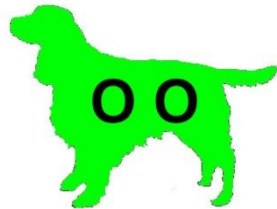


HOW AUTOSOMAL RECESSIVE GENETIC DISEASES ARE INHERITED IN THE ENGLISH SPRINGER SPANIEL

- All of the genes inherited by dogs are contained within 39 different sets of chromosomes. Within those sets of chromosomes, there are thought to be between 20,000 - 30,000 different genes.
- Any chromosome between number 1 and 38 is called an **Autosome**. The 39th chromosome determines the sex of the dog.
- Chromosomes (and therefore genes) are inherited in pairs, with one copy of each being inherited from each parent.
- The genes responsible for diseases such as **Cord1 PRA**, **Fucosidosis**, **Acral Mutilation Syndrome (AMS)** and **Phosphofructokinase Deficiency (PFK)** in the English Springer Spaniel are inherited as **Autosomal Recessive Traits**. This means that (a) they are not linked to the chromosome that determines the sex of the dog, and that (b) **two** abnormal (mutant) copies of the gene must be present (one from each parent) in order for a dog to be clinically affected by the disease.
- With all diseases that are inherited as simple autosomal recessive traits, every dog can be classified **genetically** in one of three ways:



GENETICALLY CLEAR

This dog has inherited **TWO NORMAL COPIES (OO)** (one from each parent) of the gene associated with a particular disease. It will not itself have the disease and it cannot pass on a mutant copy of the gene to its offspring.



GENETIC CARRIER

This dog has inherited **ONE NORMAL COPY (O)** of the gene from one parent and **ONE MUTANT COPY (X)** from the other parent. A Carrier will not itself have the disease, but (*statistically*) it will pass on a **MUTANT** copy of the gene to approximately **HALF** its offspring.

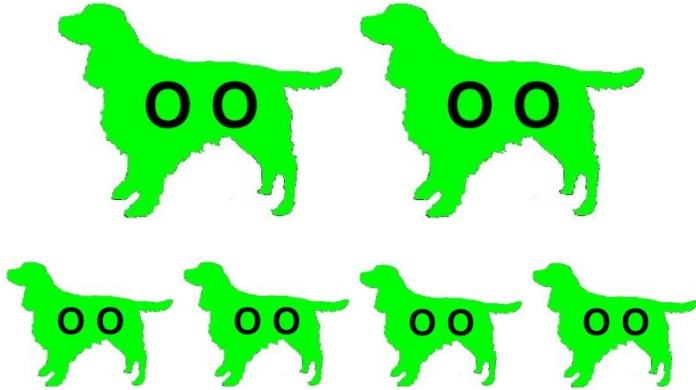


GENETICALLY AFFECTED

This dog has inherited **TWO MUTANT COPIES (XX)** of the gene (one from each parent). It will usually suffer from the disease (although clinical signs may not always develop during its lifetime). **GENETICALLY AFFECTED** dogs will **ALWAYS** pass on a **MUTANT** copy of the gene to their offspring.

