# Online-available milk-recording data for efficient support of farm management

*B. Logar, P. Podgoršek, J. Jeretina, B. Ivanovič, T. Perpar, Agricultural Institute of Slovenia, Animal Science Department, Hacquetova 17, 1001 Ljubljana, Slovenia*
E-mail: Betka.Logar@kis.si, Peter.Podgorsek@kis.si, URL: https://gss.kis.si

## Summary
For the purpose of milk recording and herdbook keeping in Slovenia, a central database has been established at the Agricultural Institute of Slovenia. Following the recording scheme, the farmers receive reports of productive and reproductive status of their herds and/or individual cows within a few days. When requested, the reports include urea and somatic cell count info. Milk composition provides valuable information on the management practice of dairy herd. On the basis of fat-protein ratio, animals with digestive disorders and excessive body reserve mobilization, can be detected. Information about urea concentration and its relation to milk protein concentration enables optimization of ruminal nitrogen balance and metabolizable protein supply. Based on the somatic cell count and lactose concentration, farmers are warned about eventual udder infections. Since 2003, the milk-recording data is available online as well. Special application for farmer use was developed. After authorization, the farmers can browse through tabular and graphical presentations of the whole herd or individual animal data. Data on current and previous lactations is available. Reports are in pdf or txt format. Data can be sorted, filtered and exported to other programs for further analysis. The system offers an efficient support to farm management.

**Key words:** cattle, information system, database, recording, herdbook

## Introduction
In Slovenia the history of recording in cattle goes back to the beginning of the twentieth century. In the last decades the organization of expert work in cattle breeding in Slovenia has been based on the organization of Cattle Breeding Service of Slovenia - GSS (Cattle breeding in Slovenia, 1997). Approved breeders' organizations are going to take over the leading role in the year 2005. Milk recording, herdbook service, and genetic evaluation in cattle are the main tasks of GSS. Numerous data is produced by these activities. The methods of collection and processing of data have been changing over time, in connection with the development of information technologies. The objective of this paper is to present the Slovenian Cattle Breeding Information System and Central Cattle Breeding Database with emphasis on online-available milk-recording data used for efficient support of farm management.

## Constitution of Central Cattle Breeding Database and Information System
The establishment of cattle breeding information system and central database goes back to the last decade of the 20th century. Before that, six local and two central databases were held to support GSS activities. Local data bases were maintained by the district cattle breeding service offices. Central databases were run at central institutions of GSS, at Zootechnical Department of Biotechnical Faculty and at Animal Science Department of Agricultural Institute of Slovenia. In this scheme, joining of the data on the national basis, was quite time consuming. There was an excessive duplication of activities and data storage in the system which led to differences in the data as well. In order to eliminate the duplication of activities and data a single system was established. In the nineties, the development of a new information system was initiated at Animal Science Department

of Agricultural Institute of Slovenia. Oracle tools were used for the development of information system and database. Windows operating system was selected for the server to run the relational Oracle database.

**Data migration**

Building of new database required a migration of data from eight old systems to a new system. The data migration was performed gradually. At first the pedigree data was included in the new system. More than 1.2 million animals were included into the new central database. In 2001, when Slovenia introduced an Identification and Registration (I&R) System[*], registration module of cattle information system was already in full functionality. After newborn animal data enters into the cattle database, the I&R data is sent directly into the national I&R database. In addition to the reduced costs, this concept provides important opportunity to reduce the number of errors. At entering the data is checked by a number of business rules based on the information already saved in the database. The next big step in the migration process was relocation of milk recording data. A parallel processing strategy was adopted and herds where switched from the old to the new system on a record-by-record basis. This principle provided the time necessary for resolving eventual discrepancies in the data, before the processing started under the new system. Within a period of two months all herds (>5500) were included in the new system. To conclude, the data migration has been quite time consuming and complex. A great deal of trial-and-error was required before all inconsistencies were resolved. The new information system is fully operational and incorporates a national cattle herdbooks and performance data.

