6.1 Definition of a quantitative trait

In section 1.4 was given a definition of the terms phenotype and genotype for a quantitative trait, this equation is shown below. Until now the terms have only applied to qualitative traits.

$$\text{Phenotype} = \text{Genotype} + \text{Environment} \qquad P = G + E$$

The phenotype can be seen or measured, in contrast to the genotype which can be transferred to offspring. In chapter 1 the distribution of fat-% in the milk in two Danish dairy breeds was given as an example of a quantitative trait.

The distribution of fat-% in the milk is characterized by a mean value and a standard deviation. For HF dairy breed the mean value is 4.3 % and the standard deviation is 0.25 % units. Most cows have a fat-% of around 4.3, and only very few have a fat-% of 3.5 or 5.0. For the Jersey breeds the mean fat-% is 6.4.
The phenotype of an animal should always be evaluated as being a deviation from the mean value of the population. For instance a Jersey cow should be evaluated based on the mean value of the Jersey and not on the mean value of HF.

Quantitative traits are normally influenced by the effects of several gene pairs and the environment, and have a normal distribution of population values. This is **polygenic** inheritance, as opposed to single gene (monogenic) inheritance or Mendelian genetics, which have been described in the preceding chapters.