Useful equations for Population and Quantitative Genetics

$$p_A = \frac{2p_{AA} + p_{Aa}}{2}$$

$$P'_{AB} = (1-r)P_{AB} + r\ p_A\ p_B$$

$$P_{AB} = p_A p_B + D$$

$$P_{Ab} = p_A p_b - D$$

$$P_{aB} = p_a p_B - D$$

$$P_{ab} = p_a p_b + D$$

$$P(x) = \binom{N}{x} p^x (1-p)^{N-x}$$

$$P[x] = \frac{e^{-\lambda}\lambda^x}{x!}$$

$$f(x) = \frac{1}{\sqrt{2\pi\sigma^2}} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$$

$$F' = \frac{1}{2N} + \left(1 - \frac{1}{2N}\right)F$$

$$F_t = 1 - \left(1 - \frac{1}{2N}\right)^t (1 - F_0)$$

$$H_t = \left(1 - \frac{1}{2N}\right)^t H_0$$

$$N_e = \frac{4N - 2}{V + 2}$$

$$N_e = \frac{4N_m N_f}{N_m + N_f}$$

$$\tilde{N} = \frac{1}{\frac{1}{n}\sum_i \frac{1}{N_i}}$$

$$p_t = (1-\mu)\, p_{t-1} + \nu\, (1- p_{t-1})$$

$$\hat{p} = \frac{\nu}{\mu + \nu}$$

$$p_t = \hat{p} + (p_0 - \hat{p})(1 - \mu - \nu)^t$$

$$F' = \left[\frac{1}{2N} + \left(1 - \frac{1}{2N}\right)F\right](1 - \mu)^2$$

$$\hat{F} = \frac{1}{4N\mu + 1}$$

$$\Delta p = \quad = \frac{pq(w-1)}{w\ p + q}$$

$$p' = p'_{11} + \frac{p'_{12}}{2}$$

$$= \frac{p^2 w_{11} + pqw_{12}}{\overline{w}}$$

$$q' = \frac{q^2 w_{22} + pq\, w_{12}}{\overline{w}}$$

$$p' = \frac{p(1 + s + sp)}{1 + 2ps}$$

$$\hat{p} = \frac{t}{s + t}$$

$$\Delta\overline{w} = V_g$$

$$w_i = \sum_j w_{ij}\, p_j$$

$$p'_i = \frac{p_i w_i}{\overline{w}}$$

$$p' = p^2 + 2kpq$$

$$\hat{q}^2 s = \mu$$

$$\hat{q} = \sqrt{\frac{\mu}{s}}$$

$$\hat{q} \cong \frac{\mu}{hs}$$

$$F = \frac{H_0 - H}{H_0}$$

$$H = 2pq(1 - F)$$

$$\delta = \frac{W_0 - W_I}{W_0}$$

$$\hat{F} = \frac{S}{2 - S}$$

$$W_S - \frac{W_O}{2} > 0$$

$$F_{ST} = \frac{Var[p]}{\overline{p}\,\overline{q}} = \frac{H_T - \overline{H}_S}{H_T}$$

$$F_{IS} = \frac{\overline{H}_S - H_I}{\overline{H}_S}$$

$$F'_{ST} = \frac{1}{2N} + (1 - m)^2\left(1 - \frac{1}{2N}\right)F_{ST}$$

$$F_{ST} = \frac{1}{4Nm + 1}$$

$$\alpha = a + d(q - p)$$

$$V_P = V_A + V_D + V_I + V_E$$

$$V_A = 2pq\alpha^2$$

$$h^2 = V_A / V_P$$

$$R = h^2 S$$

$$b_{OP} = h^2 / 2$$

$$b_{O\overline{P}} = h^2$$

$$Cov[HS] = \frac{1}{4} V_A$$

$$Cov[FS] = \frac{1}{2} V_A + \frac{1}{4} V_D$$

$$V_{A,w} = (1 - F)V_A$$

$$V_{A,b} = 2FV_A$$

$$u = \frac{1 - \exp[-2sN_e / N]}{1 - \exp[-4N_e s]}$$

$$D' = (1 - r)^t D$$

$$\hat{H} = \frac{4N_e\mu}{4N_e\mu + 1}$$

$$\binom{n}{x} = \frac{n!}{x!\,(n - x)!}$$