

Literature Featherpecking - Risk factors - Climate

Gilani, A.-M., et al. (2012). "The effect of dark brooders on feather pecking on commercial farms." Applied Animal Behaviour Science **142**: 42-50.

Commercial laying hen chicks experience continuous light for up to 24 h/day in the first week of life. Under these conditions, active chicks disturb, and may direct feather pecks towards resting ones. Previous experimental work with small groups showed that both problems were reduced in chicks brooded by dark brooders (heaters). The current study aimed to extend these small-scale trials by examining the use of dark brooders on two commercial rearing farms. Each farm contributed two identical houses, one of them equipped with dark brooders and the other with regular brooders. The experiment comprised five replicates, each consisting of one dark brooder flock and one control flock (total of 10 flocks). Each flock contained 2000 Columbian Blacktail chicks with intact beaks, which were reared to organic standards. Observations took place three times during the rearing period at 1, 8 and 16 weeks and three of the five replicates were also followed into lay, with observations at 25 and 35 weeks. Bird weights, the evenness of body weight, mortality at the end of rear, feather pecking, the percentage of the flock with missing feathers and individual feather scores were measured, as well as the flock's reaction to a novel object and an approaching human in selected areas of the house. Apart from mortality, which was analysed as a paired t-test in PASW Statistics 18, data were ordered in three (or four) levels (visits within (flock within) replicate within farm) and were analysed using the multilevel statistical software MLwiN 2.25. Treatment and age were entered in the model as explanatory variables. On average, across observations taken at all ages, dark brooder flocks performed significantly less severe feather pecking than control flocks ($\chi^2 = 12.215$, $df = 1$, $P = 0.0005$) and had a significantly lower percentage of birds with missing feathers ($\chi^2 = 7.380$, $df = 1$, $P = 0.007$). Individual feather condition deteriorated faster in the control treatment (treatment \times age: $\chi^2 = 12.148$, $df = 1$, $P = 0.0005$). There was also an interaction between treatment \times age for weight ($\chi^2 = 11.087$, $df = 1$, $P = 0.0009$) which meant that dark brooded birds ended up slightly heavier than birds from the control treatment. Mortality at the end of rear, gentle feather pecking and evenness of the weight were not measurably affected by treatment. The novel object and human approach test gave mixed results. In conclusion we found no detrimental effects of dark brooding on commercial farms and suggest this is a promising approach to reducing problems with feather pecking and generally improving the welfare of commercial pullets.

Gilani, A.-M., et al. (2013). "The effect of rearing environment on feather pecking in young and adult laying hens." Applied Animal Behaviour Science **148**(1-2): 54-63.

Abstract Although the rearing period has an important influence on the development of feather pecking in laying hens, few studies have quantified the risk factors operating on commercial farms during this time and identified their long-term impact. Our aim was to conduct a longitudinal study to investigate the effect of rearing environment on feather pecking in young and adult laying hens. Thirty-four flocks from 29 rearing farms were recruited and visited at the beginning, middle and end of the rearing period and once at lay (35 weeks). Twelve flocks were beak trimmed. Information on rearing environment was used to create models predicting feather pecking and plumage damage during rear and lay, using the multilevel statistical software MLwiN 2.25. Across all flocks, gentle feather pecking (GFP) was observed during 94% of the visits at both rear and lay, at 1.3 and 1.0 bouts/bird/h respectively. Severe feather pecking (SFP) was observed during 27% of the visits during rear and during 65% of the visits at lay, with a mean rate of 0.4 pecks/bird/h during rear and 1.9 pecks/bird/h at lay, across all flocks. The mean percentage of the flock with missing feathers was 12% at 16 weeks and 49% at lay. The mean individual feather score at lay was 21 (range 6-24 (best)). The study confirmed that feather pecking and feather damage occur during the rearing period. Statistical modelling further showed that the percentage of the flock with missing feathers was significantly lower and individual feather scores significantly higher (better) at lay, in flocks where feather pecking had not started at the end of rear. The three models on the effect of rearing environment on GFP, SFP and the percentage of the flock with missing feathers during rear contained 21 significant variables. Approximately a third of those related to house climate (temperature, humidity, sound, light and dust levels), while another third related to foraging. Foraging itself appeared in all three models, confirming that good foraging is one of the major factors in reducing feather pecking. The four models on the effect of rearing environment on GFP, SFP, the percentage of the flock with missing feathers and individual feather scores at lay contained 17 significant variables and sound level was significant in three of the four. The analysis further indicated that experienced rearing staff was protective against feather pecking at both rear and lay and that feather pecking increased with an increasing number of diet changes during rear.

