

Coat Color Genetics Student's Note Taking Guide

Please follow along with the Power Point Presentation and fill in the missing information.

The Reason Behind Paint Horse Coat Color

- Paints are a unique breed known for beautiful and colorful _____.
- The base coat color can be _____ in the equine spectrum.
- Superimposed over the base color are _____ spotting patterns.

Paint Horse Color Patterns

- Tobiano
- Overo
 - Frame Overo
 - Sabino
 - Splashed White
- Tovero

Coat color patterns are created by _____. Genes carry the genetic codes that will create a horse's size, shape, make-up and color. Let's continue to learn how genes create coat colors.

The Reason Behind the Coat Pattern

- Genetic inheritance determines a Paint's coat pattern
- What is genetic inheritance?
- Genetic inheritance is the genes (codes) parents pass on to their offspring.
- Why is this important?
- It is important for Paint Horse breeders to understand genetic inheritance so they can breed for certain coat patterns, possibly raising the value of the Paint Horse.
- What is the main job of genes?
- Genes are responsible for _____ from the parent to the offspring, which determines the make-up of the offspring, including the _____.

The Genetic Explanation-Genes

- Genes
 - Genes are the tiny, basic units of inheritance found in DNA.
 - Genes determine _____ for every living species.
 - Each equine species receives $\frac{1}{2}$ of their genes from their sire (father) and $\frac{1}{2}$ from their dam (mother).
 - Physically, they are linked together like a strand of pearls to form a chromosome.

The Genetic Explanation-Chromosomes

- Chromosomes
 - Chromosomes are made up of _____.
 - Every Paint horse has 64 chromosomes.
 - Each chromosome was initially created through fertilization where genetic information from the sire (father) was united with genetic information from the dam (mother).
 - _____ are also found on chromosomes.

The Genetic Explanation-Loci

- Loci
 - The different points or _____ along a chromosome.
 - Loci are like street signs in a busy city, allowing us to find our way along a complex chromosome.
 - At specific loci, scientists can locate certain genes and these genes appear at those loci for every individual of that species.
 - At one locus there can be _____ Alleles

The Genetic Explanation-Alleles

- Alleles
 - Two alleles are found at each locus on a chromosome.
 - Alleles code for the _____ expressed.
- For example, consider your eye color. You have loci on a chromosome for eye color. At that locus there are two alleles, one from your mother and one from your father. The dominant of the two alleles will be the eye color that you display. This is your phenotype (what we see). The genetic classification (what we can't see, but what is on the loci) is called the genotype.

The Genetic Explanation

- In coat color genetics, one of the goals is to identify the genes (genotype) in the parents and predict the probability of coat colors in their offspring (phenotype).
- 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)
 - And in general, serve as labels to identify genes.
- If Paint Horse breeders understand how genes work, they can selectively breed for certain coat colors.

The Genetic Explanation-Simple Dominance

- Simple Dominance explains how genes are expressed.
 - In Simple Dominance, two genes (one received from each parent) will be passed to the offspring. The genotype of the parents' determines the genotypic possibilities of the offspring.
 - In Simple Dominance, one gene is _____ over the other. The characteristic this gene codes for will be physically displayed. Scientists will identify this dominant gene as a capital letter.
 - The _____ form of the gene is _____ to the dominant form and will not be physically displayed but will always be found in the genotype and could be passed on to this individual's offspring. Scientists will identify this recessive gene as a lower case letter.
 - Since two genes are passed to an offspring, several pairing possibilities can occur. Homozygous or heterozygous pairing can occur in the offspring's genotype.

The Genetic Explanation- Homozygous Pairing

- Homozygous
 - “Homo” means “same”.
 - A homozygous genotype would be two of the _____ alleles (two dominant or two recessive) at one locus.
 - Consider black or sorrel base coat color. *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 will be expressed. This is simple dominance because just one dominant *E* means 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*.

The Genetic Explanation- Simple Dominance

- Heterozygous
 - “Hetero” means “different” or “other”
 - A heterozygous genotype would be 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 _____ since *E* is _____.