

**A comparative study, by simulation,
of bull and cow evaluation methods**

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The efficiency of different evaluation methods of dairy cattle has been studied on simulated data. For sire evaluation : the contemporary comparison, the index based on up to three records of the daughters and the direct comparison (Blup « 1st lactations » and « all lactations ») have been compared. For cow evaluation : the index with and without paternal half-sibs and the direct comparison (BLUP « all lactations »). 3 600 lactations corresponding to 1 800 daughters of 30 sires distributed in three groups recorded in 62 herds were generated by routines using 0.20 as value of h , 0.45 as value of repeatability and a phenotypic « within herd » variance equal to .60.

Two versions were built differing by the presence (version 1) or not (version 2) of a great number of connections between groups of sires. The efficiency was measured by the rank correlation between true values and values estimated by the different methods. All these correlations are higher for the Blup method. Furthermore the superiority of the direct comparison is also well illustrated when comparing the average true breeding values of the 150 best cows selected on the basis of the three methods.

SESSION V a

**PROBLÈMES DE CHOIX DES REPRODUCTEURS
DANS LES PETITES POPULATIONS**

Horse breeding problems

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The purpose of this paper is to give a short survey of present problems concerning the genetic improvement of horse breeds.

The evolution of these populations in Europe, characterized by a deep change from production of draught horses towards that of leisure horses, is described and the influence of the demographical parameters on the selection of these horse population, is discussed.

The generation interval represents an important handicap only surmounted in the case of racing breeds where a high selection intensity can be practised since all animals are subjected to performance testing. In the other cases, the farmer mostly does not use modern breeding techniques, but crossings leading to earlier visible results.

The next point treated in this paper is the available selection criteria. A distinction is made between direct estimates evaluating the abilities of the animals in practice and the indirect estimates measuring a character in correlation to the previous ones. — For the first estimates, a distinction is made between those resulting from competitions (handicap, records or earnings) and those resulting from direct in station measurements (saddle, jumping, dressage abilities, draught power).

As regards the indirect estimates, often used especially for selection of mares, the most important analysis is obviously that of the conformation. However, in the future early selection criteria according to more physiological data should be searched for and developed.

Estimation of the breeding value according to a given ability is there after pointed out. There are two situations : « The panmictic case » concerning sport and draught horses and « the non-panmictic case » corresponding to racing horses, which give rise to some problems.

The setting up of breeding plans is discussed. On account of the different economic situations and various objectives of horse production, conclusions are drawn about the role played by geneticists in the present development of this sector.

Prediction of breeding values for multiple traits in small non-random mating (horse) populations

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A mixed model method (Blup) is introduced for the estimation of breeding values for multiple traits of all animals included in a dataset, by utilizing the complete genetic relationship. Considerable computational simplifications are obtained by linear transformation of the variates, thus enabling the equations to be solved separately for each trait. The method is illustrated by an example. Undesirable effects of sampling variance on estimated genetic parameters are discussed and a recent method (« bending ») for the improvement of defective variance matrices is recommended. Recent advances in ML estimation of genetic parameters are briefly reviewed.

Inbreeding and infertility in the *Thoroughbred* mare

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Coefficients of inbreeding were calculated for the breeding population of *Thoroughbred* mares in Ireland and Britain in the early 1960's. The average coefficient of inbreeding over five generations was found to be 0.01. Coefficients of total inbreeding were estimated for a sample of 60 mares. The average coefficient of inbreeding over the 21.5 generations since the foundation of the breed was found to be 0.125. A fertility score was calculated for each mare in the breeding population in the early 1960's. The score was based on the ratio of successful years at stud for the mare. Neither the regression of fertility score on coefficient of recent inbreeding, nor the regression of fertility score on coefficient of total inbreeding, was significant. The heritability of fertility score was estimated to be 0.077 ± 0.030 .