Recording of claw and foot disorders in dairy cattle: current role and prospects of the international harmonization initiative of ICAR


Claw and foot disorders causing lameness are among the major culling reasons in dairy cattle around the world and play a significant role in farm profitability and compromised animal welfare. In recent years, several countries have started routine recording of claw health data. Documentation of claw health status during regular claw trimming has been identified as a valuable source of information on feet and legs conditions in individual cows and can also provide an important insight into the health status of the entire herd or population. However, heterogeneous documentation practices complicate the routine collection of claw health data and consequently the use of the data. To document the current situation of recording and the use of claw health data among ICAR member countries, the ICAR Working Group for Functional Traits (ICAR WGFT) carried out an online-survey during August and September 2014. Responses from 18 countries showed that around half of them have a single national key for recording claw and foot disorders.
Information is collected on 6 to 20 different disorders, in many cases including severity grades using numeric or descriptive recording and affected sites. Professional claw trimmers were found to be the main source of data collection, often using handheld electronic recording devises and customized software. Digital dermatitis, white line disease, sole ulcer, interdigital phlegmon (foot rot); interdigital hyperplasia (corns), and sole hemorrhage are among the most commonly recorded disorders. Routine genetic evaluation for claw health has been implemented in the Nordic countries in 2010 (Denmark, Sweden and Finland) and Norway (2014). Since 2010, the Netherlands has published breeding values for claw health. Other countries including Canada, Spain, and France have successfully set up recording schemes for claw health information. Other countries also have plans to initiate projects. To be able to make comparisons of claw health between countries and for breeding purposes, the harmonization of the terminology of claw disorders is advantageous. Since May 2014, ICAR WGFT has been engaged in a collective effort involving international claw health experts and interdisciplinary collaborators to develop harmonized definitions for claw disorders along with representative photographs of each disorder. The focus is on descriptive findings. The objective is to establish an international claw health atlas which can guide future developments towards better claw health data that can be used to improve management and breeding of dairy cattle.

This paper provides an overview of the recording of claw and foot disorders in dairy cattle with a focus on aspects of breeding and presents the results and prospects of the work of the ICAR WGFT and international claw health experts on harmonization of terminology and definitions of claw disorders.

Key words: claw health, harmonization, claw disorders, genetic evaluation.

Introduction

Along with reproductive- and udder health problems, foot and claw disorders are major reasons for involuntary culling in dairy cattle. Culling caused by lameness problems accounts for 10-15% of all culls and shows the economic importance of this trait complex (Green et al., 2002; ADR, 2009; Bruijnis et al., 2010; Cha et al., 2010). In general, there are negative genetic correlations between milk yield and functional traits and because of this, an increase in incidences of lameness may be expected worldwide (Veerkamp et al., 2003; Gernand et al., 2012). German figures have shown this unfavorable trend in lameness and involuntary culling over the last decades (ADR, 1980-2009).

According to Van der Waaij et al. (2005) more than 70% of cows in The Netherlands have at least one claw disorder. The study is based on data from routine claw trimming over a period of 1.5 years. Rouha-Müller et al. (2009) found an incidence rate of lameness of 36% in the average of 80 dairy herds in Austria reported variation of 0 to 77% between herds during two consecutive visits. Hoof lesions compromise the welfare of animals (Whay et al., 2003) and coincide with reduced milk yield (Warnick et al., 2001; Amory et al., 2008), reduced fertility (Hernández et al., 2001; Meléndez et al., 2003) and an increased risk of premature culling (Rajala-Schultz and Gröhn, 1999; Booth et al., 2004). Studies estimate a loss of up to 450 Euro per lame cow per year. According to Cha et al. (2010), 38% of the loss of $216 (US) due to sole ulcer is because of lower milk yield; 42% of the $120 (US) costs for digital dermatitis are due to labor costs and 50% of the costs of interdigital phlegmon are due to reduced reproductive performance.

Foot and claw disorders are often accompanied by pain and are therefore a major animal welfare issue. According to EFSA (2012) a maximum of 10% lame cows with a lameness score of 2 or higher is tolerable. Weber et al. (2013) suggested that lameness might be a useful indicator for claw and leg health. The conformation of feet and legs are recorded routinely by linear type classification systems that are often part of the services offered by breeding societies and some traits may be useful indicator traits for claw health. Although they cannot replace direct measures of claw health, because of low genetic
correlations with claw disorders, routinely collected conformation data can be used to increase the reliabilities of estimated breeding values (EBVs) (Häggmann and Juga, 2012; Chapinal et al., 2012).

In addition to the information from claw trimming, veterinary diagnoses are potentially valuable sources of information, particularly for more severe cases. Genetic studies on foot and claw disorders have shown the advantage of using direct claw health data when breeding for improved claw health (Linde et al., 2010; Koenig and Swalve, 2006), and heritability estimates were generally higher when data from claw trimming were used (Koenig et al., 2005; Boelling et al., 2008; Laursen et al., 2009; Linde et al., 2010). Boelling et al. (2008) suggested an index where the different relevant data sources are combined. For effective improvement of the feet and legs complex by breeding, it is important to establish systems that allow the collection of comparable data from claw trimmers.

