

# Young Animals without Observations:

Animals	Genotypes	k	Observations
1	$G_1 G_1$	$I_2 I_2$	$y_1$
2	$G_1 G_2$	$H_1 H_2$	$y_2$
...	$H_1 H_1$	$I_2 I_1$	
N	---	$I_1 I_1$	$y_N$
N+1	$G_2 G_2$	$I_2 I_2$	
N+2	$G_1 G_1$		
...			
N+M	$G_1 G_2$	$I_1 I_2$	

Model:

$$y = X\beta + Zg + e$$

- vector  $g$  contains genome breeding values for all animals. It can be partitioned into two parts

$$g = \begin{bmatrix} g_1 \\ g_2 \end{bmatrix} \text{ where } \begin{array}{l} g_1 : \text{animals with observations} \\ g_2 : \text{young animals without observations} \end{array}$$

- variance-covariance matrix

$$\text{var}(g) = G \cdot \sigma_g^2 \rightarrow \text{var} \begin{bmatrix} g_1 \\ g_2 \end{bmatrix} = \begin{bmatrix} G_{11} & G_{12} \\ G_{21} & G_{22} \end{bmatrix} \cdot \sigma_g^2$$