Literature Featherpecking - Mechanism

Alm, M., et al. (2015). "Welfare and performance in layers following temporary exclusion from the litter area on introduction to the layer facility." Poultry Science **94**(4): 565-573.

When introduced to the laying facility, pullets are sometimes temporarily excluded from the litter area in order to help them locate food and water, and to prevent floor-laid eggs. This procedure is not permitted in Sweden, because it involves denying access to both litter and space, which may have a negative effect on bird welfare. The present study investigated how the welfare and performance of layers were affected by this temporary exclusion on introduction of hens to the laying facility. The study included 600 floor-reared Dekalb White layers obtained at 16 wk age and housed in 6 groups of 100 in a conventional single-tier floor-laying system. Birds were either given full access to the litter area during the whole study or were excluded from the litter area during the first 2 wk after transfer to the laying facility. From 18 to 72 wk age, birds in both treatments had full access to the litter area. Excluding birds from the litter area for 2 wk resulted in better feather cover and reduced fearfulness, according to novel object and tonic immobility tests. Furthermore, birds initially excluded from the litter area produced eggs with a lower proportion of shell irregularities than birds with full access to the litter area throughout. No difference was found in corticosterone metabolites in droppings rate of lay, mortality, or proportion of floor-laid eggs. In conclusion, none of the parameters studied indicated that the welfare of laying hens was compromised by temporary exclusion from the litter area on introduction to the laying facility. In fact, some of the data suggested that bird welfare had improved.

Altan, O., et al. (2005). "Heritabilities of tonic immobility and leucocytic response in sire and dam layer lines." Turkish Journal of Veterinary & Animal Sciences **29**(1): 3-8.

Fearfulness reaction was examined using tonic immobility (TI) response and differential leucocyte counts as physiological indicators of distress from sire and dam brown layer lines. The study was performed on 20 male and 131 female chickens from the sire line and 24 male and 116 female chickens from the dam line. The duration of TI, the time interval until the bird righted itself, and the number of inductions (15 s periods of restraint) necessary to attain TI were recorded. If TI could not be induced after 5 attempts, a score of 0 was recorded. After the TI test, blood samples were collected from 16 male and 45 female chickens in the sire line and 17 sires and 42 dams in the dam line and leucocyte parameters were examined. After the normality test, TI, tonic immobility per number of inductions (TI/Ind) and the heterophil:lymphocyte (H/L ratio) showed deviations from normality. After applying the Box-Cox transformation all data were analysed by a general linear model using JMP. Heritabilities and phenotypic correlations were also obtained. Significant line differences were obtained from TI reactions. There were no significant differences in the leucocytic parameters between lines, except for eosinophils. The H/L ratio was significantly higher in males than in females. Heritability estimates for the duration of TI and TI/Ind were low to moderate in the sire line, but moderate to high in the dam line. The results suggest that fearfulness could be controlled through selection.

Bilcik, B. and L. J. Keeling (1999). "Changes in feather condition in relation to feather pecking and aggressive behaviour in laying hens." British Poultry Science **40**(4): 444-451.

1. The aim of this experiment was to describe and examine the relationship between pecks received by individual birds and the feather and skin damage of those birds at different ages. The effect of group size was also studied. 2. Laying hens were raised in floor pens in group sizes of 15, 30, 60 and 120 birds, each with 4 replicates. Behavioural observations were performed at the ages of 22, 27, 32 and 37 weeks. Detailed feather scoring was carried out at the ages of 18, 23, 28 and 33 weeks. 3. Behavioural observations focused on the number of feather pecks (gentle and severe) and aggressive pecks received, and on the past of the body that was pecked. Scoring of feather and skin damage focused on the same 11 parts of the body 4. Increasing numbers of aggressive pecks received were associated with decreased body weight and increased feather damage at the ages of 27 and 32 weeks. 5. The number of severe feather pecks received was significantly related with feather damage at all ages; however, no relation with gentle feather pecks received was found. 6. Group size had a significant effect on feather condition, with large group sizes hating most feather damage.

Bilcik, B. and L. J. Keeling (2000). "Relationship between feather pecking and ground pecking in laying hens and the effect of group size." Applied Animal Behaviour Science **68**(1): 55-66.

