

Animal Model components:

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

$$\begin{bmatrix} y_{23} \\ y_{24} \\ y_{35} \\ y_{46} \end{bmatrix} = \begin{bmatrix} 4.5 \\ 2.9 \\ 3.9 \\ 3.6 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \\ 0 & 1 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} + \begin{bmatrix} u_1 \\ u_2 \\ u_3 \\ u_4 \\ u_5 \\ u_6 \end{bmatrix} + e$$

$$\begin{bmatrix} 1 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 \end{bmatrix} \begin{bmatrix} u_1 \\ u_2 \\ u_3 \\ u_4 \\ u_5 \\ u_6 \end{bmatrix} + e$$

matrix(0, nrow = nrobs,
ncol = (nr_ani - nr_ds))

Animal Model for single observation y_i :

$$y_3 = 4.5 = \begin{bmatrix} 1 & 0 \end{bmatrix} \begin{bmatrix} \text{herd}_1 \\ \text{herd}_2 \end{bmatrix} + \boxed{u_3} + e_3$$

$$y_{24} = 2.9 \neq \text{herd}_2$$

Sire Model $y_3 = \text{herd}_1 + \boxed{\text{sire}_1} + e_3$