

Livestock Breeding and Genomics - Exercise 5

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Problem 1: Own Performance

Given is the dataset with weight observations for 12 animals. The heritability (h^2) for the trait is 0.2025. The population mean μ can assumed to be the mean of the weights in the table below.

Animal	Weight
1	285
2	282
3	278
4	280
5	281
6	282
7	285
8	282
9	281
10	287
11	281
12	282

Your Tasks

- Compute the breeding values for all animals given in the table above
- Compute the accuracies of the breeding values of all animals shown in the table above.

Problem 2: Breeding Value Prediction Based on Repeated Observations

Elsa has observations for her birth weight (52 kg) and some more repeated measures for her weight. We assume the heritability to be $h^2 = 0.45$. The population mean for the repeated observations of the weight is 170 kg. The repeatability of the weight measurements is $t = 0.65$.

The following tables contains all observed values for the weight.

Measurement	Weight
1	52
2	82
3	112

4	141
5	171
6	201
7	231
8	260
9	290
10	320

- a) Predict the breeding value for Elsa based on the repeated weight records.
- b) What is the reliability for the predicted breeding value from 2a)?
- c) Compare the reliability from 2b) with the reliability that would result from a prediction of breeding values based on own performance.

Problem 3: Predict Breeding Values Based on Progeny Records

A few years later Elsa was the dam of 5 offspring. Each of the offspring has a record for weaning weight. Predict the breeding value of Elsa for weaning weight based on the offspring records listed in the following table.

Offspring	Weaning Weight
1	320
2	319
3	320
4	320
5	321

The mean and the heritability can be taken the same as in Problems 1 and 2 resulting in $h^2 = 0.45$ and $\mu = 250$