KONINKLIJK NEDERLANDS RUNDVEE SYNDICAAT

THE USE OF SIRE EVALUATION DATA FROM ABROAD IN THE DUTCH ANIMAL MODEL RUN

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1. Introduction

In most countries semen of a number of bulls and a number of embryo's or female dairy animals are imported or exported. As a consequence, a number of bulls has offspring in more than one country and imported embryo's or dairy animals usually don't have parents with official proofs in the country of import. In both cases the use of information created by the animal model run in the country of export may be valuable in the genetic evaluation of genetic imported material in the import country.

This paper describes how information from the animal model from abroad will be used in the Dutch animal model run.

2. Advantages and disadvantages of incorporating foreign animal model information

The primarly goal of the Dutch animal model is to maximize the probability of a correct genetic ranking of bulls and cows under Dutch circumstances. As the circumstances, such as climate, housing, sort of forages etc. will be rather fixed for the next future, it is obvious to select animals which are the best under the given environment. This would mean that information collected in other environments is of less value.

We will make a restriction on the use of foreign animal model information for the country where the animal or the parents are originally born and tested. For example a bull, born in the US and tested in US and Germany at the same time, only information from the US will be used. This restriction is made in order to get no complicated situations without much gain in accuracy.

Some advantages of use of foreign information in the home animal model are:
- reduction in bias of breeding values for imported bulls and females, because the parents do usually not have records in the import country and the records of imported animals may be biased to some extent;
- increase in accuracy of evaluation.

Some disadvantages are:
- use of foreign information will mask some sorts of genotype * environment interaction, which partly can be solved by assuming a R_e less than 1;
- the method is much more complicated and the logistic of getting the data should be well organized;

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- there is still an animal model run needed without use of foreign information for international comparisons (estimation of conversion factors, etc.). This would result in two proofs for every bull, one for international comparisons and one for publication.

3. Animal model proofs for imported sires

Foreign breeding values of sires of which semen or offspring were imported, were converted to The Netherlands. As soon as these sires had a breeding value, based on daughters born in the Netherlands and a reliability of at least 85%, the converted breeding value was replaced. Farmers and the AI industry knew exactly then the genetic merit of that bull for Dutch circumstances. Usually the change of converted proof to a Dutch proof was fluently, in some cases however the changes were great (sometimes justified, sometimes not). In general this system was good and simple. There was a clear distinction between converted proofs and Dutch proofs. For this reason, possible masks of genotype - environment interactions and our aim to have 1 proof for every bulls which can be used for all purposes, we will not include foreign animal model information in published Dutch breeding values for bulls.

4. Animal model proofs for cows, imported as embryo or after birth

Cows with records, which are imported as embryo or after birth, are usually of interest for bull dam selection. AI organizations starting with nuclei may buy a lot of genetic material abroad. If it concerns females, bias of their breeding values should be minimized. For this category of animals foreign animal model information will be used to increase the accuracy of breeding values of the parents.

The general formula of an animal model proof is:

$$A_{ANIM} = W_1\ YD + W_2\ (A_S + A_D)/2 + W_3\ NAK$$

where: YD = records adjusted for all other effects in the model;

$$NAK = \overline{2\ A_{PROG} - A_{MATE}}$$

A = breeding value for the animal (ANIM), sire (S), dam (D), progeny (PROG) and mate (MATE);

W_1, W_2, W_3 = weighing factors.

For imported females (as embryo or after birth) the breeding value of the dam is replaced by a weighted average of the converted breeding value of the dam and the dam's breeding value based on offspring with records in the Netherlands. For the breeding value of the sire, daughter yield deviations (DYD) from the country where the sire is born and first tested, is used. Let the proof of that sire, estimated on Dutch data, be:

$$A_{STIER} = W_1 (A_{ss} + A_{ds})/2 + W_3 NAK$$

which can be rewritten as (VanRaden and Wiggans, 1991):

$$A_{STIER} = X_2 (A_{ss} + A_{ds})/2 + X_3 DYD_{NLD}$$

where X_2 and X_3 are weighing factors (sum = 1) and DYD_{NLD} is DYD based on progeny in The Netherlands. With use of DYD from a foreign country (DYD_{FOR}), the breeding value of the sire is computed as:

$$A_{STIER} = X'_1 (A_{ss} + A_{ds})/2 + X'_{31} DYD_{NLD} + X'_{32} DYD_{FOR}$$

DYD_{FOR} is scaled to Netherlands equivalents by the b factor which is used for conversion purposes. In addition DYD_{FOR} is weighted by a number of progeny which is derived from the reliability of the breeding value in the foreign country and an assumed genetic correlation between the true proofs in that country and in The Netherlands.

5. Literature

VanRaden, P.M. and G.R. Wiggans. 1991. Derivation, calculation, and use of national animal model information. J. Dairy Sci. 74:2737-2746

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