

Answers to Problems in Population Genetics:

1. 100 Shorthorn

60 RR 60 R 60 R R Freq. = 150/200 = .75

30 RR' 30 R 30 R'

10 RR' 10 R' 10 R' R' Freq. = 50/200 = .25/1.00

2. $.16 = b^2$ $\sqrt{.16} = .4$ is b

A + b = 1 So, A = .6

(A) .6 freq. of dom. allele

(B) $2 (.6) (.4) = .48$

3. Lowest X repeatability #

$6 \times .16 = .96\%$ change of difference later on in different litters.

4. $\Delta G =$ Average gain $\Delta G = h^2 \times Sd$

$h^2 =$ heritability

Sd = Selected difference $Sd = P_s - \bar{P}$

$P_s =$ Population selected

$\bar{P} =$ Population

$P_s = 3.1$ $3.1 - 4.2 = -1.1$

$\bar{P} = 4.2$

$h^2 = .31$ $(.31)(-1.1) = -.341$

Sd = 1.1

$4.2 - .341 = 3.859$

5. $\Delta G = h^2 \times Sd$, $Sd = P_s - \bar{P}$

$P_s = 225$ $225 - 195 = 30$ Sd

$\bar{P} = 195$

Sd = 30 $205 - 195 = 10$ ΔG

$\Delta G/Sd = h^2 \times \underline{Sd}$

$\Delta G/Sd = h^2$

$10/30 = 33 h^2$

6. Average population = 2.0 $\bar{P}_s - \bar{P} + S_d$ $\Delta G = h^2 \times S_d$

Selected population = 2.8 $2.8 - 2.0 = (.8)$

$h^2 = .60$ $.48 = .6 \times .8$

Expected genetic gain is .48

Offspring = $.48 + 2.0 = 2.48$

7. Average liter size - (the average of both A & B)

The average of both A & B

$8 + 7 = 15/2 = 7.5$

$\frac{9.0 - 7.5}{7.5} = \text{heterosis}$