Standardization of the terminology of foot and claw disorders within and across countries supports activities including genetic evaluation. International cooperation is an important way to support the development of genetic evaluations for novel traits with limited numbers of phenotypes. For example, there has recently been success in pooling dry matter intake data from 9 countries for genomic prediction purposes (de Haas et al., 2015). A survey on the needs of ICAR member countries regarding functional traits showed that there is substantial interest in the feet and legs trait complex and claw health traits (Stock et al., 2012). Establishing a working group with international experts on claw health and assessing the situation in the different countries was an obvious first step towards global harmonization. A meeting was held in May 2014 in conjunction with the ICAR annual meeting in Berlin, Germany to lay the groundwork for such an initiative. Subsequently, a survey on the status of recording of claw health data in the different ICAR member countries was conducted. Based on the needs of international harmonization of foot and claw disorders, the ICAR WGFT and international claw health experts began working on the harmonization of descriptions of foot and claw disorders in October 2014 and this global collaboration concluded with the publication of the ICAR Claw Health Atlas in June 2015.

To better understand the current situation on claw health and feet and legs disorders in the different member countries of ICAR, a survey using a questionnaire was conducted from mid-August to the end of September 2014. The overall response rate among the 53 ICAR member countries was 60 percent, with answers to all questions from 18 countries and partial information from further 14 countries.

Using the information from these questionnaires about harmonized key of claw disorders, 10 countries (Denmark, Finland, France, Germany, Israel, Norway, Spain, Sweden, The Netherlands, United Kingdom) reported that they each have a single key on claw disorders and leg conditions used throughout the country. Countries using a single key collect information on 6 to 20 different disorders. The level of information collected on foot and legs conditions varies widely from cow level information (2 countries) to single claw information (4 countries); others gathering information at the cow leg level (9 countries).

In addition to claw lesion information, several countries also record information on severity grades using numeric (1 = mild, 2 = moderate, 3 = severe) or descriptive codes (mild, moderate, severe) of the lesions observed.
Eight countries (Australia, Austria, Canada, Czech Republic, Italy, Poland, Slovenia, United States) have no key for data recording. The absence of a key does not mean that there is no effort to collect information; for example, electronic devices are used by trimmers in Austria, Canada and the United States to collect information that stays at the farm level.

For the 18 countries that use a single key for recording claw disorders, Figure 1 shows the frequency of different claw disorders White Line Disease (WL), Sole Ulcer (SU), Interdigital Phlegmon (IP), Interdigital Hyperplasia (IH) and Digital Dermatitis (DD) are the most frequently recorded lesions (12 countries). Sole Haemorrhage (SH) is recorded in 10 countries, followed by Heel Horn Erosion (HHE) and Double Sole (DS) in 9 countries.

Other disorders recorded in several countries are horn fissures (horizontal, vertical, axial), Digital Dermatitis associated with White Line Disease, and Digital Dermatitis associated with Sole Ulcer. In most cases the most frequently recorded lesions across countries are also those claw disorders ranking with the highest priorities. However, regional differences were observed. For example, in Australia wall cracks (Axial Horn Fissure (HFA)) are the 2nd most important lesion, whereas wall cracks are not mentioned in any other country under the most frequent lesions. A similar observation is Corkscrew Claws (CC), which is of high relevance in Norway and Finland.

Which disorders are recorded?

Figure 1. Frequency of the claw disorders most often recorded.
The survey revealed that claw trimmers are the main source for the collection of information and events on these specific dairy cattle disorders in most countries. As veterinarians mainly intervene at the farm when cases are severe, they represent an incomplete source of information for claw health. It is estimated that 40-60% of claw trimming is done by professional claw trimmers in most of the countries (Austria, Canada, Germany, Italy, Netherland, Norway, Sweden, United Kingdom).

In countries including Finland, and France, 60-80% of the trimming is by professional claw trimmers. In Denmark, Israel, and Spain 80-100% of claw trimming is done by professionals. In countries including New Zealand and Australia, where cows are on pasture most of the year, claw trimming is not a standard practice on most farms.

Trimming also is done by people who have not received special, such as dairy farmers. In some countries (Austria, France, Germany, Italy, Sweden, Finland and Norway, trimmers are licensed and/or certified. In other countries (Canada, Denmark, Finland, Israel, Spain, The Netherlands or United Kingdom) claw trimmers are provided with either special education programs or training by experts. Most of the trimmers use an illustrated guide for the identification of lesions which includes pictures and definitions. As most countries do not have a national scheme to collect information about the people doing this work, it is often difficult to figure out the exact proportion of professional trimmers that are involved.

Some countries with established infrastructures to collect and store data from claw trimming centrally for breeding purposes also organize regular training sessions, or undertake other measures to ensure comparability of the results between the different claw trimmers (e.g. Charfeddine, 2014; Van Pelt, 2015).