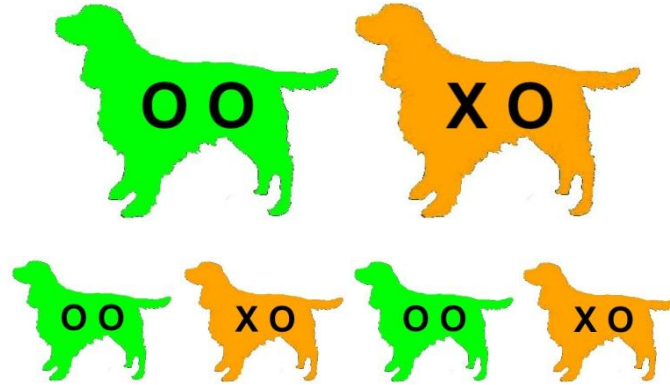
AT-A-GLANCE: GENETIC RESULTS FROM DIFFERENT MATING COMBINATIONS

MATING:
CLEAR to CLEAR



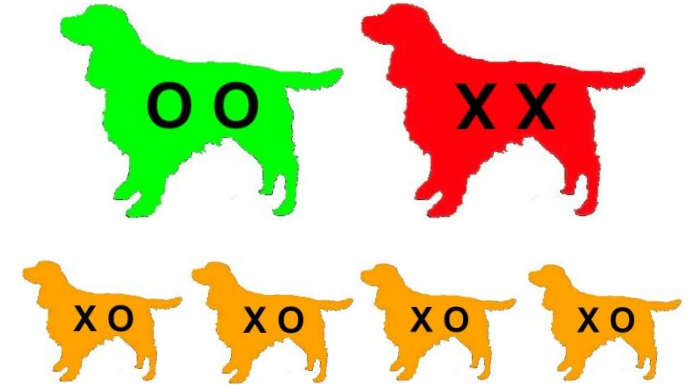
RESULT:
ALL OFFSPRING WILL BE GENETICALLY CLEAR

MATING:
CLEAR to CARRIER



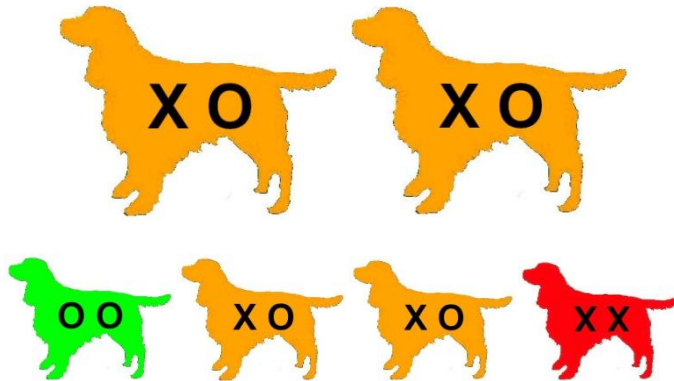
RESULT:
ON AVERAGE: 50% WILL BE CLEAR
50% WILL BE CARRIERS

MATING:
CLEAR to AFFECTED



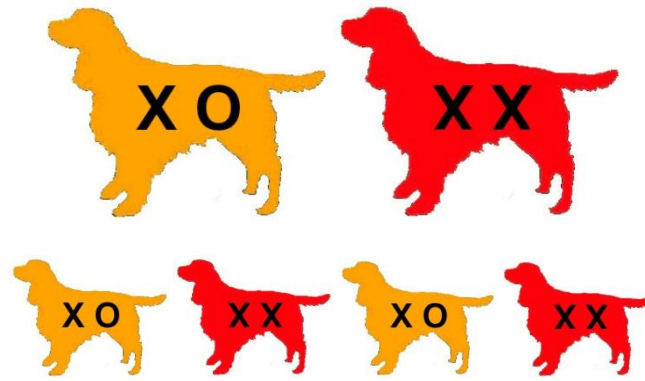
RESULT:
ALL OFFSPRING WILL BE CARRIERS

MATING:
CARRIER to CARRIER



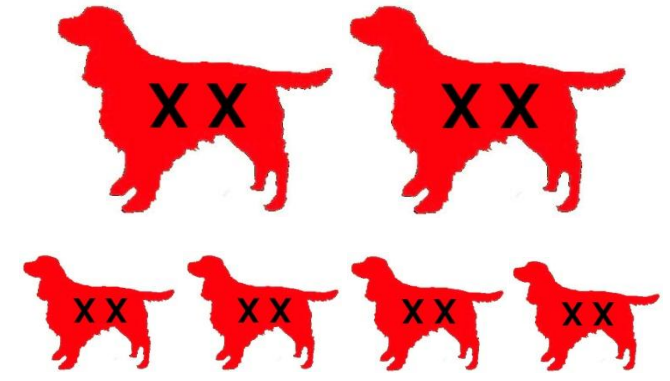
RESULT:
ON AVERAGE: 50% WILL BE CARRIERS
25% WILL BE CLEAR, 25% WILL BE AFFECTED

MATING:
CARRIER to AFFECTED



RESULT:
ON AVERAGE: 50% WILL BE CARRIERS
50% WILL BE GENETICALLY AFFECTED

MATING:
AFFECTED to AFFECTED



RESULT:
ALL OFFSPRING WILL BE GENETICALLY AFFECTED