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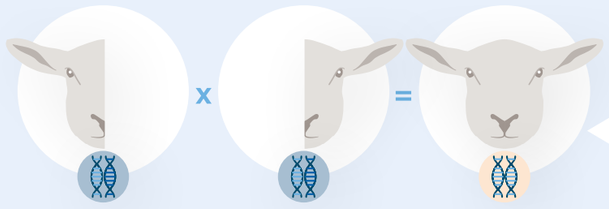
What is inbreeding and why is it a problem?

WHAT IS INBREEDING?

Basic DNA rule

Offspring



Animal A

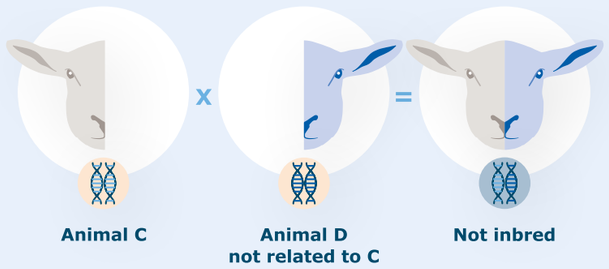
Animal B

Inbred

related to A

Inbreeding

An inbred animal is the offspring of two related animals. These parents have common ancestors.



Animal C

Animal D
not related to C

Not inbred

RECESSIVE GENES AND GENETIC DEFECTS

Recessive genetic defect

There are many genetic defects. Every animal *(including humans)* unknowlingly carries different *(lethal)* defects. Only with two copies of the same *(lethal)* gene, the defect will be expressed.

Homozygous: present on both copies

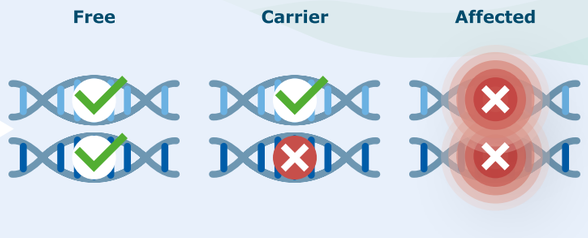
Genetic defect is expressed

Heterozygous: present on one copy

Animal is carrier, no genetic defect

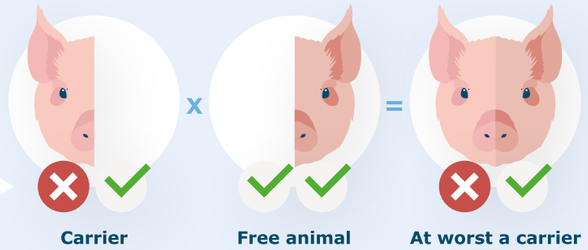
Free, carrier and affected

Genetic defects are rare and most animals are free *(no copy)* or carrier *(one copy)*. With increased inbreeding higher frequency of affected animals *(two copies of the same defect)*.



Matings between carriers and free animals

With a mating between a carrier and a free animal the offspring are, at worst, carriers.



Carrier

Free animal

At worst a carrier

INBREEDING DEPRESSION

Decreased vitality

Lower fertility

Less resistance

Less growth

Lower milk yield

Shorter lifespan

GENETIC DEFECTS

Serious consequences

Skeletal deformities

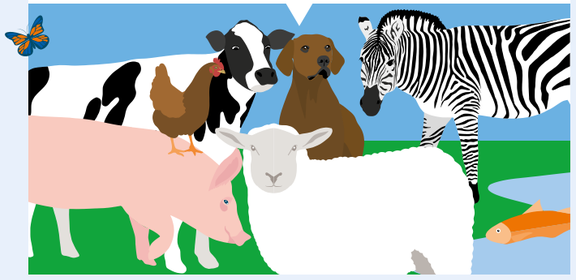
Metabolic diseases

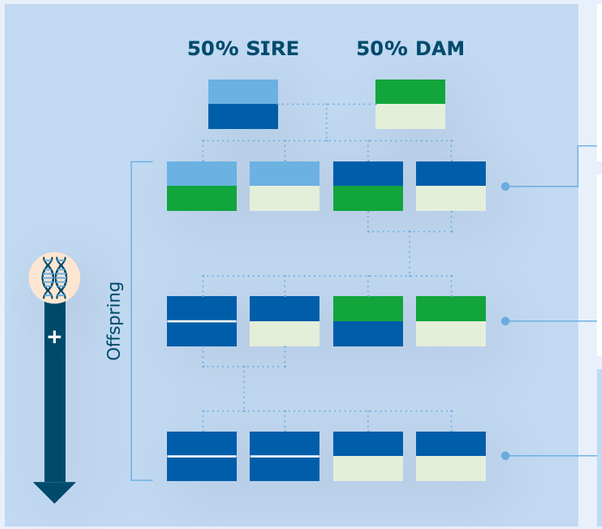
Immune system diseases

Epilepsy

Blindness

The animals in this infographic have been chosen randomly. Inbreeding can occur throughout the whole animal kingdom.





No inbreeding

For each gene, different combinations of the DNA of the sire and the dam are possible.

Inbreeding

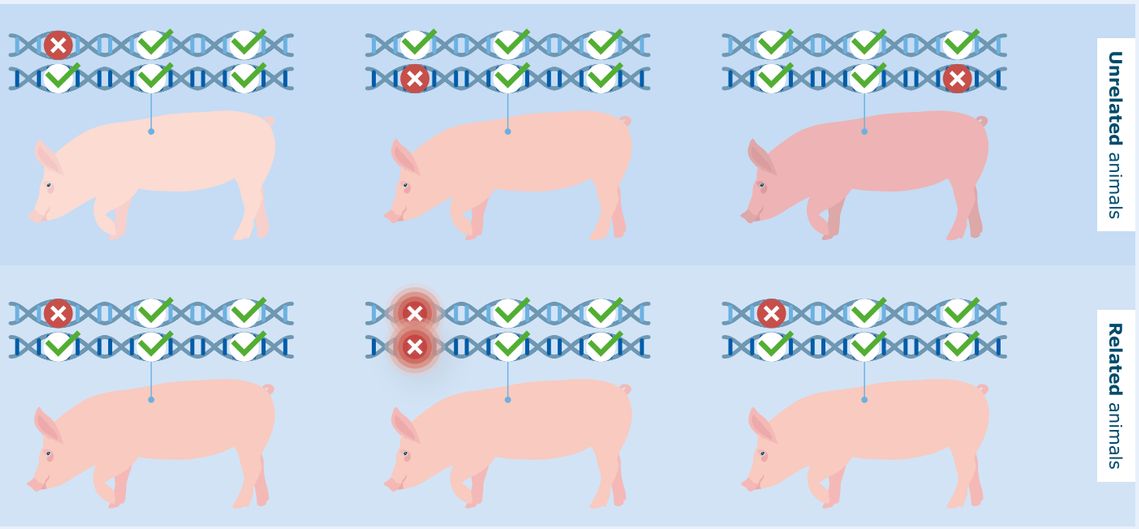
Variation in gene combinations decreases. Animals are homozygous if they have twice the same gene (▬).

Inbreeding

Causes reduced variation and increased homozygosity in future generations.

Matings between carriers

Unrelated animals carry **different** genetic defects. Mating between unrelated animals will hardly ever result in two copies from both sire and dam of the same defect in their offspring. Affected animals are extremely rare.
Related animals are more likely to carry the **same** defect. Their offspring can inherit the same defect from both sire and dam, consequently the defect will be expressed.



Unrelated animals

Related animals

LEGEND

Free animal

Genetic defect
Carrier

Genetic defect
Expressed

Inbred

Not inbred

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