First national recording of health traits in dairy cows in the Czech Republic

E. Kasna[1], P. Fleischer[2], L. Zavadilová[1], S. Slosárková[2], Z. Krupová[1], and S. Stanek[1]

[1]Institute of Animal Science, Prátelství 815,10400 Prague – Uhríneves, Czech Republic
[2]Veterinary Research Institute, Hudcova 296/70, 62100 Brno, Czech Republic

Summary

This study presents a basic description and analysis of 20 common health disorders/diseases monitored in 289 802 dairy cows in the Czech Republic. The data were provided by farmers on a one-time basis from 1 183 herds and were collected between July 2015 and June 2016. In 55 % of cows, no disorders/diseases were treated, while in 45 % of cows, at least 1 of 20 monitored disorders/diseases was recorded. The most frequent disease was mastitis (19.8 % treated lactations, i.e., lactational incidence risk, *LIR*), followed by metritis (*LIR* 11.3 %) and foot and claw diseases (*LIR* 11.0 %). Treatment of metabolic disorders was rather seldom (*LIR* 1-3.2 %). Not all farms recorded all diagnoses; while almost 90 % of farmers reported the incidence of mastitis, less than 50 % of them recorded the incidence of metabolic diseases. Additionally, the comparison of the incidence of foot and claw diseases with studies based on hoof trimmer records showed possible under-reporting. Despite those limitations, our basic analysis is important for intended genetic evaluation of health traits and gave us an idea about the health conditions and disease recording in Czech dairy cattle.

Keywords: cattle, lactational incidence risk, mastitis, reproduction disorders, metabolic disorders, foot and claw diseases.

Introduction

Health traits in dairy cattle attract attention not only for their influence on farm profitability and production efficiency but also for the impact of the diseases and their veterinary treatment on animal welfare, food safety and quality (Egger-Danner *et al.*, 2013). Growing attention is also paid to the impact of drugs used in veterinary medicine, such as the spread of antibiotic-resistant strains of bacteria that can negatively impact human health (Egger-Danner *et al.,* 2014).

Health traits have generally low heritability; however, there is a possibility that health traits can be selected, as they show sufficient genetic variability and that genetic improvement can occur; however, for this purpose, we need a large amount of reliable data (Heringstad and Osteras, 2013).

Corresponding Author: krupova.zuzana@vuzv.cz

The incidence of diseases in Czech dairy cattle is high, where more than 80% of culling is due to health reasons. The most frequent reasons for culling in 2016 were reproduction disorders (21.5%), dystocia (10.1%) and udder diseases (8.5%); the remaining 43.9 % were other unspecified health reasons (Kvapilík *et al.,* 2017). According to Bauer *et al.* (2016), Czech farmers use approximately 20 different farm management software packages for recording different farm data, including data on health situations (61% of farmers), veterinary treatments and drug applications (59% of farmers). Based on the Law of Veterinary Care, the farmers are obliged to keep records about the use of medication bound by a prescription and to keep records of the reason for those diagnoses. These records have not been standardized, nor have they been gathered or stored in a joint database yet, which would enable their processing and utilization for the purposes of genetic evaluation and selection. Our aim was to describe the health conditions and to gather and evaluate data on the incidence of 20 common diseases/disorders in Czech dairy cows over one year.

Materials and methods

The data on disease incidences were provided retrospectively by farmers via electronic survey. The observation period covered the period from the 1st of July 2015 until the 30th of June 2016. The survey contained information on the identification numbers of farms and cows, health status of each cow (treated/not treated), diagnosis (chosen from 20 common diseases listed in Table 1), use of antibiotics and their dose and way of application. Other data (breed of cow, date of calving, parity, milk yield) were filled in from the database of lifelong performance.

The first occurrence/incidence of each disease (or group of diseases in case of foot and claw) during lactation, was coded as 0- not treated, 1- treated (lactational incidence risk – *LIR*). Repetitions of the same diagnosis during the same lactation period were not considered.

Data were edited, so that only lactations which started with calvings from July 2015 until 7 days (for dystocia, parturient paresis, retained placenta), 20 days (for metritis) or 60 days (for other diseases) before the end of observation period were included in the evaluation. To differentiate the farms with incomplete data, each herd with a minimum of 20 lactations was required to have at least 1 record of disease/group of diseases. For smaller farms (<20 lactations) no minimum *LIR* was required. For editing of the database and basic calculations we used *SAS 9.4*.

