

Fatale Ansammlungen von Legehennen: Auftreten und mögliche Lösungsansätze. (Project 2.17.05)

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Key words

Piling behaviour, smothering, laying hens, group housing, animal welfare

Aim of the study

Piling behaviour in laying hens – defined as a dense clustering of two or more motionless animals - may lead to smothering (i.e., death due to suffocation) and therefore is considered a concern for animal welfare. Based on a questionnaire with Swiss producers, smothering is a problem in Swiss laying hens flocks and measures to prevent smothering are anecdotal and have not been scientifically investigated. Despite the hazard, the underlying behaviour for smothering, piling behaviour, has not been studied and described in detail and little information exists about triggers, frequencies, and other key details. Therefore, this project aimed to:

- 1) Investigate and describe piling behaviour in commercial Swiss laying hen flocks according to characteristics such as frequency, time of day, causes, duration and number of birds involved and identify potential risk factors including environmental factors (i.e. acoustic information and temperature) (Objective 1).
- 2) Induce piling behaviour in a controlled, experimental setting using environmental cues that were identified in part one of the project in order to confirm and better understand the mechanism behind piling behaviour. Validating particular triggers of piling behaviour would simplify the development of effective measures to reduce piling behaviour in Swiss laying hen flocks (Objective 2).

Material and methods

For objective 1, data was collected on thirteen commercial laying hen farms throughout Switzerland. Five flocks consisted of white hybrids, five flocks of brown hybrids, and three flocks consisted of white and brown hybrids. All barns were equipped with aviary systems and provided access to a covered winter garden and free range area. In order to investigate piling behaviour, farms were selected based on a phone interview with the producer reporting to previously experiencing smothering issues. At 20 and 30 weeks of age in each flock, video recordings of piling behaviour in four corners of the barn as well as the winter garden to record frequency and pile characteristics (i.e. duration and number of hens involved in the pile) were made. When possible, triggers eliciting piling behaviour were described per pile. Environmental measures were taken including: aisle width, air movement, corner temperature, barn temperature and environmental noise. In addition, a novel object test and stationary person test was conducted to assess flock behaviour. Each producer was also interviewed to collect information on flock management.

Data for objective 2 was collected in an experimental setting to control for possible interfering factors influencing piling behaviour. Eight pens, each with 55 Lohmann Selected Leghorn hens (white hybrid), were used to test three different stimuli that could be identified during the first part of the project: 1) light spot, 2) local temperature difference and 3) novel object. Using a 4x4 Latin square design each pen received each treatment stimuli in an alternating order including a control treatment (i.e. no treatment) over a period of four weeks and thus pen served as its own control. Each experimental pen consisted of two comparable parts, with one part serving as a 1m² test area and the other as a 1m² control area. Light spots were induced by flashing a 10 cm wide light spot on the pen floor for ten minutes. Differences in local temperature were obtained by a hidden heating plate, which induced a temperature difference of up to 20°C at the wall of the test area for 30 min. The novel object consisted of a piece of glittering tape, which was visible at the wall of the test area for 30 min. All stimuli were automatically applied at once at a random time between 4am and 5am. During this time, the test and control areas were video recorded and videos analysed for one day per week. We assessed the attractiveness of the stimuli by counting the number of hens in the test and control areas during three pre-defined times for the light spot and seven pre-defined times for difference in local temperature and novel object, respectively. The potential of stimuli to cause piling behaviour was assessed by counting the number of piling events in the test area during the time the stimuli were applied.

