Regression

$$y_i = \mu + b \cdot \text{breast\_circumference}_i + e_i$$

e_i: herd u_i

Mixed-linear Model

$$y_{ij} = \mu + \text{herd}_j + u_i + e_{ij}$$

- Dataset

$$\begin{cases} y_{12,1} = \mu + \text{herd}_1 + u_{12} + e_{12,1} \\ y_{13,1} = \mu + \text{herd}_1 + u_{13} + e_{13,1} \\ \vdots \end{cases}$$

- Matrix-vector notation:
  - define vector $y = \begin{bmatrix} 2.61 \\ 2.31 \\ \vdots \\ 3.16 \end{bmatrix}$
  - define vector $\beta = \begin{bmatrix} \text{herd}_1 \\ \text{herd}_2 \end{bmatrix}$