Understanding Paint Coat Color and Genetics

This information was obtained from the Paint Horse Website but is also a good article for color in general and how color markers work. For more information please follow the link for Coat Colors & Detailed Genetics Charts.

The Below information is from "Coat Color Genetics" courtesy of the American Paint Horse Association. For more information please visit www.apha.com/education or www.apha.com/breed/index.html

There's a wonder article that APHA provides as well you can view it by clicking here (pdf file and opens in new window)

Paint Horse Color Patterns

- Tobiano: white markings usually cross the back between the withers and tail.
- Overo: white markings usually do not cross the back between the withers and tail.
  - Frame Overo
  - Sabino
  - Splashed White
- Tovero: a combination of the Tobiano and Overo coat patterns.

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In coat color genetics, one of the goals is to identify the genes (genotype) in the parents and predict the probability of coat colors (phenotype) in their offspring.
As scientists identify genes that contribute to coat color, they assign them a letter.

–Letters range from A-Z,

–Can be capital or lower case (A, a),

–May have a super script (Ast)

If Paint Horse breeders understand how genes work, they can selectively breed for certain coat colors.

What is Homozygous Pairing?

Homozygous

–"Homo" means "same."

–A homozygous genotype is two of the same alleles (two dominant or two recessive) at one locus.

–Consider the Black or Sorrel base coat colors. "E" codes for Black and "e" codes for Sorrel. E has simple dominance over e.

–A homozygous dominant pair for Black base coat is EE. If one dominant E gene is in the genotype, the Black coat is expressed. This is an example of simple dominance because only one dominant E results in a Black coat.

–A homozygous recessive pair for a Sorrel coat is ee. Because e is recessive, the only way a Sorrel coat will be expressed is if you have a homozygous recessive genotype of ee.

What is Heterozygous Pairing?

Heterozygous

–"Hetero" means "different" or "other."

–A heterozygous genotype is two different alleles at one locus.

–One allele of the pair is dominant, while the other is recessive.

–For example, what color would a foal with the genotype Ee be? Remember, E has simple dominance over e, and E codes for Black where e codes for Sorrel.

The coat color will be Black because E is dominant.

Below is a coat Color Genetic chart

- TT - Tobiano Homozygous - Tobiano coat pattern present
- nT - Tobiano Heterozygous - Tobiano coat pattern present
- nn - Homozygous Negative - no Tobiano coat pattern present

This chart shows the possibilities of offspring when mating two horses.

	nn	nT	TT
nn	100% nn	50% nT 50% nn	100% nT
nT	50% nT 50% nn	25% TT 50% nT 25% nn	50% TT 50% nT
TT	100% nT	50% TT 50% nT	100% TT

TT	The genetic markers tested indicate the horse is homozygous for Tobiano. The horse should pass on the Tobiano gene to all of its offspring.
nT	The genetic markers tested indicate the horse is heterozygous for Tobiano and carries one copy of the Tobiano gene.
nn	No genetic markers associated with the Tobiano coat pattern were detected.