

INBREEDING AND OUTBREEDING

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Inbreeding

- Inbreeding is the process of mating genetically similar organisms.
- In humans, it's associated with consanguinity and insects, in which close relatives have sexual relationships and children.
- Inbreeding results in homozygosity, which can increase the chances of offspring being affected by deleterious or recessive traits.
- An individual who inherits such deleterious traits is colloquially referred to as inbred.

- The allele frequencies remains the same but the genotype frequencies change.
- Self fertilization is the most extreme example but other examples such as the mating of full siblings, first cousins, parents and offspring and half siblings have the same effect, namely to increase the frequency of homozygotes and decrease the frequency of heterozygotes.

Inbreeding Coefficient

The effects of inbreeding can be quantified by using the inbreeding coefficient, symbolized by F .

“The inbreeding coefficient is the probability that two alleles in an individual are identical by descent from a common ancestor”

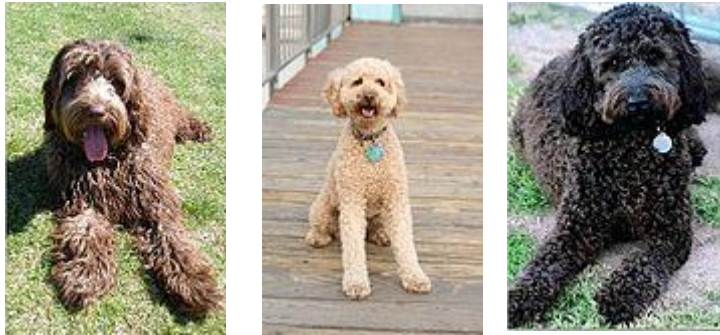
Inbreed log coefficient is defined as:

“Probability which must have a value between zero and one. $F=0$ means that there has been no inbreeding, that is, that mating is random, and $F=1$ means that inbreeding is complete”

Outbreeding

- Out-crossing or out-breeding is the technique of crossing between different breeds with no common ancestors.
- It increases genetic diversity, thus reducing the probability of an individual being subject to disease or genetic abnormalities.
- The outcrossing breeder intends to remove the traits by using "new blood".

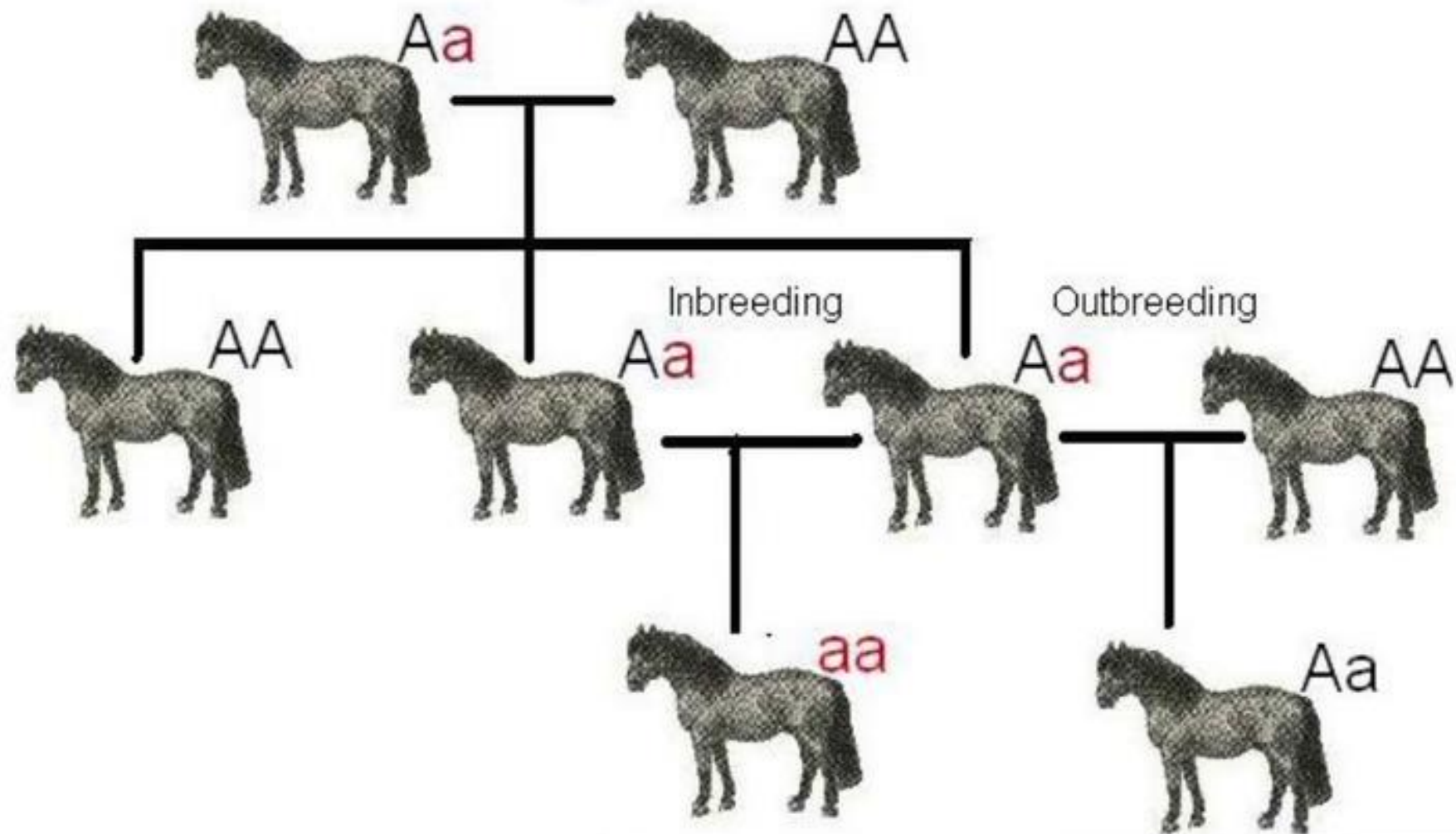
- With dominant traits, one can still see the expression of the traits and can remove those traits whether one outcrosses, line breeds or inbreeds.
- With recessive traits, outcrossing allows for the recessive traits to migrate across a population.
- The outcrossing breeder then may have individuals that have many deleterious genes that may be expressed by subsequent inbreeding.
- There is now a gamut of deleterious genes within each individual in many dog breeds



Labradoodles, a crossbreed between a Poodle and a Labrador Retriever

INBREEDING

A= Dominant allele a= Recessive deleterious allele



Reference

- <https://www.youtube.com/watch?v=NzM6qrm9SXQ>
- <https://www.slideshare.net/schoenian/breeding-systems>
- <https://www.slideshare.net/Jheiiyn/outbreeding-56984690>