**Structure of the Cattle Breeding Information System**

The current overall design of the system is schematically presented in Figure 1. As a tool of communication with the central cattle database, two types of applications were developed: classical client-server application and several web applications. The client-server application using internet, consists of modules that enable users to have select, insert and update access to the data base. Internet applications are accessible through web browsers. They enable data input, alteration and a wide range of different reviews and analysis. After login the user gets access to the portal procedures. The menu is dynamic and can be personalized depending on the permission one user has. To be more flexible in supplying information to different users, specific modules were prepared. Numerous management reports for the use by service organizations are available. These reports are created either on demand or according to an agreed schedule and can be prepared in MS Excel, HTML or PDF format. Beside the internet applications for the use on personal computers, special applications for the use on the mobile phone (WAP) or pocket PCs were developed. Since July 2004 the data can be reviewed and inserted into the database using mobile phones or PDA directly in the barns.

The users are divided into two groups depending on their access rights. In the first group there are users from central GSS institutions, district GSS institutions[†], and insemination centers. Breeders,

[*] managed by Ministry of Agriculture, Forestry and Food

[†] district offices of Chamber of Agriculture and Forestry of Slovenia (KGZS)

agricultural advisory service staff, governmental officials, and other organizations form the second group of users. The first group of users is allowed to use all the types of applications. Depending on their access rights the users from this group can perform all the actions on data. The users from the second group use those internet applications that enable selection and review of data only.

The core of the information system is the Oracle data base, which is located at the Agricultural Institute of Slovenia. It is now being used for information needs of milk and meat recording, type classification, herdbooks, breeding bulls, bull dams, reproduction, and it is a source of all pedigree and most performance data for national cattle genetic evaluation in Slovenia. From this database the data for various publications (catalogues), reports and research and the data for different national needs is prepared.

