

# ABC's of Dog Breeding

## *Study Guide*

### **Lesson 1, Part 2 -Genetics**

#### 1. UNDERSTAND FERTILIZATION

- A fertilized egg (zygote) contains two new sets of plans on how to “build” a puppy. One set of plans comes from the sire; the other, from the dam.

#### 2. KNOW THE BASICS OF MENDEL'S LAWS

- Genes are inherited in related pairs.
- *Law of Segregation* tells us genes don't blend; *Law of Independent Assortment* states that the inheritance of each gene pair is independent of other gene pairs.
- Dominant genes overrule recessive genes.
- Be familiar with commonly agreed upon dominant and recessive traits and know that little research has been done in this area.
- 3 gene pairs are possible: LL, ll or Ll .

#### 3. UNDERSTAND HIDDEN RECESSIVES

- Hidden recessive genes have been overruled by the presence of a dominant gene and remain an unknown part of a dog's genotype.
- A simple recessive trait is produced in a dog when it inherits one recessive gene from the sire and one recessive gene from the dam.

#### 4. BE ABLE TO DEFINE PHENOTYPE, GENOTYPE, HOMOZYGOUS AND HETEROZYGOUS.

#### 5. KNOW SITUATIONS OF DOMINANT AND RECESSIVE GENES NOT BEHAVING IN THE USUAL WAY

- Define incomplete dominance, epistasis, incomplete penetrance and pleiotropy.

#### 6. GIVE EXAMPLES OF TRAITS RELATED TO GENDER AND DEFINE :

- Sex-linked traits, sex-limited traits and sex-controlled traits.

## 7. KNOW WHAT POLYGENIC TRAITS ARE, INCLUDING ADDITIVE TRAITS AND THRESHOLD TRAITS.

In a polygenic trait, the phenotype of offspring is an averaging of what the trait is in the parents.

- **Additive traits:** What we “see” regarding the trait is a good indicator of what genes a dog is carrying and what the dog might produce.
- **Threshold traits:** A dog must inherit a critical number of genes, in any combination, from both parents to exhibit the trait.

## 8. UNDERSTAND HERITABILITY

- How much a trait’s expression is due to genes rather than environment. The higher the trait heritability the more offspring will resemble the parents in the trait.

## 9. KNOW HOW ENVIRONMENT AFFECTS PHENOTYPE

- Nutrition, socialization, developmental environment and climate.