Jensen, A. B., et al. (2006). "Effect of brooders on feather pecking and cannibalism in domestic fowl (*Gallus gallus domesticus*)." Applied Animal Behaviour Science **99**(3-4): 287-300.

Several studies have shown that the tendency to feather peck is influenced by events early in life and preventive measures should therefore be introduced at hatching. Separating inactive chicks from active chicks by providing dark electrical brooders was predicted to reduce the risk of chicks developing pecking preferences for conspecifics. Twelve groups of 15 layer hen chicks (Lohmann Tradition) were reared in pens (2.55 m²); during the first 5 weeks after hatching six pens were provided with dark brooders and six pens with heating lamps. All pens were observed continuously for

30 min per pen once a week until the chickens were 23 weeks old, and each bout of severe feather pecks was recorded. The chickens were observed several times daily, and all injured individuals were removed from the experiment. Faecal samples were collected from the pens when the chicks were 16, 17 and 18 days old and analysed for corticosterone metabolites. At the end of the experiment, the plumage and skin damage were scored. Data were analysed using repeated measures ANOVA. The dark brooders completely prevented severe feather pecking in the dark brooder pens, whereas the frequency of severe feather pecking rose with age in the heating lamp pens (treatment x age: $P < 0.0001$). At the last observation (week 23), the frequency of severe feather pecking bouts in the dark brooder pens was 0.3 ± 0.4 (mean S.E.) compared to 31.3 ± 10.1 in the heating lamp pens. The frequency of gentle feather pecking was significantly higher in the heating lamp pens at all ages ($P < 0.0001$). Mortality followed the same pattern as severe feather pecking; it was almost nonexistent in the dark brooder pens, whereas from point of lay it continued to rise with age in the heating lamp pens (1 versus 24 casualties, treatment x age: $P < 0.0001$). The high level of severe feather pecking in the heating lamp pens was also reflected in the scores of plumage and skin damage as both were found to be significantly higher in the heating lamp pens (plumage: $P = 0.0004$; skin: $P = 0.0273$). There was no difference between treatments in concentrations of faecal corticosterone metabolites ($P = 0.8146$). The results suggest that the provision of dark brooders has a long-lasting reducing effect on the frequency of feather pecking and cannibalistic attacks, resulting in reduced mortality and an improved condition of both plumage and skin. (c) 2005 Elsevier B.V. All rights reserved.

Lambton, S. L., et al. (2015). "The risk factors affecting the development of vent pecking and cannibalism in free-range and organic laying hens." *Animal Welfare*. 24.

