# Improving Welfare of Layers by Ash Bath Possibility

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**Abstract**
The purpose of this work was to study effect of access restriction to dusting substrate on hens behaviour. Forty laying hens from furnished cages (FC) and nonfurnished cages (NC) at the age of 28 weeks were used. The observations were performed in an experimental aviary equipped with dust bath of ash. The water obstructed the access to the ash bath. The first level of difficulty was without water; the others included water for an increased difficulty. Times of eating were higher in FC group. Locomotion and standing were longer in NC group during all difficulties. The length of vacuum dustbathing was shorter in FC group than NC group (1.2 min vs. 4.2 min) per one hour of observation. The average length of normal dustbathing represented 6.6 min (FC) or 5.4 min per hour (NC). Results suggested that dustbathing is under the control of external factors, especially of former housing. Deprivation of the normal dustbathing was not a sufficient cause for suffering in hens.

**Keywords**: behaviour, dustbathing, hen, welfare.

## 1. Introduction

Dustbathing behaviour consisting of several behavioural elements that lead to dust collecting between the feathers [1]. Possible causes of this activity are removal of fat from feathers [2]; improvement of structure and arrangement of feathers [3]; or removal of ectoparasites [4]. Poultry hatches with a predisposition on dustbathing, which enables it to distinguish substrate suitable for dustbathing [5].
Conventional cages for laying hens are due to be banned in the EU from 2012. Furnished cage dimensions were improved according to welfare rules. Cages must be provided with roosts, nesting place, and area for scratching and dustbathing. It is still unclear whether hens actually suffer through not being able to dustbathe and perform certain other activities in cages [6, 7].

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Each behavioural manifestation of an animal has a natural variability, which is influenced by many factors: environmental and individual, neurophysiologic and constitutional properties of the animal, which lead to a variety of conclusions sometimes contradictory, found in a lot of research.
Laying hens have preferences for dustbathing substrates [8]. Material for dustbathing is the key element. Hens prefer litter of fine and loose structure, which penetrates easily into plumage. The literature sources showed that the cheapest and most available material remains ash [9].
The vacuum dustbathing pattern exhibited by birds that dustbathe without litter could be a sign of frustration; an indication that dustbathing without litter does not provide the required welfare [10]. If the hens are prevented from dustbathing as chicks, or as pullets when first moved to the enriched laying cages, they may

persist in vacuum dustbathing even if a dustbath is made available to them.

## 2. Materials and methods

In the experiment were used 40 laying hens of ISABROWN hybrid at the age of 27 weeks from two different housings. Twenty layers were reared and housed in furnished cages (FC) and twenty ones were from nonfurnished cages (NC).
Maintenance activities (feeding, drinking, walking, standing, staying, roosting, vacuum dustbathing) were recorded in the housing area.
Dustbathing was recorded in two locations of the aviary: in the housing area as vacuum dustbathing and in the dustbath place with the ash (complete dustbathing). The water ford obstructed the access to dust bath and it helped to examine the motivation and will of layers to cross it and dust bath. Day 1 – difficulty level 1, free access to dust bath through a ford without water. Day 2 – difficulty level 2, access to dust bath through a water (20 mm). Day 3 – difficulty level 3, access to dust bath through a water (70 mm). Day 4 – difficulty level 4, access to dust bath through a water (150 mm). Day 5 – difficulty level 5, access to dust bath through a water (180 mm). The observations were performed during 12 hours of light-day (from 7 h to 19 h) in five consecutive days. The video-recorded behaviour was analyzed using continuous behaviour and focal animal sampling at 60-second intervals. The results were calculated via ANOVA using a statistical package STATISTIX, Version 8.0. The experiment was evaluated by means of a 4-way variance analysis. The normal distribution of data was evaluated via Wilk-Shapiro/Rankin Plot procedure.

