PRACTICAL NO. 3

ESTIMATION OF CORRELATED RESPONSE TO SELECTION

Most of biological traits are of quantitative nature and have genetic correlation between them varying in magnitude and direction.

When breeder attempts to select and improve a single trait, other traits, which are genetically associated with the trait being selected, show correlated changes which are known as correlated response.

The correlated response in secondary trait (Y) due to selection in primary trait (X) depends on magnitude of genetic correlation and genetic and phenotypic standard deviations.

$$C.R._{(Y,X)} = I_x h_x r_G \sigma_{A(Y)}$$

The efficiency of correlated response is generally expressed as ratio of correlated response to direct response in a trait with the assumption of same intensity of selection.

Relative efficiency

$$\frac{CRy}{Ry} = \frac{I_x h_x r_G \sigma_{A(y)}}{i_y h_y \sigma_{A(y)}} = \frac{i_x h_x r_G}{i_y h_y}$$

Therefore, under identical intensity of selection, the correlated response to selection will be more effective when $h_X.r_G > hy$.

Solved Problem:

Following information for peak yield (kg) and body weight at calving (kg) of Hariana cows is given.

Traits	Average	σ P	h^2
Peak yield (Y trait)	12.50	1.20	0.35
Body weight (X trait)	401.0	37.50	0.25

The genetic correlation between peak yield and body weight at calving (rg xy) is 0.30. If the best 40 percent cows are selected for breeding, calculate,

(i) The expected direct response to selection in body weight at calving

(ii) The correlated response in peak yield

Solution:

(i) Direct response to selection in body weight at calving

$R_x = i_{(x)} \times \sigma P_{(x)} \times h^2_{(x)}$

Proportion of cows selected = 40% = 0.40

By table value of i =0.97

R_x =0.97 X 37.5X 0.25

=9.09

(ii) $CR_{(y)} = i_{(x)} \times h_{(x)} \times h_{(y)} \times rg_{(xy)} \times \sigma P_{(y)}$

= 0.97 X √0.35 X √.025 X 1.20

= 0.343

Home Exercise No.1

From the following information find out correlated response in Y for direct selection in X.

r_G	σ_{P1}	σ_{P2}	σ_{G1}	σ_{G2}
0.3	300	1200	100	240
0.4	150	1200	100	240
0.5	400	1600	100	200