Ultrasound Examination Through The Sole Horn On A Weight-bearing Claw: Pilot In Vitro Study

Bach, Kurt; Nielsen, Søren Saxmose; Capion, Nynne

Publication date:
2017

Document version
Publisher's PDF, also known as Version of record

Document license:
Unspecified

Citation for published version (APA):
Ultrasound examination through the sole horn on a weight-bearing claw: 
pilot in-vitro study

Author: Bach K1, Nielsen SS1, Capion N1

1Faculty of Health and Medical Sciences - University of Copenhagen

kurtbach@sund.ku.dk

Introduction

A decrease of the soft tissue thickness in the claw increases the pressure on the corium from the pedal bone and may lead to injuries and claw horn lesions (Ossent & Lischer 1998, Tarlton, et al. 2002). Ultrasonography has been described as a useful method to exam the soft tissue inside the claw capsule (Kofler, et al. 1999, Laven, et al. 2012, Toholj, et al. 2013, van Amstel, et al. 2004), but performing ultrasonography directly through the sole horn on raised claws or on legs of slaughtered cattle. The aim of this study was to develop a method that made it possible to measure the thickness of the soft tissue inside the bovine claw using ultrasonography on a weight-bearing leg of live cattle.

Materials and methods

We designed a tub made of polyethylene with the following dimensions: width: 750 mm; length: 400 mm; height: 50 mm; thickness of the bottom: 10 mm (RIAS, Roskilde, Denmark). We checked if the tub was able to carry the weight of a cow.

Fifty-two hind feet from Holstein cows were collected from a slaughterhouse. After trimming the claws the sole of each claw underwent an ultrasonographic examination at two points as described by Laven et al. (2012). Examination was done with a linear-transducer from GE (GE i739L-RS) at 6 MHz connected to GE Logic e (GE Healthcare, USA) portable scanner. Afterwards the examinations were repeated on the same claws, while the claws were placed in water with the sole horn in the bottom of the custom made polyethylene tub. The ultrasonografic examination was made from below through the bottom of the tub.

After scanning we measured the distance between the internal margin of the sole horn and the pedal bone by using the measuring software on the ultrasonographcal machine.

Results

The 10 mm. polyethylene could carry the weight from the hindlegs of a 700 kg heavy Holstein cow

The correlation between the thickness of the soft tissue measured with the two different methods was 0.91 (Pearson’s correlation coefficient, Figure 1).

Discussion

The bottom of the tub could carry the weight of a 700 kg cow. It was possible to scan through the

Figure 1: The correlation between the thickness of the soft tissue in millimeter, measured on ultrasonicographic images from scannings made directly through the sole horn (x-axis) and scannings made through 10 mm. polyethylen and the sole horn (y-axis). The grey line represents a 100% correlation and the black line shows the correlation between the two methods.
sole horn and a plastic plate, even though the image quality was not as good as from scans made directly through the sole horn, it was still possible to identify the essential structures: outside and inside margin of the sole horn and the pedal bone. The measurements made on sonographic images preformed directly through the sole horn and through the polyethylene plate respectively had an acceptable correlation.

Acknowledgements

Thanks to Mogens Nielsen Kreaturslagteri A/S for providing slaughter house legs.

References


van Amstel SR, Palin FL, and Shearer JK 2004 Measurement of the thickness of the corium and subcutaneous tissue of the hind claws of dairy cattle by ultrasound. The Veterinary Record 155: 630-633.

Keywords: Ultrasound, Weight bearing claw, Claw suspensory apparatus