

Heritability. Heritability is the extent to which genetics influences a trait or characteristic. Unlike breeding values and predicted transmitting abilities, which are estimated for individuals, heritability is a population parameter. Strictly defined, heritability is the ratio of additive genetic variance to phenotypic variance. Additive genetic variance is the true variance among breeding values of animals in a population. Hence, heritability is a ratio of the variance of breeding values to the variance of phenotypes. The possible range of values for heritability is from 0 to 1.0, because additive genetic variance is a part of phenotypic variance. Phenotypes are what is observed or measured about a particular trait; phenotypes are influenced by genetic and environmental effects. In measuring heritability, phenotypic variances are taken to be the total of random sources of variation after adjusting for systematic sources of variability, such as herd-year, age, month of calving, or stage of lactation.

The extent of genetic control is different for each trait. Approximate heritabilities for several common traits of dairy cattle are in Table 1. The higher the heritability, the greater is the genetic control on the trait, and the more rapidly selection will result in genetic progress. In general, yield traits and overall type tend to be moderately heritable; fat and protein percentages, stature, and size have higher heritabilities, and reproductive efficiency has lower heritability. Mastitis resistance has a heritability of about .10. In other words, genetics accounts for 10% of the variation in cows' capacity to resist mastitis infection, and environment accounts for the remaining 90%.