Chapter 14: Maintenance of genetic diversity

In previous chapters we have learned that breeding programs are set up to create genetic improvement. The genetic variance of the traits to be improved is of crucial importance. This aspect is fully recognized in the previous chapter where we evaluated the realized genetic improvement. In addition to the improvement obtained, the genetic relationship among animals in a population is important. When it increases as a consequence of the selection of parents, in the future strongly related animals have to be mated. Then, inbreeding effects become relevant: inbreeding depression and the occurrence of recessive genetic defects. Genetic variation of traits and variation in the composition of pedigrees is relevant in the evaluation of breeding programs. It are aspects of the genetic diversity that should be continuously evaluated when running a breeding program. The genetic variance of traits in a breeding program or a production program (pyramidal structure in pig and poultry breeding) is not limited to the genetic variance of the breed at stake. It can extended to the genetic variance in the species that can be utilized in a breeding program with crossbreeding. Thus attention for genetic diversity is not restricted to genetic diversity within a breed but comprises the genetic diversity within and between breeds. Therefore the conservation of breeds is important as will be explained too in this chapter. In succession we will discuss: what is genetic diversity, how can we measure it, what is the value of conserving breeds, the importance of the relationship among animals in avoiding inbreeding within a breed and how can we prevent excessive increases in relationship in a breeding program.

In writing this chapter two books were frequently used: “Utilization and conservation of farm animal genetic resources” (editor Kor Oldenbroek; Wageningen Academic Publishers, 2007) and “Het fokken van rashonden” (Kor Oldenbroek en Jack Windig, Raad van Beheer op Kynologisch gebied in Nederland, 2012; in Dutch).