Impact of the Integrated National Cattle Database on Progress in Genetic Evaluation Procedures

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Summary

Hungarian cattle breeding is strongly involved in the international breeding integration. To breed Holstein Friesians including the decisive majority of the stock and Hungarian Fleckvieh, an independent breeding program considering the trend of international breeding is carried out. Performance testing based on the recommendations of ICAR, consequently the progeny testing and breeding value estimation are important conditions for performing the independent breeding program. In the course of our work special attention is paid to compare our result on the international level. In connection with the methodology of breeding value estimation our primary aim is the adaptation of international developments to Hungarian conditions, the accurate, reliable survey, control and processing of basic data of the required traits. The integrated database of animal breeding was developed for this purpose and the *Cattle Information System* forms its integral part. The system consists of several sub-systems. The logical relationship developed between some sub-systems ensures the continuous supervision of data on several level, thus the complete satisfaction of the data requirements of breeding value estimation.

Key words: integrated database, animal identification and registration, genetic evaluation

Hungary elaborated a comprehensive cattle breeding program in 1972 resulting in the development of the breed structure of the current population. Holstein-Friesian and Hungarian Fleckvieh are the dominating breeds in the Hungarian dairy population. The progeny performance test considering the international tendencies and the breeding value estimation aimed at the traits characteristic of the breed, form the integral part of the independent breeding programs used by the breeding organisations of both breeds. In order to test young bulls, some 20-25 % of the female stock is involved in the regular progeny testing. Table 1 shows the number of bulls yearly involved in testing. Selection of both breeds is carried out on the basis of the selection index (HGI and KTI, respectively) laid down in the breeding program and expressing the breeding goal.

Table 1. National progeny test program

Breed	Number of bulls		
	1998	**1999**	**2000**
Holstein-Friesian	78	86	86

Breeding values of performance and type traits characteristic of the breed are included on a weighted basis in these indices and according to the desired breeding goal.

Hungarian cattle breeding tries to exploit the advantages of international breeding integration with the best efficiency possible. Results of the

countries top-ranking in the genetic development work are widely utilized both in the Holstein-Friesian and Hungarian Fleckvieh breeding. As our data should be measured and compared on the international level, we pay great attention to this consideration. Our active INTERBULL membership also serves this purpose. In conformity with our membership we have participated in the INTERBULL international comparative test for production traits from 1999 and type traits from 2001.

Connected with the methodology of breeding value estimation, our intention is to continuously adopt the developments made in this field to Hungarian conditions. By these developments Hungarian cattle breeding can keep level with the world and its results could be comparable. At the present time the internationally best known animal model is used in Hungary. However we arrange that the survey of basic data of origin, production, type and other, for the breeding very important secondary traits (e.g. somatic cell count) should methodologically meet the recommendation of ICAR. We set prominently high value that data should be accurate, authentic and characteristic of the animal. A national integrated information system with its interior, logical control mechanism may have a determinant contribution to this. This is the reason for elaborating the Cattle Information System (CIS) forming the integrated part of the Hungarian animal breeding database, which is continuously developed according to the conditions and demands. The structure of this system is illustrated in a Figure (Appendix 1.). This is the sole authentic information system of which is used not only by breeding, but animal health for the registration of each cattle and to follow the change of keeping places. It is of great importance as due to the application of the animal model, each information, data may have an influence on the breeding value in more relations than previously.

In relation to the integrated cattle database, at least three components of the correct and reliable breeding value computation can be mentioned: reliable data of origin and identification, reliable data of milk production and type and a proper statistical model. We do not intend to deal with the model including the components used in the international practice, because it would be outside of the scope of this paper. On the other hand we would like to present the effect of an integrated system on the breeding value made through the used data. First of all let us look over the data having a role in the course of each evaluation. These data are summarised in the grouping as follows:

- **identification and pedigree data:** identification number, breed, country of origin of animals, ancestors, relatives, progeny, identification number of the keeping place of sire, dam
- **data related to the utilization method of the sire to be evaluated:** involvement in artificial insemination, progeny test program, origin (import semen, import bull, or embryo)
- **production (lactation) data**
- **type data**
- **other data (somatic cell count).**

Now the sub-systems of the integrated information system affected by data listed beforehand and their logical sequences will be outlined.

The Herd Information System (HIS) and the animal Identification and Recording System (I&R) are the two most important basic sub-systems of the integrated one.

