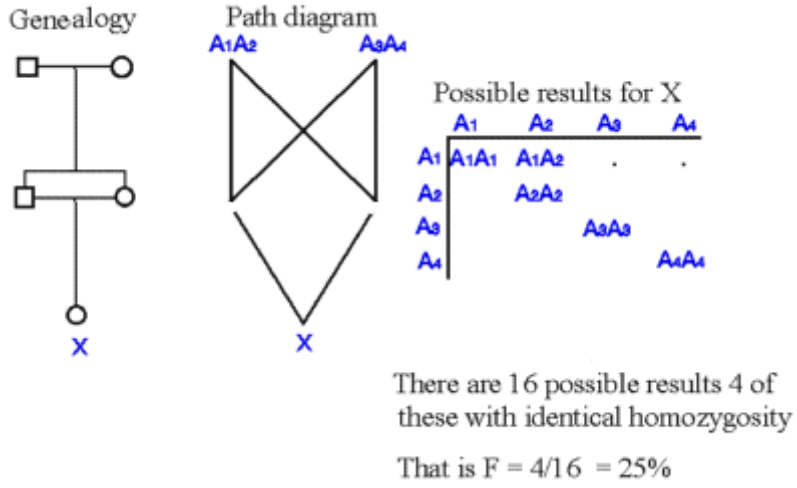
# 4.1 Relationship and inbreeding, definition

As introduction to this chapter should be given some general remarks. Inbreeding is often a negatively charged word, which generally is used to describe situations where no new blood is introduced. As for instance a scientific institute can get the attribute inbred. The expectation is also lower to inbred animals. Relationship is synonymous with 'being in family with'. Relationship is normally a positively charged word as for instance. I'm in family with this person.

**Inbreeding** occurs in offspring of individuals that are related. Related individuals have common ancestors in the pedigree. Common ancestors can be parents, grand parents etc. These common ancestors are not necessarily from the same generation in relation to the individuals in question. Two individuals are for instance related if the grand father of one of them is the father of the other. In Figure 1 is shown the consequences of identical homozygocity in offspring after full sib mating

Figure 4.1. Identical homozygocity in offspring after full sib mating.




**The degree of inbreeding** is defined as **the probability that identical homozygocity occurs in a locus**. The identity is not an allele type, but it should be inherited from the same allele in the common ancestor. The degree of inbreeding is given the symbol F and can vary between 0 and 1. The degree of inbreeding in outbred individuals is 0. This is valid even though the parents of the individuals have common ancestors more than 10 generations back. The degree of inbreeding after full sib mating is 0.25, which can be derived by means of the example in Figure 4.1. **The degree of additive relationship (a)** between two individuals is defined as **two times the probability that two randomly chosen alleles in a locus are identical because of decent from the common ancestor(s)**, or the proportion of identical alleles from the common ancestor(s) in the two related individuals. The alleles are 'identical by decent'. Inbreeding in an individual and the additive relationship between the two parents is directly related. **The degree of inbreeding in an individual constitutes half of the degree of relationship between the two parents.** The degree of relationship and inbreeding are also called **the coefficient of relationship and inbreeding.**

A graph of inbreeding on chromosome level is shown e