The conditions and circumstances of claw care differ widely across countries. The percentage of trimmings recorded by professional trimmers varies. For large farms, claw care is generally carried out by farm staff, professional claw trimmers, or the farmers themselves. It is interesting to note that there are many different tools used to record information on claw disorders and foot and leg conditions, including individual free-text notes (no standardized form), standard forms with reference to the key for claw health on paper sheet reports, free-text or standard forms on mobile electronic devices, and herd management software. The tools most widely used among countries are electronic devices and either mobile or herd management software (11 countries), followed by formatted paper sheet reports (5 countries). In most cases a mixture of recording practices coexist. Despite the different tools available for data recording, it is assumed that many claw trimmings are not documented at all. No exact figures about the documented and centrally recorded claw health information relative to the percentage of dairy cows under milk recording agencies are available. In countries with routine genetic evaluations for claw health, data from claw trimming are stored in a central database and also are used for herd management recommendations. A key aspect of the successful initiatives to build routine genetic evaluations for claw and leg health is the development of an infrastructure for electronic documentation and recording of claw trimming data (Kofler et al., 2011, 2013; Nielsen, 2014; Van Pelt, 2015). Kofler (2013) published an overview of computerised claw trimming database programs which were currently available worldwide.
The current status of the collection and use of claw trimming data from different countries was presented at the 2014 ICAR annual meeting in Berlin (www.icar.org/Documents/Berlin_2014/functional_traits_meeting.htm). The status of such system varies widely internationally. Routine genetic evaluations for claw health have been implemented in Denmark, Sweden, and Finland since 2010, and since 2014 they have published genomic breeding value for claw health. 10,000 genotyped cows with phenotypes were included in the genomic reference population (Johansson et al, 2011; NAV, 2014). Norway has published breeding values for claw health since 2014 (Odegard et al, 2013). The Netherlands have published breeding values for claw health since 2010 and Spain and France have successfully managed to set up an infrastructure to capture claw trimming data (25-30% of cows) (Charfeddine, 2014; Thomas and Leclerc, 2014). In other countries claw trimming information have been collected from commercial dairy farms for research projects purpose (e.g. Canada, Germany). In summary, the survey indicated that many activities and projects are under way.

The survey and presentations at the ICAR WGFT meeting in Berlin showed that several countries have recently introduced electronic systems to routinely record foot and claw, and many more are planning or have committed to begin recording in the near future. The broad range of recording practices and documentation schemes with mixture of descriptive and etiological codes has suggested a need for a standardized, practice-oriented approach that accommodates most common circumstances in the field. This motivated the ICAR WGFT to prioritize foot and claw health and to invite internationally recognized claw experts to collaborate in the development of best practices for data recording. This collaboration was intended to complement existing research on specific aspects of the claws and feet of dairy cattle, focusing solely on the standardization and harmonization of data recording. This fruitful interdisciplinary collaboration among experts from different backgrounds (claw health experts, claw trimmers, bovine practitioners, geneticists) resulted in harmonized descriptions of 27 different lesions, providing comprehensive coverage of theoretical and applied needs. It is designed to provide a universal tool for claw trimmers and practitioners and presents guidelines for the recording of important conditions affecting the claw health of cattle. Descriptive trait definitions are used to ensure that accurate classifications are made, which will support the collection of comparable and high-quality data within and across countries to support many activities (e.g., genetic evaluation purposes).

After the harmonized descriptions of foot and claw disorders were agreed upon by the international experts and members of the ICAR WGFT, the next step was the collection of representative photographs of each lesion in the key. Claw experts, trimmers, veterinarians, and other contributors submitted photographs, and the most representative examples were selected by voting. The results were discussed and the final selections made by the working group. Harmonized descriptions, photographs, and other descriptive information were assembled to create the first ICAR Claw Health Atlas (Egger-Danner et al., 2015). This Atlas, published in the official ICAR language (English), will be available for translation by any country that would like to distribute it to its professionals and/or farmers. Information about translation and access to a print-quality version will be provided by ICAR. An on-line English-language version will be available on the ICAR website once it is approval by the ICAR member countries: www.icar.org/Documents/ICAR_Claw_Health_Atlas.pdf.
The ICAR Functional Traits Working Group has focused on a range of very important traits in dairy cattle including: fertility, udder health, and feet and legs. This work is part of ICAR's strategy for helping its members to provide better services to farmers and to facilitate the genetic improvement of farmed livestock, particularly dairy cattle.

For the first time there is an international atlas and coding system available for claw traits in dairy cattle. This represents a major step forward in ensuring that the incidence of claw defects affecting animal health, welfare, and productivity can be reduced in the future.

The ICAR Working Group on Functional Traits acknowledges the excellent cooperation with international experts on claw health, and expresses its gratitude for their support and ideas for the development of new standards for recording claw health information. Without their expertise and their great support it would have been impossible to succeed with the ambitious plans of making available this new ICAR Claw Health Atlas.


