Livestock Breeding and Genomics - Exercise 11

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Problem 1 Multivariate BLUP Animal Model

The table below contains data for pre-weaning gain (WWG) and post-weaning gain (PWG) for 5 beef calves.

Animal	Sex	Sire	Dam	WWG	PWG
4	Male	1	NA	4.5	6.8
5	Female	3	2	2.9	5.0
6	Female	1	2	3.9	6.8
7	Male	4	5	3.5	6.0
8	Male	3	6	5.0	7.5

The genetic variance-covariance matrix G_0 between the traits is

$$G_0 = \begin{bmatrix} 20 & 18 \\ 18 & 40 \end{bmatrix}$$

The residual variance-covariance matrix R_0 between the traits is

$$R_0 = \begin{bmatrix} 40 & 11 \\ 11 & 30 \end{bmatrix}$$

Your Task

Set up the mixed model equations for a multivariate BLUP analysis and compute the estimates for the fixed effects and the predictions for the breeding values.

Problem 2 Comparison of Reliabilites

Compare the predicted breeding values and the reliabilites obtained as results of Problem 1 with results from two univariate analyses for the same traits are used in Problem 1. All parameters can be taken from Problem 1.