Results and significance

The frequency of piling behaviour ($n = 642$ total observed piling events) varied between flocks with one to 73 piling events per day (mean = 25 piling events per day). Piling events repeatedly occurred in the same corners of the barn and six main triggers could be identified: sunlight, barn light spots, a person walking through the barn, distinct behaviours of a single hen e.g. pecking or resting at a wall which attracted other hens, fights between hens and increased local animal densities as a result of sudden mass movements. Furthermore, more piling events occurred in white coloured flocks (mean: 38 ± 17) than in brown flocks (11 ± 6) and in week of age 30 (29 ± 21) than in week of age 20 (20 ± 15). Most piling events occurred at 5-10h after lights on (13 ± 12) compared to 0-5h or 10-15h after lights on. Only a low number of piling events occurred in the winter garden (5 ± 6) compared to inside the barn (22 ± 16). Piles lasted longer in brown (24 ± 26 min) than in white (14 ± 13 min) and mixed (12 ± 15 min) coloured flocks and were larger at 0-5h after lights on (30 ± 28 hens) and at 5-10h after lights on (35 ± 33 hens) compared to 10-15h after lights on (23 ± 17 hens). Piling behaviour was more often observed in larger flocks and in barns with larger aisle widths. Environmental factors such as draft, barn temperature and flock behaviour did not have an effect on the occurrence or characteristics of piling behaviour.

Results of the experimental study showed that the stimuli chosen from the first part of the project were not successful in inducing piling behaviour; however different stimuli attracted hens differently. Specifically, the light spot attracted hens depending on the time it was applied in the test corner. More hens approached the light spot after 5 and 10 minutes of application (0 min: 0 ± 1 hens, 5 min: 3 ± 2 , 10 min: 2 ± 2) compared to the other stimuli as well as the control treatment which hens did not approach at all.

Our results indicate that piling behaviour is occurring in Swiss laying hen flocks and is related to smothering which could be confirmed on videos recorded during this project. Results revealed that several factors influence the occurrence as well as the characteristics of piling events such as hybrid, day time and barn constructions. Potential triggers eliciting piling behaviour could be confirmed in the second part of the project. Results of both parts are useful in order to further investigate and develop preventive measures to prevent piling behaviour and thus smothering. Potential interventions that were observed during this study and are worth further investigation include: increasing feeding times to dissolve piles, using visual barriers to reduce mass movements, and prevention of light spots within the barn.

Due to the large variation of piling events between farms which is likely related to a different management of the producers, farm-specific solutions probably provide the best potential to prevent piling behaviour and thus smothering on commercial farms. In addition to investigating the mentioned approaches found in this project, we recommend a thorough examination of individual farms affected by piling behaviour and smothering as a first intervention.

Publications, posters and presentations

Publications

Winter, J., M.J. Toscano, and Stratmann, A. Piling behaviour in Swiss laying hen flocks: frequency and characteristics. *In prep, submission expected September 2019.*

Winter, J., Stratmann, A, and M.J. Toscano. Identification of key triggers of piling behaviour. *In prep, submission expected September 2019.*

Conference poster and presentations

Winter, J. 2019. Anhäufen von Legehennen: erste Erkenntnisse. Schweizer Geflügelzeitung 5/19.

Winter, J, Stratmann S, Toscano M. 2019. Piling and Smothering in laying hens: Origin and contributing factors. 53rd Congress of the International Society for Applied Ethology

Winter, J. 2019. Are differences in environmental factors such as light, novel object, and temperature attractive stimuli for laying hens and able to cause piling behaviour? Royal Veterinary College Poultry Day, London, UK.

Winter, J. Origin of piling behaviour and possible solutions. European Layer Training Initiative (ELTI), 04-2019.

Winter, J. Piling and Smothering in laying hens: Origin and first results. Federal Food Safety and Veterinary Office Switzerland (BLV)/Worlds Poultry Science Association (WPSA) Conference, 03-2019.

Winter, J. Ethics and Ethology in Swiss layer flocks. Network for Veterinary Ethics (Austria, Germany, Switzerland), 01-2019.

Winter, J. Piling and Smothering in Switzerland. Swiss Commission for Bewilligungsprüfungen, 11-2018.

Winter, J. Piling and Smothering in laying hens. Veterinary Public Health Conference Zurich, 11-2018.

Stratmann, A. und Winter, J. 2017. Erdrückte Hennen: auf der Suche nach Ursachen. Schweizer Geflügelzeitung 12/17: 11.

Project 2.17.05

Project duration August 2017 – July 2019