

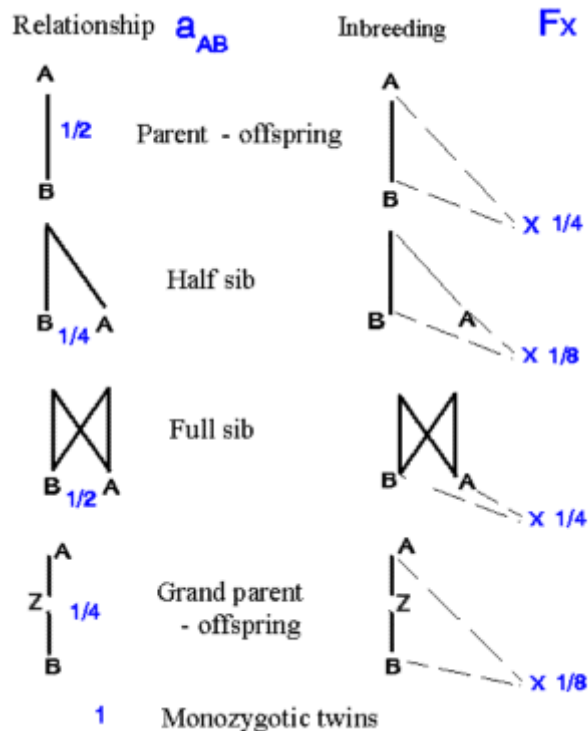
4.3 Simple forms of close inbreeding

Figure 4.4. Relationship and inbreeding after the mating of closely related individuals.

Related individuals can be used as sources of information when estimating the breeding value of an animal, see chapter 7. Therefore it is important to have a clear understanding of which types of relatives occur in large numbers and which at the same time are closely related. Figure 4.4 shows the most common forms of close relationship.

Recapitulation of the calculation methods for the coefficient of relationship: Count the number (n) of generations between the parents A and B through the common ancestors. How many different routes occur? The coefficient of relationship is the sum of $0.5^n(1+F_A)$ for all possible routes.

Example: The coefficient of relationship between full sibs is $0.5^2 + 0.5^2 = 0.50$, from the routes back to each parent.



The coefficient of inbreeding in the offspring equals half of the coefficient of relationship between the two parents. The figure also shows that parent-offspring have the same relationship as full sibs. The same is true for half sibs, and an individual and its grandparent.

Full and half sibs can be bred in large numbers within domestic animals. New methods for the cloning of oocytes make it possible to produce several identical twins.

When breeding laboratory animals, for instance rats and mice, it is common to reproduce the animals by continued full sib mating. Most of the laboratory strains are 100 % inbred, and the inbreeding is maintained by continued full sib mating. For an outbred population 20 generations of continued full sib mating is necessary, before the coefficient of inbreeding is above 99%. Most of our large domestic animals have difficulties in reproducing if the inbreeding coefficient is above 50%, as inbreeding lowers the fitness, as will be shown in the next section. In chapter 9 more details of the effects of inbreeding and how to control it will be given.