The aim of this experiment was to study the relationship between feather pecking and ground pecking in laying hens and the effect of group size on feather pecking behaviour. Hisex White hens were kept in floor pens in group sizes of 15, 30, 60 and 120 birds, each with four replicates. Behavioural observations were performed at four different ages and focused on the number of feather pecks and aggressive pecks, both given and received. The part of the body pecked and the location of the bird was recorded as well as the number of pecks made to the floor, feeder and drinker. The results showed that most feather pecking activity occurred in the largest group size (120 birds) and there was some evidence of an increasing frequency of aggressive pecks with increasing group size. The parts of the body which were targets for feather pecking varied depending on the location of the bird giving the peck and the bird receiving it. When looking at the behaviour of individuals, birds doing a lot of feather pecking also showed more ground pecking. (C) 2000 Elsevier Science B.V. All rights reserved.

Blokhuis, H. J. (1986). "Feather-pecking in poultry: Its relation with ground-pecking." Applied Animal Behaviour Science **16**(1): 63-67.

It was shown that the motivation for non-aggressive pecking at conspecifics varies along with ground-pecking motivation. This supported the view of a common regulating mechanism. It was concluded that feather-pecking is to be considered as redirected ground-pecking, and hence that the latter is an important parameter in experiments comparing the risk of different environmental factors concerning the development of feather-pecking.

Blokhuis, H. J. (1989). The development and causation of feather pecking in the domestic fowl. [S.l.], Blokhuis.

Uitgaande van de hypothese dat verenpikken in de leghennenhouderij beschouwd kan worden als een vorm van omgericht bodempikken, is divers gedragsonderzoek verricht op strooisel- of roostervloeren, of een combinatie van beide. Ook werd het effect van snavelkappen op het bodem- en verenpikken bestudeerd. Thesis: http://edepot.wur.nl/202211.

Chow, A. and J. A. Hogan (2005). "The development of feather pecking in Burmese red junglefowl: the influence of early experience with exploratory-rich environments." Applied Animal Behaviour Science **93**(3-4): 283-294.

This study examines the development of feather pecking and its relationship to exploration in Burmese red junglefowl (Gallus gallus spadiceus). Ten groups of four chicks each were raised from hatching on wire mesh floors (home pen). Two of the four chicks in each group received experience in exploratory-rich environments four times a week for 5 weeks, and the other two chicks remained in the home pen. Observations conducted in the home pen revealed that chicks deprived of experience in exploratory-rich environments performed significantly more gentle feather pecking, and tended to show more severe feather pecking than the experienced birds. Experience in the exploratory-rich environments did not affect the frequency of environmental pecking or food pecking. These results suggest that chicks deprived of exploratory-rich environments may come to perceive pen mates as appropriate exploratory stimuli and subsequently direct exploratory behavior toward conspecifics. This tendency to peck pen mates may lead to the development of feather pecking. We suggest that forceful pecks may be reinforcing, and that the more likely pecks are directed to a conspecific, the more likely feather pecking will develop. (c) 2005 Elsevier B.V. All rights reserved.

Dennis, R. L. and H. W. Cheng (2011). "The dopaminergic system and aggression in laying hens." Poultry Science **90**(11): 2440-2448.

The dopaminergic system is involved in the regulation of aggression in many species, especially via dopamine (DA) D1 and D2 receptor pathways. To investigate heritable differences in this regulation, 2 high aggressive strains [Dekalb XL (DXL) and low group egg productivity and survivability (LGPS)] and one low aggressive strain (low group egg productivity and survivability; HGPS) of laying hens were used in the study. The HGPS and LGPS lines were diversely selected using group selection for high and low group production and survivability. The DXL line is a commercial line selected through individual selection based on egg production. Heritable differences in aggressive propensity between the strains have been previously assessed. The birds were pair housed within the same strain and labeled as dominant or subordinate based on behavioral observation. For both experiments 1 and 2, behavioral analysis was performed on all 3 strains whereas neurotransmitter analysis was performed only on the most aggressive (DXL) and least aggressive (HGPS) strains. In experiment 1, the subordinate birds were treated with D1 agonist, D2 agonist; or saline controls (n = 12). In experiment 2, the dominant birds from a separate flock were treated with D1 antagonist, D2 antagonist, or saline controls (n = 12). Treatment-associated changes in aggressive behaviors and central neurotransmitters were measured. Aggression was increased in all strains in response to D1 agonism but increased only in the less aggressive HGPS birds with D2 agonism. Aggression was decreased and hypothalamic serotonin and epinephrine were increased in birds from all strains treated with D2 receptor antagonist. The D1 receptor antagonism elicited different behavioral and neurotransmitter responses based on the aggressive phenotype of the genetic strains. Aggressive strains DXL and LGPS but not the HGPS strain decreased aggressiveness following antagonism of the D1 receptor. The data show evidence for distinct neurotransmitter regulation of aggression in high and low aggressive strains of hens through different receptor systems. These chicken lines could provide new animal models for the biomedical investigation of the genetic basis of aggression.

