

## Animal model evaluation for production traits in Hellas; status of implementation.

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### 1. Introduction

In Hellas, sire and cow evaluations for milk production traits have not been calculated yet. The reasons were lack of an appropriate amount of relevant data and the peculiar structure of the greek dairy genetic improvement programme, characterised by the importation of all semen used in the active population.

Recently, after a data base has been established with enough data, work is done on the implementation of a repeatability Animal Model for the recorded greek Holstein-Friesian, B. Swiss and Simmental populations. The first official Animal Model genetic evaluations are intended to be published in autumn 1992.

### 2. Model

The model used for evaluation is a single trait with repeated records, additive genetic and repeatability model:

$$y_{ijk} = r y s d_i + l_j + \alpha_k + \sum_{r=1}^n q_{kr} g_r + p_k + e_{ijk}$$

where :

$y_{ijk}$  , is the observation (the  $j$  305 day production of the  $k$  cow for  $kg$  milk).

$rysdi$  , is the fixed effect of the  $i$  region  $\times$  year-season of calving  $\times$  herd level deviation.

$l_j$  , is the fixed effect of the  $j$  parity.

$a_k$  , is the random additive genetic value of the  $k$  cow deviated from the respective genetic group effect.

$q_{kr}$  , is the contribution of the  $r$  genetic group to the genetic merit of the  $k$  cow.

$g_r$  , is the fixed effect of the  $r$  genetic group.

$p_k$  , is the random permanent environmental effect of the  $k$  cow.

$n$  , is the number of genetic groups.

$c_{ijk}$  , is the random residual effect associated with each lactation.

For some effects in the model, some more details are given in the following:

\*  $rysdi$  - effect and parity

Because of the very small herd size in the recorded population (average size 19.5 cows), herds were grouped according to the geographical region. Furthermore, as seasons of calving were taken two periods of 6 months each, from which the first lasted from October of the previous to March of the next year, and the second from April to September of the same year. Because the effect of the season of calving may change from year to year, the combined effect of year-season of calving was considered, starting from 1978. The deviation of the herd level was computed by calculating the average of all available lactation records for all cows in a herd by the year of entering the dry period and comparing it with the region average of the same year.

## Genetic groups

Under practical conditions and especially under the greek recorded population, a grouping strategy must be defined, because there is a lack of many ancestors in the pedigree files, depending on various reasons.

With the strategy used, an unknown parent can be replaced by a phantom parent. These phantom parents of the same genetic potential can be put together into a group, a phantom group. Besides animals with only one parent unknown, there are animals with both parents unknown. In this case, both parents are connected to the same phantom group.

## 3. Data

The evaluations are calculated for milk production only and simultaneously for all breeds (Holstein-Friesian, B. Swiss and Simmental). In the data, all these breeds are mixed, allowing to better evaluate the cows raised in mixed breed herds. However, evaluation proofs of animals belonging to different breeds, are separated by assigning them to different genetic groups.

All lactation data available after 1978 were used, provided that they satisfied the following criteria:

- first lactation had to be known
- the lactation length had to be at least 200 days.
- lactations with less than 305 days were not extrapolated.
- all available lactations were taken into account.

## 4. Computing strategy

The system of mixed-model equations has been using the indirect approach which performs Gauss-Seidel iteration while reading the data files, rather than the matrix of coefficients. Although the indirect approach is based on mixed model equations, these are not used explicitly.

### 5 Including information on genetic evaluations from abroad

In countries where the genetic improvement programme is based on the importation of semen and, recently, embryos, which is the case of Hellas, the use of information on genetic evaluations of ancestors from abroad should provide additional data to the model. This includes the ancestors of imported heifers which get lactation records in Hellas, and also, the genetic evaluations of imported bulls progeny tested in other countries. A further evolution of the model used, should take into account this additional information.

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# DATA AVAILABLE FOR THE ANALYSIS

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GEOGRAPHICAL AREA : MACEDONIA, EPIRUS,  
THRACE, THESSALY

PERIOD : FROM 1978 TO 1991

HERDS : 2,107

COWS : 46,652

PRODUCTION RECORDS : 91,069  
(305 day milk yield)

AVERAGE 305 DAY PRODUCTION : 4956Kg  $\pm$  1274Kg

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## NUMBER OF EQUATIONS SOLVED FOR THE ANIMAL MODEL EVALUATION

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Effects	Number of equations
rysd (region x year-season of calving x herd level deviation)	815
l (parity)	10
g (genetic groups)	14
u (additive genetic value)	46727
p (permanent environment)	46652
Total number of equations	94218

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