

THE EFFECT OF THE REARING ENVIRONMENT ON THE PREVALENCE OF BEHAVIOUR RELATED DISEASES IN LOOSE HOUSED LAYING HENS

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Introduction

The importance of early experiences for a normal development of the individuals has been demonstrated in different animal species, including the jungle fowl and the domestic hen. When studying health and behaviour of the laying hen, it is therefore also crucial to consider the rearing period and its effects on the adult hen. There are indications that failure in the normal development of the individual hen may jeopardise appropriate utilisation of resources, even if the hen has a need for the resource.

This paper will present some previous work on the early access to perches influenced the prevalence of floor eggs and cloacal cannibalism in laying hens, in relation to the development of spatial cognition of the birds (Gunnarsson et al., 1999; Gunnarsson et al., 2000). The first aim was to investigate the effect of early rearing conditions on the prevalence of floor eggs, cloacal cannibalism, and feather pecking in commercial flocks of laying hens in loose housing systems. The second aim was to investigate the spatial skills in laying hens that had been reared with and without early access to perches.

Material and Methods

Epidemiological study

A retrospective epidemiological investigation were performed in a database created within the Swedish National Board of Agriculture pre-testing programme for new technique for laying hens (Gunnarsson, 2000a). The bird health was studied at clinical examinations, performed on a representative sample of 100 birds from each flock, and at post-mortem examinations of a representative sample of dead or culled birds. The individual farmers were recording the egg production daily.

The database contained information about egg production, clinical health, and post-mortem examinations from 59 flocks housed in either OLI Free or Vencomatic aviary at 21 different commercial farms in Sweden. The total study population was about 120,000 laying hens of seven different hybrids.

Three different subsets of data used for modelling of floor eggs, cloacal cannibalism and feather pecking were used. To test for rearing effects on the dependent variables and correct the results for interaction effects and confounders, multiple regression analyses were performed, using stepwise linear logistic regression. These separate stepwise logistic regression models were applied to estimate predictors for the dependent variables; floor eggs, cloacal cannibalism and feather pecking, respectively.

Experimental study

Thirty, day-old chicks (Hisex brown hybrid) were randomly allocated into 2 equal groups and reared in litter pens, one with access to perches (P+) and one without

(P-). At 8 weeks of age all birds were given access to perches and by 15 weeks all birds were using perches for roosting at night.

At 16 weeks, 10 birds from each group were tested in pens where food was presented on a wire mesh tier 40 cm above the ground. Three consecutive tests, with increasing difficulty for the bird to reach the food, were then performed. Firstly the food was presented at 80 cm above the ground but with the tier at 40 cm still present, secondly food was present on the tier at 80 cm and then, finally, with the food on a 160 cm high tier with the tier at 80 cm still present. All birds were food deprived for 15 h before each test and the time from the bird entering the pen until reaching the food was recorded.

Wilcoxon rank sum tests were used to analyse the jump scores, as well as time to reach the food.

Results

Epidemiological study

In the epidemiological study of commercial aviary farms, it was found that access to perches from not later than the fourth week of age decreased the prevalence of floor eggs during the period from start-of-lay until 35 weeks of age, (Odds Ratio=0.30; $P<0.001$). Furthermore, there was a significant effect of early access to perches which decreased the prevalence of cloacal cannibalism during the production period (OR=0.46; $P=0.03$). No other factor studied, such as strain of birds, stocking density or nesting space, was found to have significant effect on floor eggs and cloacal cannibalism. Early access to litter did not reduce the prevalence of feather pecking.

Experimental study

In the experiment there was no difference in the time to reach the food between birds reared with early access to perches and birds that had late access to perches in the test where the food was placed on a tier 40 cm off the ground ($p=0.82$). However, when the food was placed on a tier at 80 cm with the tier at 40 cm still present, birds reared with perches (P+) were faster in reaching the food ($p=0.04$). In two consecutive tests, where the food was placed on a single tier at 80 cm and on a tier at 160 cm with the tier at 80 cm still present, the differences in time to reach the food between birds reared with and without perches were even larger ($p<0.01$).

Discussion

Epidemiological methods are excellent to use when investigating relationships between different factors within databases created from commercial farms. Thus, it is possible to study more factors than in one experiment. Furthermore, it is possible to investigate diseases that can not be studied in experiments as they are hard to predict or ethically questionable to induce, such as cloacal cannibalism. Epidemiologically studies have been successfully used to study feather pecking and

cannibalism in commercial laying hens (Huber-Eicher B. & F. Sebö, 2001; Nicol et al., 2003; Pöttsch et al., 2001).

However, it was not possible from the epidemiological study to draw any conclusions about, why birds reared without early access to perches have a higher risk for laying floor eggs and being cannibalised. Therefore, this had to be investigated further in an experiment. A possible explanation for why hens that had early access to perches have a lower prevalence of cloacal cannibalism and floor eggs during the production period, compared to hens that had been reared without early access to perches, may be that the former have enhanced spatial skills. Therefore, these hens might be more likely to escape cannibalistic attacks and may more easily find nest boxes.

Thus, perches or tiers seem to be an important resource to prevent problems with cloacal cannibalism and floor eggs. No difference in the time to reach the food was found between P+ and P- birds in the T40 test. But, as the difficulty of the task increased, the difference between the P+ and P- birds became significant, with the P- birds taking a longer time to reach the food or not reaching it at all. Since there was no difference between P+ and P- in the T40 test, it seems reasonable to suppose that the later differences did not depend on differences in physical ability. Therefore, the results may imply that rearing without early access to perches in some way impairs the spatial cognitive skills of the domestic hen.

Yngvesson (2002) found experimentally that birds reared with early access to perches had a reduced latency to jump onto a perch when exposed to simulated cannibalistic attacks. However, there was a large individual variation in the birds' reaction to cannibalism, which may partly be related to other individual characteristics than previous experiences, e.g. Yngvesson & Keeling (2001) found that both cannibals and victims were more asymmetrical than control birds.

The importance of the two-dimensional features of the rearing environment has been investigated by Freire and coworkers (2004). They found that the spatial memory in occlusion-experienced domestic chicks had a dramatic effect on how the birds performed a detour test at ten days of age, where chicks reared in a barren environment had less developed spatial memory. Furthermore, these chick also had a less developed brain functions associated with spatial memory.

The majority of layer chicks in Europe today are reared in brooding cages or on litter floors without perches. An implication from the results of the present study is that the chick should be reared with access to perches before 4 weeks of age, in order to obtain good adaptability to loose housing systems in order to avoid cloacal cannibalism and floor eggs.

Conclusion

Access to perches by four weeks of age decreased the prevalence for floor eggs and cloacal cannibalism in commercial flocks of laying hens housed in loose housing systems.

Rearing without early access to perches impairs the cognitive spatial skills of the domestic hen and the effect is both pronounced and long lasting. It affects how easily birds move about in an aviary system and this, in turn, has practical and welfare implications.

In order to make aviaries and other loose housing systems, that will replace battery cage in Europe within the next decades, it appears to be crucial for animal health and welfare that the rearing of the pullets is done in a way that prepare the birds for the housing system they will be housed in as adults (Gunnarsson, 2000b).

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