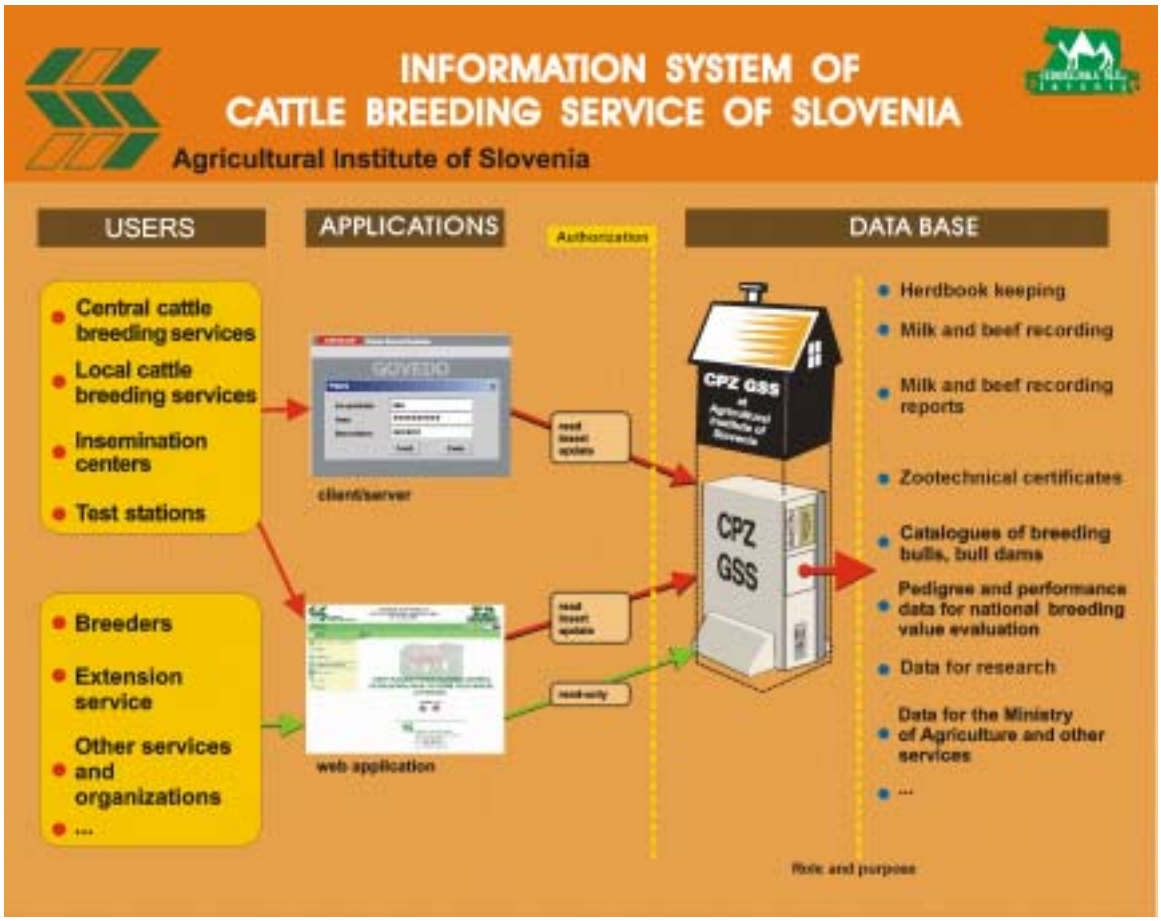


**Figure 1: Cattle Information System**

**Portal for breeders - a new tool for efficient support of farm management**

At the time when the new data base and client-server application were set up, the use of internet became more and more widespread. When developing the internet applications, great importance was laid on modules for farmer's needs. This part of web application has been named 'portal for breeders'. Every breeder included in a recording scheme, as well as breeder included only in I&R through this system have access to their own data. After the authorization, the farmers can browse through tabular and graphical presentations of the whole herd data or individual animal data. The data is available for all animals that are (or were) in a particular herd. Some of the most important reports present pedigree data and milk recording data. From the tabular views there are further links

to the production, reproduction and other relevant data. Current and previous recording data, as well as data on the running and already finished lactations may be reached on portal for browsing. The data is represented with different colors and therefore most important parameters could be accessed easily. A report for the review of expected calvings based on insemination data is available. For any herd the breed fraction information for active animals is available. Information about the sires is available in a form of PDF catalogue of a breeding bull. A module for mating plan, which takes into account the potential inbreeding is under development.

There are three different ways to deliver the recording report. All breeders in the milk recording receive the reports within a few days after recording by post. Optionally, the same reports could be received by E-mail or downloaded from 'portal for breeders'. In such case, the farmers in milk recording scheme can use the recording results immediately after the data processing is finished. When requested, the recording reports also include urea and somatic cell count info. Both reports are sent by mail and could also be accessed via 'portal for breeders'. Milk composition provides valuable information on the dairy management practice of dairy herd. The somatic cell count info is a good sign of potential subclinical mastitis. The urea concentration and its relation to milk protein concentration enable the optimization of ruminal nitrogen balance (three levels: poor, good, excessive) and metabolizable protein supply (three levels: poor, good, excessive). Cows are graphically arranged into nine groups according to their milk urea and protein content. For every group there are brief guidelines showing how to improve the diet. These can be obtained simply by clicking on the group. This analysis is represented as a graphical report depicting each cow individually. Another graphical report shows digestive disorders and excessive body reserve mobilization and is based on fat-protein ratio. Cows are arranged into nine groups showing whether metabolizable protein/energy supply is poor, good or excessive on one hand and whether bulkiness of diet is poor, good, excessive on the other hand. The brief guidelines for diet improvement are here at hand as well. More detailed manual on dairy cows feeding has also been published (Babnik et al., 2004).

## Conclusion

New cattle information system greatly facilitates the provision of breeding and management information service to cattle breeders. The benefit of this system is a better und regular information service for the breeders, technicians and other services. A fast and reliable information is crucial for a good dairy farm management and the 'portal for breeders' is becoming an essential tool to access this information. The increasing traffic on the site and a feedback from the users proves its necessity. Try out the link https://gss.kis.si where a demo access is also possible.

## References

1. *Cattle breeding in Slovenia*. Ljubljana: Cattle Breeding Service of Slovenia: Ministry of Agriculture, Forestry and Food, [1997].
2. Babnik, D., Verbič, J., Podgoršek, P., Jeretina, J., Perpar, T., Logar, B., Sadar, M., Ivanovič, B.. *Priročnik za vodenje prehrane krav molznic ob pomoči rezultatov mlečne kontrole*, (Raziskave in študije, 79). Ljubljana: Kmetijski inštitut Slovenije, [2004].