Dixon, L. M. (2008). "Feather pecking behaviour and associated welfare issues in laying hens." Avian Biology Research **1**(2): 73-87.

Feather pecking, the pecking at or removal of feathers from one bird by another, is a problem in the poultry industry. Elimination of damaging feather pecking from flocks is made especially difficult by the numerous factors that appear to influence its prevalence. This review outlines the various contributors to feather pecking organised around Tinbergen's four questions on causation, ontogeny, phylogeny and function. There is growing evidence that feather pecking (especially severe feather pecking) is related to foraging motivation and gut function. However, other factors, such as improper early experiences, strain and individual differences and perseveration of the behaviour help explain its continued occurrence, even if the birds are kept in enriched environments. To date, methods of dealing with feather pecking are inadequate and involve welfare concerns of their own and alternate solutions, such as provision of forages, are not usually successful in abolishing feather pecking behaviour. The problems of excessive pelage/plummage removal or redirected oral/foraging related behaviour are not unique to poultry and seem to occur in other species in which foraging and forage intake is important. Between species comparisons of related behaviour patterns may improve our understanding of feather

pecking and help to design effective solutions. In order to solve the problem of feather pecking, the factors discussed in this review need to be accounted for or we risk applying 'band-aid' solutions, which may appear outwardly to be solving the problem. However, the underlying cause(s) may still be present and the animal's welfare may still be compromised.

Dixon, L. M. and I. J. H. Duncan (2010). "Changes in Substrate Access Did Not Affect Early Feather-Pecking Behavior in Two Strains of Laying Hen Chicks." Journal of Applied Animal Welfare Science **13**(1): 1-14.

Feather pecking, commonly found in flocks of laying hens (Gallus gallus), is detrimental to bird welfare. Thought to cause this problem is the normal housing of layers without a floor substrate. Some evidence suggests that early substrate access decreases later feather pecking. However, there has been little research on the immediate effects of a change in substrate availability on bird welfare, although environmental modifications like this are often done when brooding and rearing laying hen chicks. To investigate this, the behavior of two strains of laying hen chicks was recorded for 4 weeks. The study kept the birds on either wire or peat moss for 14 days and then switched half the chicks to the other flooring. Early feather pecking was not significantly different for birds started on peat moss and switched to wire than for birds only on wire (p .05). Because moving chicks from peat moss to wire did not cause additional welfare problems, the study recommends that chicks be kept on a substrate when young as feather-pecking levels are lower and immediate welfare is improved compared with birds kept only on wire.

Dixon, L. M., et al. (2008). "What's in a peck? Using fixed action pattern morphology to identify the motivational basis of abnormal feather-pecking behaviour." Animal Behaviour **76**: 1035-1042.

Like many captive animals, hens, Gallus gallus, used for agricultural production perform abnormal behaviours. They are particularly prone to feather pecking, the severest form of which involves the pecking at and removal of feathers, which can cause bleeding and even stimulate cannibalism. The two main hypothesized explanations for feather pecking concern frustrated motivations to forage or, alternatively, to dust-bathe, leading to redirected behaviour in the form of pecks at plumage. Previous work on pigeons has shown that the detailed morphology of pecks involved in drinking and feeding, or in working for food or water, involves motivationally distinct fixed action patterns. We therefore used methods similar to these fixed action pattern studies to quantify the motor patterns involved in foraging and in dustbathing pecks, for comparison to feather pecking. We videoed 60 chickens pecking at a variety of forages and dustbaths, along with novel objects, water and bird models that could be feather pecked. We recorded the durations of the head fixation before the peck, between the head fixation to beak contact with each stimulus and of the whole peck sequence. We used mixed models to assess whether the motivation underlying a peck affected its morphology and whether severe feather pecks resembled or differed from either dustbath or foraging pecks (or even novel-object pecking or drinking). The motor patterns involved in pecks at forages, dustbaths, novel objects and water all varied significantly; importantly, the motor patterns involved in pecking during dustbathing and foraging differed ($P < 0.0001$ for all measures). Severe feather pecks proved similar to foraging pecks (NSD: power > 0.95) but different from all other pecks, including dustbathing ($P < 0.0001$ for all measures). These results indicate that severe feather pecking derives from frustrated motivations to forage, not to dustbathe. More broadly, they suggest that finely analysing fixed action pattern morphology can help elucidate the motivational bases of puzzling abnormal behaviours in captive animals. (c) 2008 The Association for the Study of Animal Behaviour. Published by Elsevier Ltd. All rights reserved.

