Validation of histological and visual scoring systems for foot-pad dermatitis in broiler chickens

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Abstract

In this study, an appropriate visual scoring system for foot-pad dermatitis was validated, considering the histologically measured depth of the inflammation zone and the histopathological grade (no lesion, mild lesion, ulcer). The aim being to evaluate whether the visual, macroscopic scoring of foot-pad dermatitis can represent the histological, microscopic findings. Two hundred Ross 308 broiler chicken feet (birds aged 39–42 fattening days) were collected at a slaughterhouse and scored macroscopically according to a modified version of the Welfare Quality® Assessment Protocol for Poultry. Afterwards, 200 histological slides (one per foot) were prepared, the extent of the inflammation measured and all slides scored by veterinarian pathologists using Michel et al’s modified scheme. The statistical relationship between microscopic and macroscopic score and depth of inflammation were estimated via regression models. Increasing macroscopic score was found to be linked with an increase in microscopic score and the depth of inflammation. In particular, feet without lesions and feet with ulcers were identifiable using the macroscopic score. Macroscopic scoring of foot-pad dermatitis can mirror histological findings once certain limitations are taken into account (superficial lesions were not clearly identifiable). Foot-pad dermatitis is considered a useful indicator of animal welfare and our findings suggest that visual, macroscopic scoring could be a practicable assessment tool.

Keywords: animal welfare, animal welfare indicator, broiler, foot-pad dermatitis, histological validation, poultry

Introduction

Foot-pad dermatitis (FPD) is a contact dermatitis on the plantar surface of the foot pad in broilers which can cause acute inflammatory and necrotic lesions (Greene et al 1985; Shepherd & Fairchild 2010). ‘Hock burn’ and ‘breast burn’ are similar forms of contact dermatitis, showing the same clinical signs in poultry as FPD but appearing on other parts of the body (Haslam et al 2007). The severity of FPD can depend on genetics (Ask 2010), stocking density (Bruce et al 1990; Spindler & Hartung 2011) and nutrition (Mardtland 1985), but the primary cause is wet litter (Mardtland 1985; Meluzzi et al 2008; Weber Wyneken et al 2015). Since FPD is a common occurrence in the conventional poultry industry (Saraiva et al 2016) and, almost certainly, painful (Algers & Berg 2001), it is a useful indicator of animal health and welfare (Allain et al 2009).

First described in the 1980s (Greene et al 1985; Martland 1985), this has been the subject of several studies throughout recent decades and several authors have had various scoring systems published that have sought to categorise FPD (Greene et al 1985; Martland 1985; Ekstrand et al 1997, 1998; Bilgili et al 2006; Welfare Quality® 2009; McKeegan 2010). As a result there is no fixed and uniform system currently in use (Heitmann et al 2018). The various systems differ in terms of the numbers of categories but, in most, a three- (Ekstrand et al 1998; Bilgili et al 2006; Welfare Quality® 2009) or a four-point scale (Mardtland 1985; Marttrenchar et al 2002) is used to describe the macroscopic findings. Furthermore, Mardtland (1985), Greene et al (1985) and McKeegan (2010) considered the FPD lesions histopathologically, and Michel et al (2012) described FPD via a five-point scaled histological score, drawing a link to macroscopic results. The five-point