Infrared thermography as a rapid and non-invasive diagnostic tool to detect inflammatory foot diseases in dairy cows

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Abstract

In this study the potential usefulness of infrared thermography (IRT) as a non-invasive tool to rapidly screen the most common non-infectious foot lesions in dairy cows was evaluated. Thirty-eight healthy cows and 38 cows affected by foot diseases were enrolled. Diseased cows showed the following disorders at lateral and medial claw in the hind foot: white line lesion, sole ulcer, sole haemorrhage, horizontal fissure, axial fissure. Thermography images of hind foot were collected for each animal using a digital infrared camera. Foot temperature was measured in four regions: central area of the hind foot (A1), interdigital area of the hind foot (A2), lateral (A3) and medial (A4) claw in the hind foot. Higher temperature values in the regions A1 and A2 compared to A3 and A4 were found in both healthy and diseased cows (p<0.001). Cows affected by foot diseases showed higher foot temperature values compared to healthy cows (p<0.05) in all considered regions. This study highlights the potential application of IRT as a reliable, practical tool for detection of hoof lesions in dairy cows. Multiple scanning images and comparisons between affected and healthy anatomical structures could be useful in defining the consistency of abnormality.

Key words: dairy cows, foot lesion, infrared thermography

Introduction

Diseases of the digital region are frequent in dairy cattle resulting as a severe welfare problem in livestock. Lameness causes detrimental effect on longevity (Cramer et al. 2009), productivity (Green et al. 2009), and reproductive performance (Garbarino et al. 2009) in dairy cattle. Consequently, it is among disorders causing the largest economic losses in the dairy industry (Ettema and Ostergaard 2006). A number of studies have now reported that higher yielding cows are more likely to become lame (Barkema et al. 1994, Green et al. 2009).