Gentle, M. and S. Wilson (2004). Pain and the laying hen. Cambridge, Cabi Publishing.

Pain in animals can best be defined as 'an aversive sensory experience caused by actual or potential injury that elicits protective motor and vegetative reactions, results in learned avoidance, and may modify species-specific behaviour, including social behaviour'. Freedom from pain is essential for animal welfare. The ability to respond in an appropriate manner to aversive environmental stimuli is a basic characteristic of animals. Noxious stimuli excite cutaneous receptors (nociceptors), leading to reflex or non-reflex behavioural responses. While nociceptor activity cannot in isolation be considered indicative of pain, there is a clear relationship between nociceptor responses and pain experienced in humans. In animal studies of pain, it is necessary to combine nociceptive information with a range of behavioural and physiological measurements in order to estimate the probability of pain. In the life of a modern commercial hen, pain is likely to arise from acute traumatic injury caused by shackling, beak trimming or skeletal fracture, or from chronic pain caused by disease. Nociceptors, the most common of which were mechanothermal nociceptors, have been identified and physiologically characterized in the chicken beak, wattles, scaly skin, joints, mouth and nasal cavity. These send information to the CNS via small unmyelinated nerve fibres (C-fibres) and have differing properties according to location; those in the beak have lower thermal but higher mechanical thresholds than those in the scaly skin. A second group of mechanothermal nociceptors, the small myelinated A-delta fibres, occur in both the scaly skin and joints of the chicken and are similar to those only previously reported in the hairy skin of humans and primates. The combination of these nociceptors is thought to be responsible for a double pain sensation; the A-delta fibres being responsible for the immediate pain sensation and rapid reflex response to the stimulus while the second, qualitatively different pain sensation modulated by the slower C-fibres would prevent repetition. The nociceptors in the chicken ankle joint show little spontaneous activity or response to normal flexion or extension but respond to excessive lateral or rotational movements, thus serving as protection against joint damage. The forces applied to the legs of chickens during shackling have been shown to exceed the mechanical threshold required to excite the C-fibre mechanothermal nociceptors in the skin of the leg. Stimulus response curves for these

nociceptors demonstrated that the maximum response in 63% of these was below the force applied in shackling, providing evidence that the process is likely to be painful. The initial pain resulting from beak trimming probably lasts for between 2 and 48 s and is followed by a pain-free period of several hours, Thereafter, the painful consequences of beak trimming vary according to the age at which the procedure was conducted. If beak trimming occurs before 10 days of age, pain-related behavioural changes do not occur immediately: pecking is not reduced 6 h post-procedure but is reduced significantly by 26 h. Beak trimming in adults has more pronounced effects. Both beak-related and non-beak-related activities are affected for at least 5 weeks postprocedure. Electrophysiological recordings from the beak stump support this; in the weeks following beak trimming. large numbers of spontaneously active nerve fibres were recorded. There was no beak regeneration and extensive neuroma formation was observed adjacent to the scar tissue at the end of the beak. While skeletal fracture is common in laying hens, and pain following fracture in humans is common, there is no published information on the electrophysiological or behavioural responses to fracture. In view of the proposed ban on conventional cages, and with the fact that skeletal fracture is more common in aviary systems. there is a clear requirement for research on the welfare consequences of fracture in laying hens. Although widespread spontaneous arthropathies leading to loss of locomotor function are more common in meat-type poultry than layers. the latter do develop gout, bacterial and mycoplasma infections. The painful consequences of these conditions in the chicken have been investigated in experiments involving intra-articular injection of sodium urate or mycoplasma. After the injection of sodium urate, joint capsule C-fibre nociceptors became sensitized and birds exhibited behavioural changes indicative of pain, including one-legged standing, limping and sitting dozing, but rapidly returned to normal following the injection of local anaesthetic into the treated joint. Injection of killed Mycobacterium tuberculosis into the ankle joint produced a severe inflammatory arthropathy with a pronounced synovitis together with destructive cartilage damage. Recordings from the sensory receptors in the ankle joint showed that they were clearly sensitized and that inflammatory arthropathies found in the chicken are likely to be painful. This technique, when combined with quantitative gait analysis, showed that histological and electrophysiological changes were accompanied by a quantifiable, severe limp in the early stages (7-21 days after infection). At the more chronic stage of the disease (49-56 days after infection), while pathological changes were still observed in the joint capsule, the sensory fibres responded normally to mechanical stimulation and joint movement, and gait analysis showed that the birds were not lame.