Results and discussion

The data set contained information from 1 183 herds and 289 802 cows, which account 78 % of the total number of dairy cows in the Czech Republic. The distribution of breeds was as follows: 138 643 Holstein (H100; 48%), 64 304 of Czech Pied cattle (C100; 22%), and the rest were crossbreds (28%) or other dairy breeds (Ayrshire, Braunvieh, Montbéliarde, Normande, Red Holstein; 2%). A total of 130 244 cows (45%) had at least 1 diagnosis, while 159 558 (55 %) cows were stated as “not treated”. Description of edited data structure and *LIR* of diseases are presented in Table 1. The most frequently treated disease was mastitis (*LIR* = 19.8 %), followed by metritis (*LIR* = 11.3%) and groups of foot and claw diseases (*LIR* = 11.0%).

Lactation incidents of mastitis and reproductive disorders were comparable to frequencies stated in other national studies (Govignon-Gion, *et al.,* 2012, Egger-Danner *et al.,* 2012, Vukasinovic *et al.,* 2017, Zwald *et al.,* 2004). On the other hand, *LIR* of foot and claw diseases was rather low. As the study of Krpálková *et al.* (2016) showed,

Table 1. The structure of edited data and lactational incidence risk LIR of monitored diseases.

Disease / disorder	No. of herds	No. of lactations	No. of treated lactations	% of treated lactations
Mastitis	1 026	209 147	41 505	19.8
Dystocia and/or retained placenta	815	192 741	9993	5.2
Metritis	802	191 438	21 549	11.3
Endometritis and/or cystic ovaries	810	165 198	17 627	10.7
Milk fever	581	136 877	2 290	1.7
Other recumbency	357	54 405	521	1.0
Primary ketosis	348	63 373	1704	2.7
Subclinical primary ketosis	337	58 180	1830	3.2
Secondary ketosis	263	37 468	564	1.5
Foot and claw[1]	907	187 450	20 673	11.0

[1]group of 9 diseases/disorders including lameness, interdigital hyperplasia, claw ulcer, toe ulcer, typical sole ulcer (Rusterholz), sole ulcer in atypical location, white line disease, interdigital phlegmon, digital dermatitis.

the frequency of claw diseases often exceeds 50%, and better care combined with more control of legs leads to higher recording of diseases. Additionally, van der Spek *et al.* (2013) examined hoof trimmer records and found that more than half of the scored cows had at least one claw disorder. The same authors pointed to the importance of trimming status, which is a heritable trait correlated with claw disorders and therefore an interesting trait to include in the genetic evaluation. Additionally, *LIR* of metabolic diseases was rather low, compared to the meta-analysis of Pryce *et al.* (2016), where the median incidence of ketosis was 3.3 %, the incidence of subclinical ketosis was up to 34 %, and the median incidence of milk fever was 2.8 %.

The quality of data is determined by their objectivity, reliability and validity. In retrospective studies, the quality of on-farm documentation plays a key role. According to Pryce *et al.* (2016), many farm computer systems still do not ensure that data captured for health traits are consistent and accurate, and thus there is a potential for underestimated/over-reported incidences. Reporting of disease is more likely when it is treated by medication, where evidence is mandatory. As mentioned by Egger-Danner *et al.* (2012), the main reasons for incomplete data were missing documentation, a fact that farmers emphasize different health aspects at different times, or situations, when not all farms record all diagnoses. The last reason was also present in our study, where almost 90 % of farmers reported the incidence of mastitis, but less than 25 % of them recorded the incidence of metabolic diseases except for milk fever, which was reported by almost 50 % of farmers.

A clear and unambiguous definition of diagnosis is very important. It is not unusual that the farmer describes the symptoms, applies the medication, but hesitates to name the disease. Additionally, Pryce *et al.* (2016) mentioned under-reporting of metabolic diseases due to differences in producer interpretation of symptoms. Likewise, Krpálková *et al.* (2016) noted the possibility of bad recognition and consequent under-reporting of the incidence of foot and claw diseases by farmers, especially in large herds.

Generally, differentiating between farms with incomplete recording and farms with very low incidence rates is a challenge (Egger-Danner *et al.,* 2012), especially in small farms. Basic measure for data validation is therefore their careful editing, which consisted mainly in determination of their minimum incidence per herd, year and/or

season (Egger-Danner *et al.*, 2012, Vukasinovic *et al.*, 2017). Only data from farms with regular and complete registration of diagnoses should be included in the genetic analysis.

Conclusions

This study presents the first step on the way to the national recording of health traits in dairy cattle and for subsequent use of such data for genetic parameter estimation and genetic evaluation. Despite the limitations, our analysis provides valuable information for future processing and validation of data and identifies the weak points that could negatively affect the recording and reporting of incidence of diseases/disorders in cattle populations.

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