□ Variances:

$var(u) = G$

↓ variance-covariance matrix of random breeding values

$var(e) = R$

↓ variance-covariance matrix of random errors

- $cov(u, e^T) = \emptyset$; $cov(\beta, u^T) = 0$, $cov(\beta, e^T) = 0$

$$\Rightarrow var(y) = var(X\beta + Zu + e)$$

$$= var(X\beta) + var(Zu) + var(e)$$

$$= X\underbrace{var(\beta)}_{\emptyset}X^T + Z\,var(u)\,Z^T + var(e)$$

$$= ZGZ^T + R = V$$

$$=$$