## 3. Results and discussion

Eating was the most recorded behaviour during all difficulty levels and values were higher in FC group. The greatest difference was obtained at difficulty level 3 (302 ± 98 min vs. 207 ± 113 min; $P<0.001$). Locomotion and standing were activities with similar course; times were higher in NC group during all difficulties. The second most often behaviour was roosting, time increased almost regularly from difficulty 1 to difficulty 5. Times of this behaviour were higher in NC group, differences were recorded in the second and the fifth difficulty (72 ± 64 min versus 104 ± 88 min; 105 ± 80 min versus 156 ± 102 min; $P<0.05$).
The average length of vacuum dustbathing was lower in FC group than NC group (1.2 min vs. 4.2 min) per one hour of observation. The shortest time of normal dustbathing was 1.2 min with difficulty level 4, and the longest time 19.8 min with difficulty 1 per hour of observations in FC group. The shortest dustbahing was in hour 8, and the longest in hour 10 of observation.
The average length of dustbathing with all layers in the given type of housing represented 6.6 min per hour. In NC group we found the lowest value of dustbathing 1.2 min with difficulty 5 and the highest value 10.8 min with difficulty 3. The average length of dustbathing was here 5.4 min per hour of observation. We recorded significant differences between groups in the difficulty 1 only ($P<0.05$).
At the present study, female domestic fowl were reared from hatching with or without access to dust bathing material. Their responses to the dust bath were influenced by previous experience. Dust bath-reared hens from FC group performed more than second group on food eating. Times of movement, standing and roosting were higher in NC hens. It would be influenced by former housing [4,11]. We found out that restriction of normal dustbathing changes sequence of other activities. Feeding was activity which kept their position during the whole course of the experiment. Other studied activities changed their order by one or two positions at the most. However, no activity rose markedly, therefore we think that normal dustbathing is of low importance for hens. As many factors influence the variability of behaviour, it is difficult to determine, which importance we can give the factor studied in our experiment.
The length of vacuum dustbathing was shorter in FC group than NC group. The average lengths of normal dustbathing were similar (6.6 min vs. 5.4 min per hour). These results indicate that the missing experience with a dusty substrate may contribute to the initiation of vacuum dustbathing. It can imply that vacuum dustbathing may be sometime normal dustbathing [2].
If hens raised and kept without litter material (for example NC group), they could perform alternate vacuum dustbathing [10]. If birds gain access to litter over a longer time they change their preference and begin to use the more functional

dustbathing [5, 8]. This implies that vacuum dustbathing is not satisfying as normal dustbathing.

Poultry motivation to dustbathe can be influenced by different factors such as internal behavioural needs [12], external factors such as the manner of rearing, substrate sight and quality, light or noise in barn [11,13,4]. Some authors also showed that if poultry have access to litter during longer time can change their preference and use different dustbath materials [8, 14].

Our results can indicate that hens' motivation to dustbathing was satisfied in aviaries than in former housing in enriched and conventional cages. Thus, laying aviaries improve hens' welfare in term of dust-bathing behaviour compared with conventional cages. It is generally accepted that alternative housing systems should provide opportunities for both dustbathing manners [15, 12, 1].

If the animals are deprived of the opportunities to dustbathe, the tendency to dustbathing increases with the time of deprivation. In our experiment, the number of passing the ford decreased with an increasing difficulty; however, the length of dustbathing in a comfortable ash place was not the shortest. Layers that passed the obstacle dustbathed longer.

We can notice that FC have been developed in response to the demand for improved hen welfare. However, these cages seldom have enough space in the dustbath for more than one hen, and this could lead to frustration and detrimental behaviour from the other hens [16]. This implies that if birds are seen to perform vacuum dustbathing on the floor, the quality of the litter in the dustbath place is not optimal or it is not sufficiently accessible. This would imply that dustbathing without litter is not able to replace functional dustbathing. From an animal welfare point of view this study further supports the view that dustbathing in a suitable substrate is a behavioural need in laying hens.

Dustbathing should focus more on the welfare of hens that are kept without litter (NC) or with limited access to litter (FC) and perform vacuum dustbathing [17]. Modern cages include dust baths to provide birds with the opportunity to perform dustbathing [15, 14].

**Table 1.** The mean times of maintenance activities

| Activity | Group | Difficulty | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | | 2 | | 3 | | 4 | | 5 | |
| | | mean | SD | mean | SD | mean | SD | mean | SD | mean | SD |
| Feeding | FC | 246 | 110 | 294 | 103 | 312 | 102 | 270 | 107 | 258 | 95 |
| | NC | 222 | 100 | 216 | 119 | 204 | 110 | 180 | 115 | 198 | 120 |
| Walking | FC | 48 | 56 | 66 | 61 | 36 | 56 | 24 | 39 | 36 | 48 |
| | NC | 60 | 65 | 78 | 73 | 72 | 64 | 66 | 60 | 68 | 65 |
| Standing | FC | 54 | 59 | 42 | 55 | 36 | 53 | 42 | 55 | 66 | 64 |
| | NC | 102 | 83 | 78 | 79 | 96 | 80 | 60 | 62 | 70 | 85 |
| Roosting | FC | 48 | 54 | 66 | 67 | 84 | 66 | 138 | 269 | 102 | 80 |
| | NC | 72 | 74 | 102 | 92 | 114 | 95 | 144 | 107 | 154 | 105 |

FC = furnished cages; NC = nonfurnished cages

## 4. Conclusions

The results of the present study suggest that dustbathing is more impacted by external factors than internal effects. The former experience before moving of hens to experimental aviary had impact on their behaviour. However, deprivation of the opportunities to dustbath per se is not a sufficient cause for suffering in layers.

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