

PRACTICAL NO. 2

COMPUTATION OF GENERATION INTERVAL AND EXPECTED GENETIC GAIN

As the actual genetic gain or response to selection (ΔG) is function of heritability times selection differential.

$$\Delta G = h^2 (P_S - P)$$

Where P_S is the mean phenotype selected male and female parents used to produce offspring and P is the population mean of base parental population before selection. Thus $(P_S - P)$ is called selection differential (SD).

Therefore if we know ΔG and the selection differential, then we can estimate $h^2_{(R)}$ (realized heritability) using selection data.

$$h^2_{(R)} = \frac{\Delta G}{S.D}$$

As it is based on actual genetic gain, it's not the expected estimate value and called realized heritability.

EXAMPLE

Egg production mean of the base population (P_0) is 230 eggs per year and the mean of the population after one generation of selection (P_1) is 260 eggs per year. Birds averaging 310 eggs per year were selected from the base population to be used for breeding purpose to produce next generation, calculate realized heritability.

SOLUTION

Mean of the base population (P_0) = 230eggs

Mean of the population after one generation of selection (P_1) = 260eggs

Therefore, $\Delta G = P_1 - P_0 = 260 - 230 = 30$ eggs.

As, mean of the selected population (P_S) = 310 eggs

Selection differential = $P_S - P_0 = 310 - 230 = 80$ eggs

Realized heritability $h^2_{(R)} = \frac{\Delta G}{S.D} = \frac{30}{80} = 0.375$

CONCLUSIONS:

The additive genetic variation in egg production is 37 % of the observed total variation in egg production of the studied flock.

CLASSROOM ASSIGNMENT

1. The average lactation milk production of a herd of Sahiwal cows is 1650 L. the average milk production per lactation of the cows selected as parents of next generation is 2500 L. the average milk production / lactation of offspring generation is 2150 L. Estimate realized heritability in this population.
2. In a random population of Patanwadi synthetic sheep the medulation % of parental generation is presented below. A breeder select top 20% sheep for lower medulation % which were also bred randomly to produce next generation progeny whose performance is also given below. Estimate realized heritability for this trait.

Medulation % of parental panmictic population.

9 7 12 13 11 9 7 8 10 7 6 6 5 9 10 8 4 4 5 13

Medulation % of next generation progeny

3 5 4 4 8 9 8 8 7 10 11 4 5 8 9 10 8 9 10 9

Home assignment

1. Consider body weight of broilers at 8 weeks. The mean of the flock is 1180 gms. Mean of the selected birds to be used as parents is 1390 gms and the mean of the progeny generation is 1230 gms, Calculate realized heritability.
2. In a panmictic population birds, body weight at 6 weeks are presented below. Top 25% birds were select by breeder for producing next generation. The body weights of progeny at 6 weeks are also given below. Calculate realized heritability.

Body weights in gms of parental population

1000 600 700 700 500 600 600 800 700 600 800 500 600 800 600
700 900 800 800 700

Body weights in gms of next generation progeny

800 900 800 700 700 800 700 800 800 900 900 600 700 800 700
800 900 800 1000

