**Original Paper**

# Application of system of health monitoring of dairy cattle in the Czech Republic

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The aim of work was to describe situation in health data recording and propose a national health data sharing and evaluation system compatible with international ICAR categorization. For analysis of situation in health data recording, a survey regarding use of commercial programs of herd management was conducted, identifying specific programs and determining parts of programs which are actively used by breeders for practical purposes. Totally 21 programs were identified as used by farmers, however four most frequently utilized programs are providing recording in 67.1 % of all companies. Most frequent types of data recorded in software were: milk production (92 %), fertility and reproduction (91 %), herd management in a narrow sense (77 %), course of milking (73 %), animal health situation (61 %) and veterinary procedures and drugs recording (59 %). A general plan for health data recording connected to other parts of information system of dairy cattle was designed.

**Keywords:** dairy cattle, monitoring, health data

## 1    Introduction

Focus of research in breeding of dairy cattle was widened lately and to equal position of milk production the functional traits were classified, especially fertility, longevity and general health evaluation (Egger-Danner et al., 2015). For effective system of evaluation of health situation in cattle population, well-designed system of health recording must be designed allowing thorough analysis leading to general overview of situation in country as a whole and possibility to successfully tackle health problems in domestic population. In that situation, the health recording system can substantially help to decrease amount of needed treatment of diseases in the country as shown by Østerås et al., 2007.

However, in many countries treatment by veterinary medicaments is recorded by legal obligation, but data are not collected into central database (Egger-Danner et al., 2013; Pryce et al., 2013) and proper analysis cannot be done due to a lack of appropriate data (Gernard et al., 2012).

Although national health monitoring system is common in neighboring states of the Czech Republic (Fuerst et al., 2011, Pffeifer et al., 2015), the country itself does not operate official monitoring system. However, health situation in cattle is strongly perceived as animal health affects economic aspects of breeding and welfare (Krupová et al., 2016)  and proper management of antibiotics distinctly reduce risk of development of resistances to applied medicaments (Trevisi et al., 2014). For these reasons, a project was formed to determine situation in health recording in the Czech Republic and to propose national recording system of health data for better management of situation and more effective development of treatment of animals. Aim of the study was to analyze situation in health data recording and propose national health data sharing and evaluation system compatible with international ICAR evaluation.

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## 2    Material and methods

To determine situation in health monitoring done by breeders a survey in cooperation with Czech-Moravian Breeders Corporation was organized. The questions of the survey were focused on use of commercial programs of herd management, identifying of specific programs and determining parts of programs which are actively used by breeders for practical purposes: herd management in a narrow sense (overview of categories of animals, culling, management of calves and heifers), fertility and reproduction monitoring (heat occurrence and its regularity, insemination index), milk production (quantity of milk, yield during a lactation), course of milking (irregularities, milking efficiency), veterinary procedures and recording of used drugs, and animal health situation. General satisfaction with use of programs was also investigated.

Results of the survey were incorporated into proposal of national health monitoring system and creation of health recording interface connected to official performance recording data held by Czech-Moravian Breeders Corporation. Moreover key of diagnoses for heath recording compatible with ICAR system was formulated.

## 3    Results and discussion

Totally 158 companies answered questions in the survey, 153 were livestock farmers and 5 were companies offering services for breeders. Use of commercially accessible software for herd management is widespread in the Czech Republic; however market shares are substantially fragmented as 21 programs are used (see Table 1). However, four most frequently used programs are providing recording in 67.1% of all companies that filled out the survey. On closer inspection, several users operate more than one program from these four most common products as shown in Table 2. Although three of most frequently used programs are utilized in combinations by breeders, the remaining one (Delpro) was always used exclusively.