Ghareeb, K., et al. (2008). "Individual differences in fear and social reinstatement behaviours in laying hens." International Journal of Poultry Science **7**(9): 843-851.

Individual differences in behavioural responses are of growing interest in behavioural studies. The present study investigated the consistency of the individual differences over time and across social (social reinstatement responses) and non social test situations (tonic immobility response). Three breeds of commercial hybrid layers (ISA Brown, Lohmann Tradition and Lohmann Silver) were reared from hatch to 37 weeks of age. Individual birds were subjected to tonic immobility test at 3, 5, 7, 10, 11, 15, 16, 20, 24, 35 and 37 weeks old and to runway test of sociality at 3, 5, 10, 16, 20 and 37 weeks old. Fearfulness did not show breed differences either in the overall means or in a certain tested age. However, ISA Brown had a higher latency to emerge to a runway than LT (16 and 20 weeks) and LS (at 37 weeks). In addition, ISA Brown hens had a higher latency to reinstate with their companion than LS (10 and 37 weeks). The individual ranks for behavioural traits of fear and sociality were consistent over time. These results indicate that fear and sociality responses are behavioural strategies used by individuals in certain test situation when repeated. Moreover, the duration of TI response was positively correlated to both sociality traits (latency to emerge and reinstate with a companion) indicating that birds had overall behavioural traits that were consistent across different contexts. This suggests that hens can be categorized into behavioural types or styles based on their test responses. The highly fearful birds (longer TI duration) had a higher latency to emerge and reinstate with their companions (reactive style) and the less fearful birds (shorter TI duration) had a lower latency to emerge and socially reinstate with their companions (proactive style). In conclusion, these individual differences are consistent over time and the behaviour of hens in one test can predict their behaviour in other test situation. Thus it could be used to assess individual hens and potentially be used in a breeding programme to select a hen with more desirable personality traits.

Hierden, Y. M. v., et al. (2004). "Chronic increase of dietary L-tryptophan decreases gentle feather pecking behaviour." Applied Animal Behaviour Science **89**(1/2): 71-84.

Many studies show the involvement of the serotonergic (5-HT) system in the performance of abnormal behaviour in both human and animals. Recently, we showed that acute reduction of 5-HT turnover in the forebrain, increased gentle and severe feather pecking behaviour in chicks from a high (HFP) and low feather pecking (LFP) line of laying hens, suggesting that the performance of feather pecking behaviour involves low 5-HT neurotransmission. In the present study, we postulated that if low 5-HT is causally underlying feather pecking, increasing 5-HT turnover in the forebrain will decrease the development and performance of feather pecking. Augmentation of 5-HT neurotransmission in the brain was induced by chronically increasing dietary levels of the essential amino acid L-tryptophan (TRP) from which 5-HT is synthesised. From the age of 34 days, LFP and HFP chicks were fed a diet containing 2% TRP, whereas control birds of both lines were continuously fed with the normal rearing feed (0.16% TRP). From 35 days of age, litter was removed from the pens (10 pens/line-treatment) and all chicks (10 chicks/pen) were housed on a slatted floor until the end of the experiment. At 49 days of age, feather pecking behaviour was studied for 30 min. At 50 days of age baseline corticosterone, TRP and other large amino acids (LNAAs) were measured in the blood plasma of

decapitated chicks (10 chicks per line-treatment). Furthermore, plasma corticosterone and central 5-HT turnover levels in response to manual restraint (5 min) were determined (10 chicks/line-treatment). For neither gentle nor severe feather pecking a significant line x treatment interaction was found. However, TRP treatment resulted in a significant [<i>P</i>=0.02] overall decrease of the frequency of gentle feather pecking. For severe feather pecking a similar but not significant pattern was found. Significant line effects were found for gentle and severe feather pecking. HFP birds showed significantly higher levels of gentle and severe feather pecking behaviour than LFP birds [<i>P</i><0.001]. TRP treatment significantly increased the TRP/LNAA ratio in the plasma of the chicks. Furthermore, TRP treatment overall increased baseline and stress-induced levels of plasma corticosterone (although more pronounced in the LFP line). TRP supplementation significantly increased 5-HT turnover in the hippocampus and archistriatum and tended to do so in the remainder of the forebrain. The results confirm our hypothesis that feather pecking behaviour is triggered by low serotonergic neurotransmission, as increasing serotonergic tone, by increasing dietary TRP, decreases gentle feather pecking behaviour.

