Linear Mixed Effects Models (LME)

Problem with fixed effect models:

- Cannot integrate genetic variance into the model analysis
- Genetic variances are different for different traits, often expressed in terms of $h^2 = \frac{\sigma_u^2}{\sigma_p^2}$

(Growth, or weight : $h^2 \approx 0.5\text{-}0.6$
⋮
health traits : $h^2 \approx 0.001$)

Matrix-Vector Notation:

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

y, X and β: like FEM

u: vector of random effects

Z: Incidence matrix relating effects in u to y

e: residuals.