below of approved US genotyping labs) codes. ONLY the Haplotype codes (6,7, or 8) and the Genotypes (E+E+, E+ e, or ee) highlighted in the red box are acceptable in defining an animal as Red coat color. Dominant Red or Variant Red is also possible and can only be verified by genetic testing. The Association strongly encourages our members to genomically test their animals in the event of any questionable coloring.

Haplotype HRR	Expected Genotype	Expected Phenotype	Expected Genetic Code
0	E ^D E ^D	Black	TR
1	E ^D E ^{BR}	Black	B/R
2	E ^D E+	Black	RC
3	E ^D e	Black	RC
4	E ^{BR} E ^{BR}	Black / Red	B/R
5	E ^{BR} E+	Black / Red	B/R RC
6	E ^{BR} e	Black / Red	B/R RC
7	E+ E+	Red	RED
8	E+ e	Red	RED
9	e e	Red	RED

Below are are some key pieces and links to other pieces on how recessive traits like Coat Color are passed through matings and what truly makes an animal “Red” for breeding and exhibition purposes.

How are these conditions inherited?

Recessive genes are expressed only when a carrier cow is mated to a carrier bull. In a random mating population, when two carriers are mated, 50% of the resulting offspring will be carriers of the recessive alleles (heterozygous), 25% will express the recessive trait (homozygous recessive alleles), and 25% will not carry the recessive alleles (homozygous dominant alleles). When a non-carrier is mated to a carrier, it can be expected that 50% of the resulting calves will be carriers (heterozygous) and 50% will be non-carriers (homozygous for the dominant alleles).

EXAMPLE: Two RC animals, carriers for red hair color are mated. (Rr x Rr)

	R	r
R	RR	Rr
r	Rr	rr

25% Black and White, non-RC (RR)
50% Black and White, Red Carrier (Rr)
25% Red and White

Source: https://www.holsteinusa.com/programs_services/genomics.html?tab=3#TabbedPanels1

Genetic Testing Labs with Coat Color and Parentage Reporting:

- **Neogen: Igenity Lab**
 - [Dairy Testing](#)
- **Sexing Technologies / Genetic Visions**
 - [Dairy Order Form](#)
- **Zoetis**
 - [Dairy Genetics | Zoetis US](#)