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Perch use by laying hens in aviary systems

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ABSTRACT

Perching preference in laying hens is well analysed in several experimental studies. However, information about perch use on farm is scarce. The present study highlights perching preferences at daytime and night-time in 19 laying hen flocks on 18 farms with symmetric (n = 9) and asymmetric (n = 10) aviary systems. Perch use was higher during night than daytime and perches on high tiers were preferred compared to perches on low tiers. Within the low tier hens preferred the higher perches compared to lowest perches. These findings indicate that in order to fulfil the behavioural priorities of laying hens for perching not only the perch length but also the height of perches within the house should be considered.

1. Introduction

The ban of conventional cages in the EU since 2012 resulted in an increasing number of laying hens kept in alternative systems. These housings are often equipped with multi-tier systems in which perches are arranged at different tiers, heights and positions. The EU directive (Council Directive 1999/74/EC) requires that perches have to be adequate without sharp edges providing at least 15 cm perch length per hen. The horizontal distance between perches should be at least 30 cm and between the perch and the wall at least 20 cm. In addition, perches must not be mounted above the litter. However, there are no legal requirements on perch height, i.e. for the distance between the perches and the floor or grid below, although it is well known that hens prefer the highest perches for roosting. This preference for high roosting sites can be traced back to the ancestor of layers, the red jungle fowl (Wood-Gush and Duncan, 1976), and is interpreted in terms of the antipredator hypothesis since a raised resting site reduces the risk of being caught by a ground predator (Newberry et al., 2001; Wood-Gush and Duncan, 1976). However, height preferences most often were tested in experimental studies (Blokhuis, 1984; Olsson and Keeling, 2000; Schrader and Mueller, 2009; Wichman et al., 2007; Brendler et al., 2014). In an on farm study Odén et al. (2002) found most hens at night-time on the top of both a tiered system and a perch system in which perches were arranged as A-shaped pyramids but the use of lower tiers or perches are not reported in this study. In an organic farm Steenfeldt and Nielsen (2015) also found the highest number of hens roosting on the top perches of an aviary system but did not observe perches of the lower tiers. In a recent on farm study, however, Campbell et al. (2016) recorded the use of perches and of ledges in a particular aviary system in which the tiers are closed and hens have access to litter only from one side of the lowest tier. In addition, in this system only one perch is offered in the upper tier as the nest boxes are installed here. In their study, at night-time the perch in the upper tier, the upper ledge, and two perches (out of four) of the middle tier most frequently were used.

Recent aviary systems can differ in a variety of aspects. Most often perches are arranged within the tiers and often the food chains, the water supply and also the nest boxes are integrated in the tiers. This results in limited possibilities to arrange perches within the tiers which may reduce their attractiveness. However, when perches are arranged at different heights within a tier level this may increase their attractiveness. Thus, in this on farm study we investigated perch use within and between tiers by laying hens kept in two different types of aviary systems in order to derive hints for possible improvements. The investigated aviary systems were either of a symmetric (both sides of a tier are identical) or an asymmetric type (sides of a tier differ and access is possible only from one side).

2. Animals, materials and methods

2.1. Housing systems and animals

A total of 19 laying hen flocks from 18 farms in Germany were included in the study. All flocks were kept in multi-tier systems

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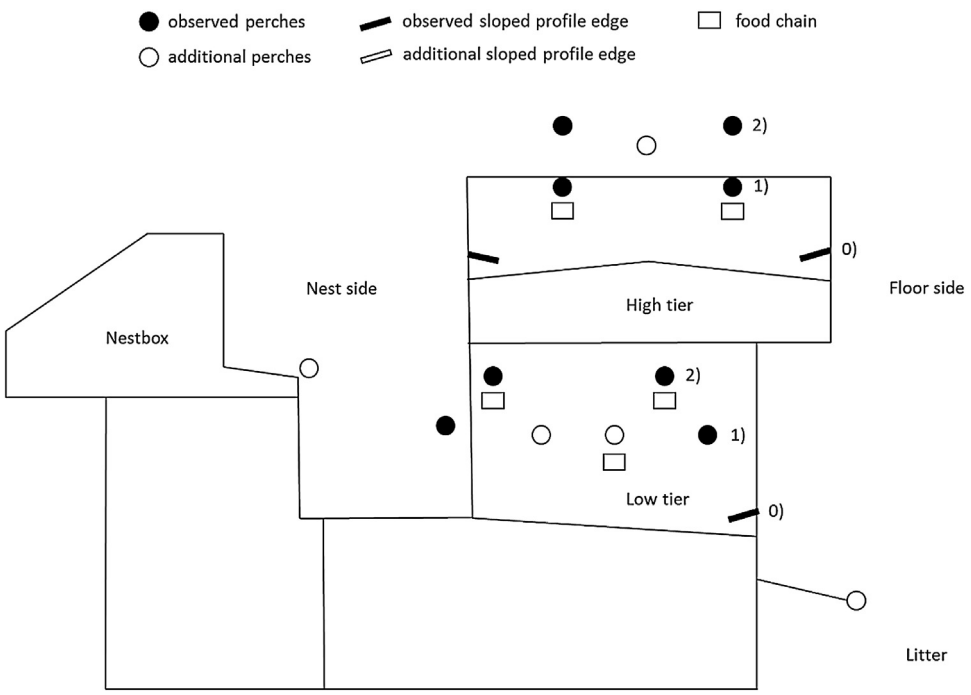