Table 1  Market share of commercial software for herd management according to the survey

| Herd management software | Market share (%) |
|---|---|
| Afifarm | 26.50 |
| Dairyplan | 15.30 |
| DelPro | 12.90 |
| Farmsoft | 12.40 |
| Alpro | 4.10 |
| Agrosoft Tábor (Fastos/skot) | 3.50 |
| PC Dart | 3.50 |
| N/A | 3.50 |
| PCSkot | 2.90 |
| Crystal (Fullwood) | 2.40 |
| T4C Lely | 2.40 |
| Ag - info Jičín - mléčný skot | 1.80 |
| Mooml | 1.80 |
| DairyComp | 1.20 |
| Uniform Agri | 1.20 |
| Zempod - Genoservis | 1.20 |
| Boumatic | 0.60 |
| ID 2000 Gascoigne Melotte | 0.60 |
| Lely astronaut | 0.60 |
| Ovarelt | 0.60 |
| their own software | 0.60 |
| Winfas | 0.60 |

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Table 2  Joint use of more programs for herd management in one farm (%)

| Program | Also uses  Afifarm | DairyPlan | DelPro | Farmsoft |
|---|---|---|---|---|
| Afifarm | 100 | 2 | 0 | 4 |
| DairyPlan | 4 | 100 | 0 | 0 |
| Delpro | 0 | 0 | 100 | 0 |
| Farmsoft | 10 | 0 | 0 | 100 |

All main parts of herd management software are adapted by dairy cattle breeders in the Czech Republic and regarding all identified software most frequently recorded is: milk production (92 %), fertility and reproduction (91 %), herd management in a narrow sense (77 %), course of milking (73 %), animal health situation (61 %) and veterinary procedures and drugs recording (59 %). In four most frequent programs, recording is even more common: milk production 99 %, fertility and reproduction 97 %, herd management in a narrow sense 90 %, course of milking 86 %, animal health situation 64 % and veterinary procedures and drugs recording 59 %.

The results of survey strongly suggest inclusion of data import from most frequent programs into new national system as health records are kept in case of 43 % of all electronically stored data. Possibility to import all electronically recorded data would be more convenient; however wide range of used programs and their updating by developers would make the import very difficult to construct and maintain.

Wide area of negative remarks was noted in filled out surveys, however most of them were not frequently mentioned which corresponds well to general satisfaction with used software; on scale of 1 (excellent) to 5 (unsatisfactory) the average value was 1.7 for practical use of programs, 1.8 for technical support provided by software companies and 2.1 for accessibility and comprehensibility of learning materials. The most frequent concerns of breeders were if the program can be connected to central database of performance testing and if standard and customized tables can be exported into spreadsheet software.  On the other hand, clarity of herd management in available software was positively emphasized.

On the basis of the survey data and information about infrastructure already present in the Czech Republic, general plan for health data recording connected to other parts of information system of dairy cattle was designed (Figure 1). It allows farmers to record health data through universal online interface, which is already used for overview of performance testing data. Common interface also enables outputs that would not be possible such as notifications for suspicion of illness of cow if milk production dropped and her inclusion into examination schedule for the day. Planned data import software will help to achieve more complete national data without causing burden to farmers to record health data twice. Export of data from central database for research purposes is now carried out as individual cases, which can be unnecessarily time consuming for those servicing the database and can eventually lead to mistakes in exported data or failures in sufficient anonymization of data. As the amount of recorded data increases due to creation of central health database, an automatic system for common cases of data export would be advisable in order to effectively use health data in evaluations, decision making and propositions to nationwide solutions.

The main part of central database managing software was programmed in Cobol, however a change to SQL is already scheduled for next two years and for that reason parts for health recording are being written in MySQL and online web sites utilize C++ language for interface. In the Czech Republic, administrator of central database is Ministry of Agriculture of the Czech Republic and therefore operation is subsidized by national budget, however for processing of data, Czech-Moravian Breeders Corporation was authorized. Individual farmers are owners of the records in the database.

