Relationship between welfare and individual ranging behaviour in commercial free-range laying hens

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Material and Methods

Shed and Range Characteristics

Inside the shed, hens had access to nest boxes on a single tier plastic slatted floor. Hen in flock B had access to approximately 1 m of perch per 47 hens, whereas hens in flock A did not have perches.

For the study, a group of approximately 2,000 hens in each flock was segregated from the main flock using temporary fencing to allow placing RFID equipment at all exits (henceforth referred to as pop holes) from the shed for accurate movement tracking. The Gantner Pigeon RFID System (© 2015 Gantner Pigeon Systems GmbH, Benzing, Schruns, Austria) with the Chicken Tracker program was used to track hen movements and has been validated previously (Gebhardt-Henrich *et al.*, 2014a). Antennas were placed on both sides of each pop hole to obtain accurate direction of movement data. All husbandry and management procedures were kept the same for the segregated flock as for the main flock, *e.g.* stocking density (indoor and outdoor), feed and water access, and range access. The hens’ use of three distinct outdoor zones was tracked with RFID antennas throughout the study: the veranda (accessed via the indoor shed through two 2 m wide pop holes), the close range (accessed via the veranda area through three 3.65 m wide pop holes), and the far range (accessed via the close range through one 3.65 m wide gate). The veranda area had a concrete floor base with a 2-5 cm deep straw and manure based litter, ~ 2 m overhead cover and no lighting or temperature control. The close range consisted of bare earth and gravel and the far range consisted of bare earth, gravel, small patches of *Juncaceae* rushes and a small number of *Eucalyptus* saplings in the centre (Supplementary Figure S1, reproduced from Larsen *et al.* (2017)).



**Supplementary Figure S1:** Diagram of the commercial sheds outlining the segregated study area, the three distinct outdoor zones (veranda, close range, and far range), and the location of the pop holes and RFID antennas (not to scale). Both sheds had identical indoor, pop hole, and range dimensions. Reproduced from Larsen et al (2017).

*Radio Frequency Identification Tracking*

Approximately 450 hens were randomly selected from the shed or veranda (roughly equal proportions) in each flock and fitted with silicone leg bands containing a unique ID chip identification number (Ø4.0/34.0 mm Hitag S 2048 bits, 125 kHz), and range access was tracked over a period of 19 days. At the end of the study, reliable ranging data were obtained on 13 full days for flock A, and 10 full days for flock B. Full details of RFID technology, placement, data collection and outdoor zone characteristics were published previously (Larsen *et al.*, 2017).

References

Gebhardt-Henrich S, Fröhlich E, Burose F, Fleurent J, Gantner M and Zähner M 2014a. Individual tracking of laying hens with an RFID-System. Landtechnik 69, 301-306.

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