

# RESPONSE TO SELECTION

## What is selection?

Choosing the livestock / poultry to be parents

Choosing the livestock / poultry to mate

Improving the frequency of desirable gene.

The change produced by selection is the change of the **population mean** in the offspring.

Response to selection is **symbolized by "R"**.

The response to selection is the difference of mean phenotypic value between the offspring of the selected parents and the whole of the parental generation before selection.

The **selection response** is how much gain one makes/obtain when mating the **selected** parents.

The response to selection also indicates about the expected genetic gain (expressed per unit time).

- $R = h^2 S$

where,  $h^2$  = heritability

$S$  = selection differential

- $\Delta G \text{ or } R / \text{year} = h^2 S / GI$

where,


$h^2$  = heritability

$S$  = selection differential

$GI$  = generation interval

- The selection differential  $S$  measures the within-generation change in the mean.
- Response ( $R$ ) is the between-generation change in the mean.

# Factors affecting genetic gain

- The factors affecting the response to selection
  - heritability,
  - selection differential and
  - generation interval.
- **Maximum gain** will result when the selection differential (S) and the heritability ( $h^2$ ) are **high** and the Generation Interval is **low** as it is inversely related.
- **Heritability:** The genetic gain depends on the  $h^2$  of the character in the generation from which the parents are selected.
- if the  $h^2$   is the genetic gain will also be more, because the environmental variation will be less.
- **Selection differential** : Higher the S, higher will be gain

# Selection differential

**Selection differential  $S = (P_s - P)$**

where,

- $P_s$  = mean of the selected parents
- $P$  = mean of the population
- The **Selection differential  $S$**  is also be expressed as
- **$S = i \sigma_p$**  ( $i = S / \sigma_p$ )

where

$i$  = intensity of the selection

$\sigma_p$  = phenotypic standard deviation

# Factors affecting selection differential



Proportions of the animal selected for breeding; smaller the number larger the selection differential



Reproductive rate- in cattle selection differential will be less whereas in pigs, it will be more because of more litter size .



Herd size; larger the herd size, smaller the proportions of animals selected.



Use of artificial insemination and frozen semen increases selection differential embryo transfer increases the selection differential or selection intensity.