- $var(u) = G$

$$= \begin{bmatrix} var(u_1) & cov(u_1,u_2) & \cdots \\ cov(u_2,u_1) & var(u_2) & \cdots \\ \vdots & \vdots & \end{bmatrix}$$

$var(u_1) = (1+F_1) \cdot \sigma_{u_1}^2 = \sigma_u^2$; F_1 = Inzuchtgrad von Tier 1

$var(u_2) = (1+F_2) \cdot \sigma_u^2 = \sigma_u^2$

$F_1 \neq 0$; if parents of 1 are related

- If animals not related

$cov(u_1, u_2) = 0$

- $cov(u_1, u_3) = cov(u_1, [\frac{1}{2}u_1 + \frac{1}{2}u_2 + u_3])$

$u_3 = \frac{1}{2}u_1 + \frac{1}{2}u_2 + u_3$

$= cov(u_1, \frac{1}{2}u_1) + cov(u_1, \frac{1}{2}u_2)$

$+ cov(u_1, u_3)$ $=0$

Animals 1 and 2 are not related $=0$

$= \frac{1}{2} cov(u_1, u_1)$

$= \frac{1}{2} var(u_1) = \frac{1}{2}\sigma_u^2$