(sex, herd, season, ...)

- In a MLEM, the expected values and the variance covariance structure of the random terms must be specified

- Random terms: u → breeding values
  e → random error terms
  y → random observations

$$E[u] = E\begin{bmatrix} u_1 \\ u_2 \\ \vdots \\ u_q \end{bmatrix} = \begin{bmatrix} E[u_1] \\ E[u_2] \\ \vdots \\ E[u_q] \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ \vdots \\ 0 \end{bmatrix} = \underline{0}_q \rightarrow \text{vector of length } q \text{ with all zeros}$$

$$E[e] = \underline{0}_n$$

$$E[y] = E[X\beta + Zu + e] = E[X\beta] + E[Zu] + E[e] = X\beta$$

($E[X\beta] = X\beta$, $E[Zu] = \underline{0}_n$, $E[e] = \underline{0}_n$)

Remember, u stands for a vector of length q, e stands for a vector of length n and y is a vector of length n,

$$E\begin{bmatrix} y \\ u \\ e \end{bmatrix} = \begin{bmatrix} X\beta \\ \underline{0}_q \\ \underline{0}_n \end{bmatrix}$$

→ Variance-Covariance Structure ... (end of lecture)

Given: Example Data Set on WWG

Specify Mixed Linear Effect Model for