Injurious pecking remains one of the biggest animal welfare and economic challenges for free-range egg producers. This prospective epidemiological study investigated the development of vent pecking (VP) and cannibalism on 62 free-range and organic UK farms (119 flocks). Flocks were visited at 25 (± 5) and 40 (± 5) weeks of age. Rates of VP were recorded and farmers were asked whether they had observed cannibalism in their flocks. Environmental and management data were collected for each flock. Risk factors associated with these behaviours were modelled using MLwiN. VP was observed in 19.5 and 29.9% of flocks, at mean rates of 0.35 and 0.21 bouts per bird per h, at 25 and 40 weeks, respectively. Cannibalism was reported at 22.6% of visits. The odds of flocks showing VP or cannibalism increased with rate of severe feather pecking (SFP). VP was more likely to be observed in laying houses with more and/or longer pop holes and where feed was scattered on the floor. Providing more aerial perch length, or perches > 0.5 m in height, was associated with increased risk of VP. When SFP was excluded from the model, likelihood of VP was higher in flocks fed pelleted feed. All of these may provide a useful basis from which to derive management strategies to reduce the risk of VP and thus improve the welfare of laying hens. However, it is important to remember that this study does not elucidate the causal relationships between these variables, and further work is needed to understand the mechanism behind these associations.

Mahboub, H. D. H., et al. (2004). "Outdoor use, tonic immobility, heterophil/lymphocyte ratio and feather condition in free-range laying hens of different genotype." *British Poultry Science* 45(6): 738-744.

Movement (frequency of changes) between inside and outside housing areas, time spent in each area, tonic immobility (TI) and differential blood cell counts were studied in relation to feather condition in laying hens of two genotypes, white (LSL) and brown (LT). From 18 weeks of age, LSL and LT were kept in 4 groups of 50 birds in a poultry house with passages to a roofed scratching room and a grassland area with a stocking density of one bird/10 m². All birds had transponders to record the movements of each hen between inside and outside areas and the time spent in each area during 24 h. Feather scoring was carried out at 6 ages from 20 to 48 weeks. At 44 weeks of age, TI reactions of 40 hens (20 from each genotype) were quantified and blood smears from 20 hens (10 from each genotype) were analysed for differential leukocyte counts. LSL hens moved more frequently to outdoor areas than LT hens ($44.66 > 28.78$ least square/d). However, the proportion of time spent on grassland was greater in LT than in LSL hens, whereas time (%) spent by LT hens in the roofed scratching area was less than for LSI hens. In LT hens TI was shorter while heterophil/lymphocyte ratio and basophilia were greater than in LSL hens. Total body feather score was poorer in LSL than in LT hens. Incidence of footpad inflammation was higher in LSL than LT hens. There was a positive association between TI and footpad inflammation. The percentage of time spent on grassland and feather damage were inversely correlated. More movement between the areas, as in LSL hens, was positively associated with fearfulness, whereas long periods on grassland, as in LT hens, were associated with indicators of increased stress. The negative correlation between feather damage and time spent outside suggests that feather pecking risk decreases in birds attracted to grassland.

Sedlackova, M., et al. (2004). "Feather pecking in laying hens: Environmental and endogenous factors." *Acta Veterinaria Brno* 73(4): 521-531.

Feather pecking, pecking directed to and damaging the feathers of other birds, is a behavioural disorder occurring in laying hens and other poultry species and breeds. Feather pecking is both a welfare and economic problem. Pulling out feathers causes pain, a higher risk of injuries and can trigger an outbreak of cannibalism. Extensive loss of feather cover is accompanied by increased heat loss that results in increased food consumption. The 1999 EU Directive laying down minimum standards for the protection of laying hens approved banning of conventional battery cages from 2012. Thus in the next few years major changes to the housing of laying hens in Europe will occur. Therefore there is an urgent need to develop feasible alternative housing systems-An increased risk of feather pecking is a main obstruction to the wide adoption of alternative housing systems, such as free range,

aviaries or percheries. There is a continuous effort of many research teams in Europe and elsewhere to expand our knowledge of this behavioural disturbance and maximize the chances to solve the problem. In this review we have attempted to summarise the present status of knowledge about feather pecking. Hypotheses on causation (redirected ground pecking or dustbathing), environmental factors (feeding, lighting, housing, group size, density) and endogenous factors (sex, age, genetic factors, physiological control mechanisms) are discussed and possible ways of prevention via changing environment, management practices or genetic selection are pointed out.