

USING COMMERCIAL PEDOMETER DATA TO PREDICT THE OCCURRENCE OF HOOF LESIONS

APPLICATION FOR A SHORT TERM SCIENTIFIC MISSION (STSM)
ILVO, BELGIUM -> LUKE, FINLAND

PARTNERS

Applicant: Jarissa Maselyne (**JM**), ILVO, Belgium (ECI)

The work will be carried out at Natural Resources Institute Finland (Luke) in Finland in collaboration with Århus University, ILVO and IceRobotics. The responsible senior researchers and data analysts in the different institutions are:

- Finland: Luke, Matti Pastell (**MP**) – Host institute
- Denmark: Århus University, Lene Munksgaard (**LM**)
- Belgium: ILVO, Annelies Van Nuffel (**AVN**) – Home Institute
- UK: IceRobotics, Vivi M. Thorup (**VMT**)

Duration: 7 March 2016 – 16 April 2016 (41 days)

-> of which the first week in Denmark for the kick-off meeting and barn visits; and the rest in Finland

BACKGROUND

Lameness in dairy cows is a modification of the gait and the clinical manifestation of painful disorders mainly related to the claws. Not only is lameness a major problem to the health and welfare of the affected animals, lameness is also one of the most expensive health disorders for the dairy farmer, with a cost only preceded by reduced fertility and mastitis (Enting et al., 1997).

Lameness itself is a symptom, not a disease, and can be caused by several different diseases that have different aetiology, such as digital dermatitis, interdigital dermatitis and interdigital necrobacillosis, and the non-infectious claw horn disruption diseases like sole ulcer and white line disease (Bicalho and Oikonomou, 2013). Other causes for lameness are joint diseases, traumatic leg injuries, and neurological problems. Sole ulcer and white line disease included 65 % of the lesions diagnosed in lame cows (Bicalho and Oikonomou, 2013). However, not all cows with claw lesions are lame, and not all lame cows have a claw lesion, thus increasing the difficulty of screening farms for the main lameness cause. To explain the discrepancy between lameness and presence of claw lesions, it has been suggested, that 1) the type of lesion seems to play an important role in the relationship between hoof lesion and lameness; 2) some lesions take time to develop, such that not all lame cows will show visible lesions at the moment of screening; and 3) the degree of lameness is more related to the severity of the lesion than to the lesion size (Van Nuffel, 2014).

With increasing farm size, time to observe and monitor the individual cows decreases and hence, also proper lameness management is impaired. Thus, there is a need for tools to support farmers in detecting lame cows in need for treatment. Pedometers are already available in many commercial farms and lameness has been shown to have an effect on the lying time of dairy cows (Ito et al., 2010). However we know very little about the relation between lying time and hoof lesions and which changes the lesions cause in the lying behaviour of individual cows.

AIMS

The aim of the STSM is to develop a model to predict hoof lesions based on data from commercial pedometers (IceTag-sensors). The data used for modeling has already been collected. The work carried out during the STSM involves data analysis and publishing the results.

WORKPLAN

An algorithm for identification of hoof lesions is developed based on an existing dataset of continuously measured lying behavior of approximately 400 cows from four Danish commercial farms using IceTag-sensors (IceRobotics, Edinburgh, UK). Data from hoof trimming was collected three times/year/farm by two scientists with a veterinarian background. The lesions were scored using the Nordic system for scoring hoof lesions (Thomsen et al., 2008). The system includes the type, location and severity of lesion. Furthermore, the dataset includes locomotion score every second month; including scoring immediately before hoof trimming.

As preparatory work, the applicant JM will perform a literature study. The mission will start with a kick-off meeting in Århus (**7 March – 12 March**). In the meeting we will agree on the categorization of the lesions, LM will present details on how the data was collected, and VMT will show how part of the data was analyzed for a recent publication relating accelerometer data with locomotion scores (Thorup et al., 2015). Also a visit to the research barn is planned. After the meeting JM and MP will work together in Finland (**13 March – 16 April**) on developing a predictive model based on the analysis of the time series data from individual cows. LM, VMT and AVN will support the modelling with their expertise.

The interpretation of the model results and the publication of the results will be done jointly between all partners and the partners are committed on continuing the work after the STSM until the results are published.

EXPECTED RESULTS

A validated model to predict hoof lesions based on pedometers. The model and the results will be published in a scientific journal and presented at an appropriate DairyCare-conference. A possible title of the paper could be “Predicting the occurrence of hoof lesions in dairy cows based on longitudinal pedometer data.”

The mission promotes collaboration and exchange of ideas and skills between four countries and institutions. In addition, the applicant will broaden her knowledge on livestock, sensor technologies and data analysis techniques, as well as increase her network through this STSM. This will be of high value for her further career as a (junior) researcher.

REFERENCES

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