The project for establishing of health data recording is still ongoing, however several goals were achieved: analysis of current situation in health data recording was performed, health key compatible with ICAR covering simplified diagnoses for recording by breeders was established, plan for implementation of health recording data was designed and module for central health database and its use in universal online interface is currently being programmed. The system designed by the project should ensure effective use of recorded data by all participants.
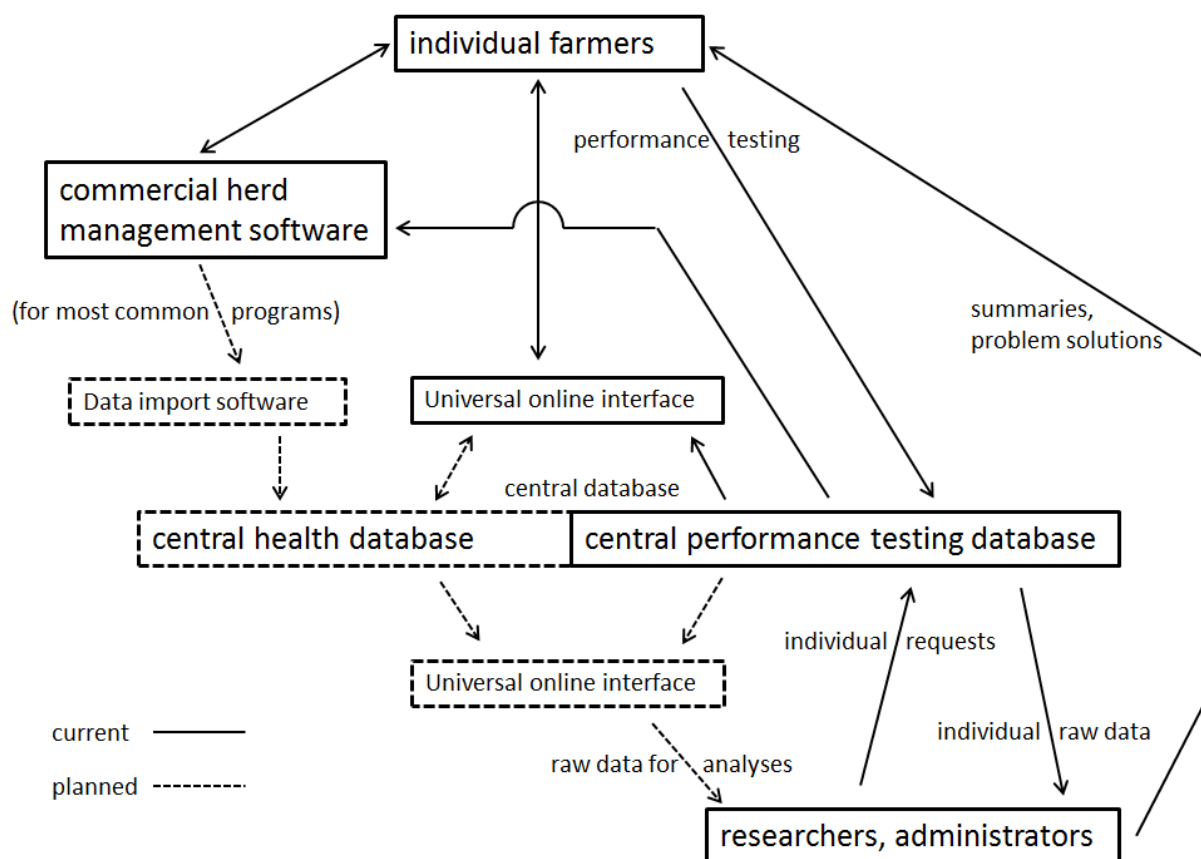
Figure 1   Diagram of current situation and planned extension of central data recording system
(dataflow marked as arrows)

## 4    Conclusions

Commercial herd management software is widely used by Czech cattle breeders and large number of different programs was adopted, however majority of farmers use only four available programs. Health data are recorded in these four programs in 64 % of cases. Therefore designed official system should support import of this data in order to increase completeness of national dairy cattle health data. System of health monitoring should be developed as connected extension of current performance testing information system.

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