Exercises: Prediction of breeding values

Exercise 2: sire model with fixed effect of herd.

Use the milk production information in Table 1 below to set up a mixed model for genetic evaluation of the four bulls. Assume that the bulls are unrelated. Use Excel for calculations.

a) Set up a ***complete*** statistical model that describes the data (this includes describing the expectations and the genetic counterpart of statistical components)

b) Set up the mixed model equations (MME) in matrix form for this example. Do reparameterization if necessary, i.e. make sure there are no dependencies in the equation system. The heritability in this example is assumed to be 0.25.

c) Solve the equation system and rank the four bulls on their predicted breeding values. How is the ranking affected compared to ranking on daughter group averages? Why?

Table 1. Number of 1st lactation daughthers and the sum of milk production for the daughter groups (within parantheses) for four bulls with offspring in two herds. Also the total and average production within herd and within bull

	Herd			
Sire	1	2	Total	Average production
1	5 (22 000)	-	5 (22 000)	**4 400**
2	2 (8 000)	6 (36 000)	8 (44 000)	**5 500**
3	3 (11 100)	4 (29 300)	7 (40 400)	**5 771**
4	-	6 (29 700)	6 (29 700)	**4 950**
Total	10 (41 100)	16 (95 000)	26 (136 100)	
Average production	**4 110**	**5 938**		**5 235**