Chapter 10.1: Selection criteria and mating decisions

In commercial farm animal breeding of pigs and poultry selection of the best animals is followed by more or less random mating. Individual mating decisions are not made because on average, at population level, there is no evidence for additional value. In other words: mating does not result in a directional change in the average of the traits under selection. If any, there may be a decreasing effect on the variation for the trait. But only if all breeders make selection and mating decisions with the same breeding goal in mind. At individual level there may be some additional value of mating decisions, especially related to monogenetic traits.

Reasons for an owner to use his/her female for breeding may differ from the need to produce offspring to initiate milk production, via striving for offspring of the highest quality, to ‘even though she is not well anymore we can always use her for breeding’. Reasons for specific choice of a mate for a female may vary from practical reasons, such as costs and travel distance in case of natural mating, via avoiding certain problems, such as heritable disorders, and compensating shortcomings, to going for the most popular mate. Selection criteria should be defined before selecting the best mate for breeding, but in practice these two processes are often interrelated. But be aware genetic improvement is created by selection and not by mating.

Owners of females make the actual decision to use an approved male for breeding or not. Effectively they are in charge of the actual breeding. Owners of the males only have a ‘product’ on the market. They may need to put some effort into marketing of their product. Quite often marketing is at least as important as quality of the males where it comes to reasons for mate choice by owners of females. A top sire determines the competitive value of a breeding organization.

Thus:

*Mating decisions have no influence at population level, but may have some effect at the level of individual mating.*

Relation of mate selection with inbreeding

Remember that an animal is inbred if his parents are related: $F_{animal} = \frac{1}{2} \times \theta_{between\ parents}$: Parents are related if they have ancestors in common. The fewer generation away this common ancestor is, the more the parents are related. Offspring of a full brother and sister have an inbreeding coefficient of $\frac{1}{2} \times 0.5 = 0.25$. The less two parents are related, the less the offspring is inbred. Some breeding organisations have regulations to avoid mating of close relatives. The Dutch Kennel Club (overall organisation of the various dog breeds in the Netherlands and in charge of pedigree registration of all registered purebred dogs), for example, has the regulation that no pedigree will registered for offspring of a bitch that was mated to her grandfather, her father, her brother, her son, or her grandson.

Thus:

*Mate selection should take the additive genetic relationship between both potential parents into account as that is a direct indication of the inbreeding coefficient of the offspring.*