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Pododermatitis in group housed rabbit does in Switzerland—Prevalence, severity and risk factors

Sabrina Ruchti[a], Andrea R. Meier[b], Hanno Würbel[c], Gilles Kratzer[d], Sabine G. Gebhardt-Henrich[a,*], Sonja Hartnack[e]

[a] Centre for Proper Housing: Poultry and Rabbits (ZTHZ), Animal Welfare Division, Veterinary Public Health Institute, Vetsuisse Faculty, University of Bern, Burgerweg 22, CH-3052 Zollikofen, Switzerland
[b] Department of Biostatistics, University of Zurich, Hirschengraben 84, CH-8001 Zürich, Switzerland
[c] Animal Welfare Division, Veterinary Public Health Institute, Vetsuisse Faculty, University of Bern, Länggassstrasse 120, CH-3012 Bern, Switzerland
[d] Department of Mathematics, University of Zurich, Winterthurerstrasse 190, CH-8057 Zürich, Switzerland
[e] Section of epidemiology, Vetsuisse Faculty, University of Zurich, Winterthurerstrasse 270, CH-8057 Zürich, Switzerland

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ABSTRACT

In rabbits (*Oryctolagus cuniculus* L.), pododermatitis is a chronic multifactorial skin disease that appears mainly on the plantar surface of the hind legs. In later stages, it causes pain leading to poor welfare of affected animals. Pododermatitis is commonly observed in commercial rabbit production in breeding does housed with wire mesh flooring. However, the prevalence in breeding does that are housed in groups on litter and plastic slats is not known. The aim of this cross-sectional study was to investigate the frequency, the severity and possible risk factors of pododermatitis in group housed breeding does in Switzerland on litter and plastic slats.

Between June and September 2016 about 30% of all adult female breeding rabbits (1090 animals in total) were evaluated for the presence and the severity of pododermatitis on 17 commercial rabbit farms with group housing. The latter was done with a tagged visual-analogue-scale. Additionally, various animal-related (*e.g.* hybrid, age or body weight) and environmental risk factors (*e.g.* temperature, relative humidity or wet area per pen) known from the literature were recorded. The risk factors were analysed with generalized linear models, additive Bayesian network (ABN) models resulting in directed acyclic graphs (DAGs) and random forests with variable importance plots.

On average, 25% of the rabbits displayed ulcerative pododermatitis likely to be painful on at least one hind leg, while the prevalence varied between farms from 4 to 49%. The age, body weight and claw-length of the animals were positively associated with pododermatitis as the most important risk factors. The best model explained 37.4% of the observed variance in the primary outcome measure for pododermatitis.

These findings demonstrate that pododermatitis is prevalent in female breeding does even in group housing systems with litter and plastic slats. However, the results of this cross-sectional study also indicate that important risk factors may have been missed or were not recorded precisely enough. Thus, more in-depth research is needed to assess risk factors of pododermatitis in view of effectively preventing the occurrence of this painful disease.

1. Introduction

Pododermatitis, also called sore hocks or foot pad lesions, is a chronic granulomatous, ulcerative dermatitis of the plantar metatarsal and, occasionally, volar metacarpal and phalangeal surfaces of the feet in rabbits (Hess and Tater, 2012). The disease is assumed to be progressive, whereby initially scaly, hairless regions with thickened skin eventually ulcerate at a later stage. Pododermatitis compromises the welfare of the animals and at least the final stages are thought to be painful (Drescher and Schlender-Böbbis, 1996; EFSA, 2005; Harcourt-Brown, 2002). Severe wounds due to pododermatitis can also be a reason for premature slaughter (EFSA, 2005; Olivas et al., 2013).

Several studies have examined the influence of different risk factors on the occurrence of pododermatitis in rabbit does. Some of the

* Corresponding author.
E-mail addresses: sabrina.ruchti@vetsuisse.unibe.ch (S. Ruchti), hanno.wuerbel@vetsuisse.unibe.ch (H. Würbel), gilles.kratzer@math.uzh.ch (G. Kratzer), sabine.gebhardt@vetsuisse.unibe.ch (S.G. Gebhardt-Henrich), sonja.hartnack@access.uzh.ch (S. Hartnack).

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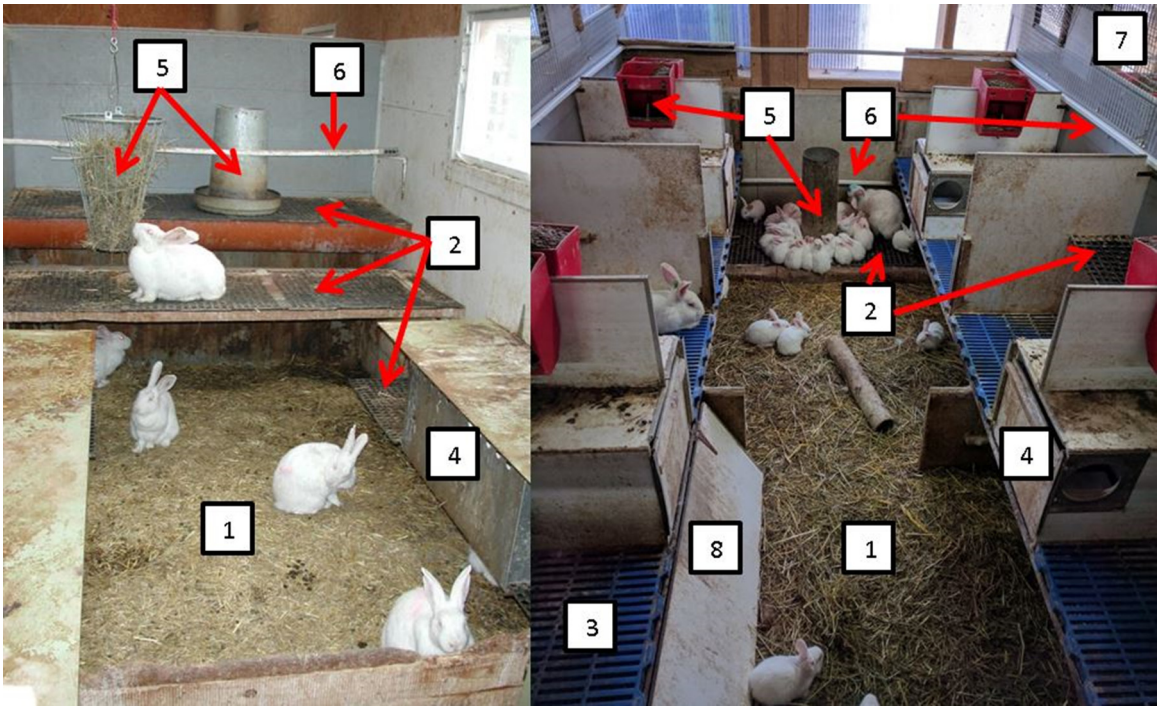