The basic function of HIS is to register the individual and specific data of animal keepers, keeping places and slaughter houses and maintain the registered data. In addition to its general veterinary functions it has the significance that data are handled as those relating to the environment and data of the utilized individual observations (e.g. inseminations, calving, milk recording, type classification data, etc.) concerning the keeping place are controlled in comparison with data stored in this system. If there is a difference between data stored in the system and data relating to the keeping place (environment), or the keeping place in question does not appear in the database, the system sends an error message and the data of individual observations shall not be credited for the observed animal till the elimination of error, or data lack, consequently it cannot distort the results in the breeding value estimation. In the course of data selection for the breeding value estimation, more other specific filter conditions are working.

I&R was built up in close connection with HIS. Animal can only be reported to the keeping place registered in the database and the system can generate individual identification number only for

animal kept in registered breeding farm. Essential functions of the sub-system are as follows: generating of the individual identification numbers, registration of marked and reported animals according to keeping place (environment). In the case of foreign animal the original, foreign identification number shall be registered together with the Hungarian one, by reporting the calf born in Hungary the simultaneous registration of the birth date (year, season), the dam and its calving, following the changes of the keeping places of animals, and laying down of information concerning the date and reason for getting out the animals from the system. The possibility to attach the individual observations to the animal shall be supervised by comparing the data stored in this system. As stated above, each sub-system of the integrated information system operates in close logical sequence, thus an individual data introduced in a sub-system, can be controlled on the basis of uniform algo-rhythms in comparison with data concerning the animal, but earlier stored in an another sub-system.

When we are speaking about I&R, reference shall be made to the A.I. sub-system handling the insemination data. This sub-system has been developed for receiving, controlling and processing of insemination data. Input of sire (sires) data required for the knowledge of the origin and blood percentage of the animal in the system will be through AIS. Forwarding of each insemination data to the central database is compulsory in Hungary. (It is recommended to report data of natural service as well). In the case the birth of a calf is reported to I&R, a series of control functions will be executed by the database. When the keeper reports the new-born calf, that is the calving of the calf's dam, the system checks the followings in the HIS:

- is there a breeding farm which reports the calving registered?
- is the dam really registered in the breeding farm which reported the calving?

Based on data stored in the AI System, I&R checks:

- has the above mentioned dam effective information on the insemination which support the birth of the reported calf?

When the system performed all the checks and no error was found, then the sire of the calf eligible for the registration will be selected by the sub-system called Parentage Checking System. This system works with a so-called sire determining algo-rhythm using the calving date and data given when inseminating. In the case of necessity this can be confirmed by an appropriate blood group or DNA test. In this way it can be essentially ensured to consider the performance of the progeny of a test bull in the process of breeding value estimation, if it is really based on reliable data of perfect quality.

Introduction of the pedigree of foreign animal in the integrated system will be through the Herd-book System. The assurance of unity is a very important function of the system, consequently only one registration of the same animal should become possible. The accurate registration of the plans for the involvement of test bulls in the progeny performance testing is one of the basic functions of this sub-system, forming the basis of controls during the test period. Laying down the fact of the involvement in the progeny performance testing is an important aspect concerning the formation of groups during the evaluation of bulls, thus also in the of data selection for the INTERBULL evaluation.

Data to be recorded only in the case of sires will be registered through the Sire Registry System. These data are as follows:

- central identification number of bulls
- name of bulls consisting of several parts

Basic data relating to production traits and connected with milk production are introduced in the system through the Milk Record Processing System.

Here the integrated system has the function to control by means of uniform algo-rhythm, whether the observed animals can be identified in HIS and I&R, and the reality of the events of observation (calving).

A new estimate module of lactation, capable of computing the lactation from one valid milk recording data, is part of the sub-system.

In addition to production traits, type data influencing the milk production trait and effective lifetime take an important part in the breeding value estimation. The introduction of these data in the system will be through the Type Score Processing System. Its function is performed along analogous lines with the Milk Record Processing System.

Appendix 1.

Herd Information System

Embryo Registration System

I&R Identification and Registration System

I&R Eartag Logistics, and Financial System

Data of animal holders, herds, abattoirs

Calvings, abortions

Flushings, embryo transfers

Offalls, movements, slaughters, export

Orders, shipments, addresses

New entries

Parentage Checking System

A.I. System

Confirmation or identification of parents

Inseminations, natural mating

Sire

National Database of Animal Breeding

Sire pedigree collection, specific data for sires

Pedigree collection, herdbook information, official pedigree certificates

Sire Registry System

Milk-test and lab records

Type scores

Herdbook System

Breeding values

Milk Record Processing System

Breeding Value Calculation System

Type Score Processing System