

Foot lesions in Swiss dairy cattle (part B) – tools for automated detection of lameness and the effect of anesthesia on painful interventions

Kathrin Nechanitzky¹, Alexander Starke², Katharina Friedli³, Adrian Steiner¹

¹Clinic for Ruminants, Vetsuisse Faculty, University of Berne, CH-3012 Berne, ²Clinic for Ruminants, Veterinary Faculty, University of Leipzig (Germany), ³Swiss Federal Veterinary Office, Centre for Proper Housing of Ruminants and Pigs, Tänikon, Ettenhausen 8356, Switzerland

Key words

Dairy cattle, anesthesia, NSAID, foot lesions, automated lameness detection

Aim of the study

Foot lesions that are associated with lameness have severe negative impact on animal welfare and productivity in dairy cattle. Farmers usually detect lameness with a delay of several weeks to months. Administration of anesthesia is regulated by law for interventions involving the pododerma. The aims of this study were (i) to evaluate different tools for automated detection of lameness (part B1) and (ii) to investigate the effect of local anaesthesia and an NSAIDs on behaviour associated with pain during and after treatment of deep, non-perforating defects of the sole horn with concurrent septic pododermatitis (part B2).

Material and methods

The study was designed as a double-blinded study in a large dairy enterprise in the area of Chemnitz, Germany. Eleven groups of 4 Holstein cows each were selected. Each group consisted of one healthy cow (negative control) and 3 cows with profound non-perforating septic pododermatitis (Rusterholz' sole ulcer or white-line disease). All affected cows received surgical treatment consisting of removal of the under-run horn, taking care not to touch the pododerma, followed by administration of a block to the healthy partner claw and bandaging. Affected cows were assigned randomly to one of the following treatment groups: Local anesthesia with lidocaine (LA; retrograde intravenous anesthesia) and intravenous NSAID, local anesthesia with lidocaine and intravenous NaCl and local and systemic administration of NaCl (positive control). Negative controls received sham-manipulation, followed by administration of a block to the healthy partner claw and bandaging. Several parameters of animal behaviour potentially associated with pain were collected and evaluated.

Results and significance

Part B1: The 4-scale weighing platform and the Itin&Hoch accelerometers represent valuable electronic tools for automated detection of cows with deep, non-perforating septic pododermatitis associated with lameness with a high sensitivity (>90%) and specificity (>80%) under field conditions. Interpretation of part B1: A combination of these tools adding additional behavioral data may be tested in the future for automated and early lameness detection in dairy cows, in order to support farmers in herd health surveillance.

Part B2: Provisional results (unblinding will be performed in Nov 2015): Manipulation/treatment in the trimming chute was painful/stressful for cows in all 4 groups. Within the first 24 hours postoperatively, the heart rate variability was higher in cows of group 2 (LA+NSAID?) as compared to group 3 (-NSAID?). Treatment revealed amelioration of most parameters within 7 days, as compared to preoperative values in all groups except the negative control. The most prominent amelioration was found in cows of group 2. Preliminary interpretation of part B2: Careful manipulation in the trimming chute is crucial; early detection and treatment of deep, non-perforating septic pododermatitis is important, as relevant amelioration within 1 week after treatment can be expected without the use of antimicrobials; pain management according to group 2 is favorable.

Publications, posters and presentations

Nechanitzky, K. (2014) How to measure behavioral changes associated with non perforating pododermatitis of the bovine foot. Dissertanden-Seminar Agroscope Tänikon

Nechanitzky, K. (in preparation, 2015) Dr. Med. Vet. Dissertation, Vetsuisse Faculty, University of Berne
Separate publications of both parts in a peer-reviewed international journal are in preparation.

Project 2.10.04

Project duration April 2010 – November 2014