Fig. 1. Pen with group housing of rabbit does on a farm using bucks (left) and a farm with AI (right). 1 = litter area; 2 = plastic slat type 1; 3 = plastic slat type 2; 4 = nest box; 5 = feeders; 6 = nipple drinkers; 7 = grids used to separate the does; 8 = retreat for kits.

suggested factors were directly linked to the animals, such as age, breed, body weight or claw length. Age, body weight and larger breeds were positively correlated with the occurrence of pododermatitis (Drescher and Schlender-Böbbis, 1996; Martorell, 2014; Rommers and Meijerhof, 1996), whereas claw length has been suggested as an associated factor by Bigler and Oester (2003). Other risk factors for pododermatitis were related to the environment of the rabbits like high temperature and humidity (Lebas et al., 1986; Martorell, 2014; Rommers and Meijerhof, 1996), as well as wire floors or wet and dirty bedding (Bigler and Oester, 2003; Blair, 2013; Drescher and Schlender-Böbbis, 1996; EFSA, 2005; Harcourt-Brown, 2002). Gnawing marks on the plastic slats resulting in a rough surface were suggested by Bigler and Oester (2003) as another potential risk factor for pododermatitis.

Pododermatitis is a common condition in commercial rabbit production (Buijs et al., 2014; EFSA, 2005; Olivas et al., 2013). Studies on pododermatitis in breeding does have mainly concentrated on singly housed animals on wire floor and/or plastic slats as this is still the most common system to house rabbit does (Buijs et al., 2014; EFSA, 2005). On Swiss farms rabbit does are often group-housed and kept on litter and plastic slats (Andrist et al., 2013), conditions in which pododermatitis prevalence and severity is lacking. The goal of this cross-sectional study thus was to determine the prevalence and severity of pododermatitis in Swiss group housing systems. Further, we aimed to identify risk factors associated with the occurrence of pododermatitis in these particular housing systems.

2. Material and methods

2.1. Ethical statement

The study was conducted in compliance with the Swiss regulations on animal experimentation and formally approved by the Veterinary Office of the Canton of Bern (License no. BE 8/14, BE 123/16).

2.2. Study design

We conducted a cross-sectional study on 17 commercial Swiss rabbit farms with group housing of breeding does that belong to the Kani-Swiss GmbH (www.schweizerkaninchen.ch, accessed 16/10/2017) with the animal friendly housing label BTS (https://www.blw.admin.ch/blw/de/home/instrumente/direktzahlungen/produktionssystembeitraege/tierwohlbeitraege.html, accessed 14/12/2017). Nine farms used bucks for breeding with remaining eight using artificial insemination (AI). Every farm was visited once between June and September 2016. The data collection lasted one to four consecutive days per farm depending on the number of rabbits. Farms with buck management were visited at any time point since their does were not synchronized regarding gestation period. Farms using AI were visited while the does were separated from each other (does were separated from the day before kindling for 12 days) for logistic reasons. Whenever possible, farms were visited in an order changing between different managements (buck or AI), sizes (few or many does) and localizations (geographically) of farms. A total of 1090 adult female does (after their first insemination) were scored for pododermatitis which corresponded to one third of the total population of adult does on commercial Swiss farms with group housing in 2016. In addition to the pododermatitis scoring, various potential risk factors were recorded that are described below (see Sections 2.4.2–2.4.4 and Table 4).

2.3. Animals and housing

In Switzerland three different rabbit hybrids are predominantly used on commercial farms. We scored 466 ZIKA (http://www.zika-kaninchen.de/, accessed 23/10/2017), 431 Hycole (http://www.hycole.com/en/, accessed 23/10/2017), 83 Hyla (http://www.eurolap.fr/fr/accueil.html, accessed 23/10/2017), four ZIKA x Hyla, and 106 does of unknown hybrid. A group of six to ten (usually eight) adult does was housed in one pen, together with their kits. On farms with bucks, the buck was either present for ten days after every kindling or permanently stayed with the does. Pens (Fig. 1) were open on the top and had an average size of 3.5 m x 2.0 m with a minimum space of 1.6 m^2 per doe (including the nest box and elevated areas). Every pen contained elevated platforms made of plastic slats as well as elevated nest boxes whose tops (wood) were accessible for the does. Two