

a Notation for system of equations

- Scalar notation

$$\begin{aligned} y_{12,1,1} &= \mu + \beta_1 + u_{12} + e_{12,1,1} \\ y_{13,1,1} &= \mu + \beta_1 + u_{13} + e_{13,1,1} \\ &\vdots \\ y_{27,2,1} &= \mu + \beta_2 + u_{27} + e_{27,2,1} \end{aligned}$$

y - Matrix vector notation:

> combine all observations: $y_{12,1,1} \dots y_{27,2,1}$

into a single vector $y = \begin{bmatrix} y_{12,1,1} \\ y_{13,1,1} \\ \vdots \\ y_{27,2,1} \end{bmatrix}$

> fixed effects in vector $\beta = \begin{bmatrix} \mu \\ \beta_1 \\ \beta_2 \end{bmatrix}$

> random breeding values $u = \begin{bmatrix} u_1 \\ u_2 \\ \vdots \\ u_{27} \end{bmatrix}$

> random error terms $e = \begin{bmatrix} e_{12,1,1} \\ \vdots \\ e_{27,2,1} \end{bmatrix}$