Prieto, M. T., et al. (2008). "Association between vent pecking and fluctuating asymmetry in hens." Itea-Informacion Tecnica Economica Agraria **104**(2): 180-185.

The purpose of the present study was to analyze the relationship between incidence of vent pecking, fluctuating asymmetry in chickens. The experiment (140 birds in three different replicates) measured the fluctuating asymmetry of several traits (middle toe length, leg length, wing length, wattle length, and leg width) in 20-week-old pullets of five Spanish breeds of chickens (Blue Andaluza, Quail Castellana, White-faced Spanish, Red-barred Vasca, and Birchen Leonesa), and a White Leghorn population, with and without evidence of suffering from vent pecking. The number of birds per breed was 20, 24, 12, 20, 18, and 46, respectively. There was a significant difference between vent pecked and non-vent pecked birds on the relative fluctuating asymmetry of middle toe length (P<0.05), the relative fluctuating asymmetry of birds who suffered from vent pecking being larger. The combined relative fluctuating asymmetry of the five traits approached levels of statistical significance (P=0.08). Thus, vent pecked birds were more asymmetrical than non-vent pecked birds, having increased relative fluctuating asymmetry. Differences were consistent across the breeds. Results indicate that vent pecking is associated with measures of stress like fluctuating asymmetry.

Ramadan, S. G. A. and E. v. Borell (2008). "Role of loose feathers on the development of feather pecking in laying hens." British Poultry Science **49**(3): 250-256.

The effect of the presence of loose feathers (on the floor) on the behaviour and plumage condition of laying hens (Lohmann Silver, LS) was studied during the rearing and laying periods. From one day old, 60 birds in each of 4 straw-bedded pens (<i>n</i>=240 in total) with 6.5 birds/m² were either kept under conventional rearing and management conditions (CT: control group with feathers on the floor; <i>n</i>=120) or in pens from which the feathers were collected from the floor 4 times/week (FR: feathers removed; <i>n</i>=120). Fifty birds from each of these 4 groups (<i>n</i>=200 in total) were randomly selected at the age of 16 weeks and allocated to 4 identical pens in a poultry layer house (PH; with perches and 1/3 slatted floor) with access to an outside area (winter garden, WG) at a stocking density of 6 birds/m² in both PH and WG. Observations on feather pecking and other behaviours (feeding, drinking, preening, standing, sitting, foraging, moving and dust bathing) were carried out at 8 ages: 6, 10, 15 (rearing period), 20, 25, 30, 35 and 40 weeks (laying period). Feather scoring was carried out at 15, 32 and 39 weeks of age. There were no differences in feather pecking rates, forms (gentle, severe and aggressive pecks) as well as in the plumage condition between groups at the end of the rearing period. Birds in the FR group exhibited lower rates and less severe feather pecking during the laying period. Accordingly, birds in the control group had worse feather condition at 32 and 39 weeks of age. Feather pecking rates within groups were, in general, greater in the afternoon compared to the morning periods. Birds in the control group were more active in walking. Wings, rump, tail and back were the main targets for feather pecking. The majority of feather pecking occurred on the floor (66%) followed by feeding area (26%), perches (4%) and slats (4%). Our results suggest that loose feathers on the floor may play an important role in the development and severity of feather pecking behaviour in laying hens and support the hypothesis (McKeegan and Savory, 1999) that feather pecking can be viewed as redirected foraging behaviour.

Riber, A. B. and B. Forkman (2007). "A note on the behaviour of the chicken that receives feather pecks." Applied Animal Behaviour Science **108**(3-4): 337-341.

Basic knowledge of feather pecking on the individual level is still limited. The aim of this study was to investigate whether active and inactive individuals preferentially attract feather pecking. Female layer hen chicks were housed in six pens with each 15 chicks. Each occurrence of gentle and severe feather-pecking bout was recorded continuously in all pens for 30 min/pen/week when the chickens were 0-23 weeks of age. For each feather-pecking bout, the behaviour (active/inactive, dustbathing/non-dustbathing) of the recipient bird immediately before being feather pecked was recorded. Inactive individuals were more likely to become the targets of both gentle (when pecks directed to dustbathing chickens were excluded) and severe feather pecks (both when including and excluding feather pecks directed to dustbathing chickens) than active individuals. This knowledge may be used to reduce feather pecking by providing distinct resting areas such that mixing of active and inactive chickens is avoided.