Genotype Frequency

□ Average genotype frequency for homozygotes (G_2G_2)

across all lines: $\overline{q^2}$

Expected allele frequency in base population $= q_0$

□ Variance:

$$\sigma_q^2 = \overline{q^2} - \overline{q}^2 = E[q^2] - (E[q])^2$$

$$var(q) = E\left[(q - E[q])^2\right]$$

$$= E\left[q^2 - 2q E[q] + E[q]^2\right]$$

$$= E[q^2] - 2E[q]^2 + E[q]^2$$

$$= \underbrace{E[q^2]}_{\overline{q^2}} - \underbrace{E[q]^2}_{\overline{q}^2}$$

□ Solve for $\overline{q^2}$:

$$\overline{q^2} = \overline{q}^2 + \sigma_q^2 = q_0^2 + \sigma_q^2 = q_0^2 + p_0 q_0 F$$