Fig. 1. Cross-section of the asymmetric aviary system in which the use of (0) non-elevated, (1) low and (2) high perches within the low and the high tier was observed.

which were classified into two categories: asymmetric (n = 10) and symmetric systems (n = 9).

In the asymmetric system (Fig. 1) only one side of the tiers gave access to the litter area whereas from the other side hens had access to the nest boxes located outside the tiers. Both, the low and the high tier were equipped with perches, food chains, and nipple drinkers. The non-elevated perches consisted of a metal profile edge; all other perches were round and made of steel. At the low tier, non-elevated perches were attached only at the side open to the litter area. All asymmetric systems were of the same model from the same manufacturer.

In the symmetric systems (Fig. 2) both sides of a row of tiers were identical and hens had access to the litter area from both sides. In the symmetric systems, nest boxes could be integrated in the tiers or were arranged outside the tiers. In all symmetric systems the low and the high tier were equipped with perches, food chains and nipple drinkers. At the low tier, only non-elevated and low perches were installed. At the high tier, non-elevated, low and high perches were present. The non-elevated perches consisted of a metal profile edge or of round steel; all other perches were of round steel. Symmetric systems were from four different manufactures.

Hens were of six different hybrids (Bovans Brown, Dekalb White, Isa White, Lohmann Brown, Lohmann LSL, Lohmann Tradition) equally distributed across system categories.

2.2. Data collection

Data were collected in the last third of the laying period (48th–78th week of life). Within the stables several groups of hens were kept in compartments divided by wire mesh. All recordings were done in the first compartment of each stable. If the compartment was equipped with more than one row of tiers either the left or the right row was randomly selected. Video recordings were done in the middle section of the selected row. At this section, recordings were made of both sides of the row and of the upper tier. The three cameras (infrared day-night cameras, Sanyo Video AG, Ahrensburg, Germany, 2.3 mm or 3.6 mm objectives) were connected to a PC on which recordings were stored using customized software. After installation a stick of 1.0 m length was held on each of the recorded perches in order to determine the exact length of the recorded sections. Due to the angle of cameras perches within the centre of tiers could not be recorded (see Figs. 1 and 2 for observed perches). In total, between 100 and 360 cm perch length of 146 perches within the 19 multi-tier systems were recorded for three consecutive days (3 × 24 h). The mean observed perch length (mean ± SD) was 179 ± 43 cm in the asymmetric and 199 ± 54 cm in the symmetric systems.

2.3. Video analysis

In order to prevent possible effects of disturbances due to camera installations on hen behaviour, we only used the second and third day of video recording for analysis. Duration of the light period differed between farms from 14 to 16 h. Therefore, during daytime the number of hens on perches was counted in the middle of the light period (few hens expected on perches due to dust bathing period) and three hours before light off (more hens expected on perches). During night-time, hens were observed three times, one hour after the onset of the dark period, in the middle of the dark period and one hour before the onset of the light period. A hen was counted when at least a part of its torso was inside the determined perch section irrespective from whether it was sitting or standing. Video recordings were analysed by three observers. Inter- and intra-observer reliability was checked at the beginning and throughout video analysis. In all agreement tests Spearman rank correlations between data of the three observers were > 0.7.

2.4. Statistical analysis

For analysis, heights of perches within tiers were allocated to three categories (non-elevated, low, high), and tier levels were classified as low and high (Figs. 1 and 2). The number of flocks in which the different perch heights and tiers could be analysed is given in the Table 1.

Perch use did not differ between the first and the second day of observation and neither between the two sampling time points at