

Livestock Breeding and Genomics - Exercise 4

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Problem 1: Breeding Values For a Monogenic Trait

We assume that the absorption of cholesterol is determined by a certain enzyme. The level of enzyme production is determined by a single bi-allelic locus E . The genotype frequencies and the genotypic values for the two dairy cattle populations **Original Braunvieh** and **Brown Swiss** are given in the following table.

Variable	Original Braunvieh	Brown Swiss
$f(E_1E_1)$	0.0625	0.01
$f(E_1E_2)$	0.3750	0.18
$f(E_2E_2)$	0.5625	0.90
a	15.0000	29.00
d	3.0000	0.00

Hints

- Assume that allele E_1 is the allele with the positive effect on the enzyme level
- Assume that the Hardy-Weinberg Equilibrium holds in both populations

Your Task

Compute the breeding values for all three genotypes in both populations.

Problem 2: Quantitative Genetics

In a population the following numbers of genotypes were counted for a given genetic locus called A .

Genotypes	Numbers
A_1A_1	24
A_1A_2	53
A_2A_2	23

- Compute the genotype frequencies
- Compute the allele frequencies
- Compute the population mean μ under the following assumptions

- the difference between the genotypic values of the homozygous genotypes is 20 and
- the genotypic value of the heterozygous genotype is 2.