

# Breeding plans – computer exercise



by Anders Dahlin & Jan Philipsson

Dept of Animal Breeding and Genetics, Swedish University of Agricultural Sciences (SLU), Uppsala, Sweden

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## Purpose

Familiarise with a computer lab for prediction of expected genetic gain ( $\Delta T$ ) in cattle breeding, allowing for variable population structures and trait parameters.

$$\text{Genetic gain per year in a trait: } \Delta T_y = \frac{r_{TI} \times i \times \sigma_A}{L}$$

## Software

The computer lab is based on two Excel files, programmed to calculate genetic gain ( $\Delta T$ ) in one trait, and in two correlated traits, respectively. Each file consists of several sheets. Sheet 1 is used to enter population data and trait parameters, and to see the resulting genetic gain. The other sheets contain programming for calculation of accuracy, generation interval, selection intensity, etc (the cell contents in these sheets are locked and cannot be altered by the user).

The first time a file is opened, sheet 1 is filled with values applicable to milk production in Sahiwal cattle in Pakistan. If you want to use data and parameters that apply to other populations, enter your own figures in any of the *yellow cells*. The genetic gain is shown in the blue field at the bottom of sheet 1. If you want to save files on your disc after entering own figures, use a new file name; otherwise you will not be able to go back to the original Sahiwal example, except from the CD (or make a printout of sheet 1 of the Sahiwal example).

## Assignments

### **Exercise 1** (use Excel file: One Trait)

Keep the Sahiwal population data and the parameters for milk yield. Register the expected *total genetic gain per year*, as well as the *relative contribution from different selection paths*, when you:

- Vary the population size from 2,000 to 20,000. Keep the proportion young bull semen used in AI at 0.70, and all other parameters unchanged.
- Vary the proportion young bull semen in AI from 0.4 to 1.0 for population size 2,000 and 20,000, respectively. Keep all other parameters unchanged.

Make graphs of the results (Excel scatter charts with lines), with genetic gain per year as dependent variable, and population size and proportion young bulls as independent variables, respectively.

### **Exercise 2** (use Excel file: Two Traits)

Keep the Sahiwal population and trait parameters. Register the expected *total annual genetic gain*, and also the *annual gain in each one of two correlated traits*, milk yield and calving interval. Vary the relative economic weights to find: (i) the economic optimum, and (ii) the weights where calving interval is not increasing.

### **Exercise 3**

Choose your own examples in dairy cattle and vary trait and population parameters.