

INBREEDING: TABOO OR TOOL?

While inbreeding is not usually a preferred practice, it should not be considered completely taboo either. When done properly, inbreeding can be a tool to achieve specific breeding objectives. It is also a common reality for many small-scale producers, who have limited breeding options. At the same time, it is important to understand that too much inbreeding reduces the health and productivity of the flock/herd -- and should be avoided.

Important terms	Breeding Practice	Coefficient of inbreeding, %
Inbreeding	Mating of first-degree relatives, such as parent x offspring and full siblings	25
	Half sib matings: half brother x half sister Grandparent and uncle/aunt matings	12.5
Linebreeding <i>Still inbreeding</i>	Mating more distantly related relatives, such as cousins or individuals who share a common grandparent. The goal is to produce prepotent breeding lines that “stamp” their characteristics onto their offspring.	≤ 6.25
Outbreeding	Mating of completely unrelated parents	~ 0

Coefficient of inbreeding

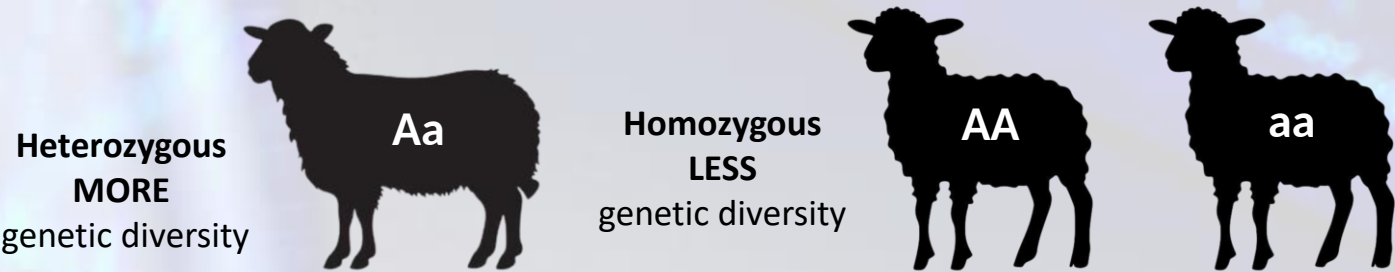
is a measure of how inbred an individual is. It is the probability of inheriting two copies of the same allele from the parents. Negative effects of inbreeding can occur at a 5 percent inbreeding coefficient. Above 10 percent, impacts are usually much more pronounced.

Inbreeding depression

is the reduced biological fitness caused by the loss of genetic diversity.

Common joke: If the offspring are great, it's linebreeding. If they're bad, it's inbreeding.

Genetically, inbreeding increases homozygosity: having identical alleles of a specific gene (one inherited from each parent). Whether it's beneficial or harmful depends on the specific gene or trait. Homozygous individuals are more uniform, and their offspring are more predictable. On the negative side, there is more risk of disease, as harmful recessive traits show up more easily with inbreeding. An overall lack of genetic diversity (heterozygosity) causes a gradual and cumulative decline in fitness and fertility. The declines are minor and very slow with mild or occasional inbreeding but can be severe with multi-generational inbreeding.



Coefficients of inbreeding (COI) are calculated by the National Sheep Improvement Program (NSIP), American Dairy Goat Association (ADGA), and some breed registries and apps. Breed averages range from 2.1 to 4.9 for NSIP-enrolled sheep. Inbreeding coefficients are usually higher for goats, from 1 to 11.5 percent. Breeds with smaller gene pools, e.g., rare and heritage breeds, usually have higher coefficients of inbreeding, e.g., Oberhasli, ~30 percent.