

# The welfare of laying hens

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The conditions under which laying hens are housed remain a major welfare concern. It is one of the most intensive forms of animal production and the number of animals involved is very high. According to Directive 1999/74/EC laying down minimum standards for the protection of laying hens unenriched cages will be prohibited from 2012 onwards. The provisions of the Directive are being progressively implemented since 2002. Both the recent report of the European Food Safety Authority (Welfare aspects of various systems for keeping laying hens) and the EU funded LayWel project, evaluated the various welfare aspects of different housing systems for laying hens. In the LayWel project special emphasis was put on furnished cages but also non cage systems, such as aviaries and free range systems, were investigated. Here we give an overview of the most severe risks for poor laying hen welfare in the different housing systems, as indicated by the LayWel project and the EFSA report. Laying hens place a high value on a discrete nest space. The LayWel database illustrates a high use of the nest box in all housing systems and indicates a risk to welfare of hens in conventional cages where no nest box is available. Dustbathing and foraging are generally accepted as high priority behaviours. Depending on the lay-out, these behaviours can not be (fully) performed in furnished cages, which is a threat to bird welfare in these housing systems. Feather pecking is still a very predominant welfare problem in birds, specifically in non cage systems with a prevalence between 40-80% in commercial flocks. In addition, it should be noticed that the rearing period is of primary importance for the adaptation of the hens to the housing system during the laying period.

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**Keywords:** laying hens; welfare; housing systems; behavioural needs

## Introduction

The conditions under which laying hens are housed remain a major welfare concern. It is one of the most intensive forms of animal production, and the number of animals involved is very high. Directive 1999/74/EC laying down minimum standards for the protection of laying hens (Commission of the European Communities, 1999) outlines in particular provisions applicable to furnished cage systems, alternative housing systems and unenriched cage systems. The Directive provides that unenriched cages shall be prohibited from 1<sup>st</sup> January 2012. From that date laying hens should be housed either in furnished cages or in alternative (non cage) systems.

The provisions of the Directive are being progressively implemented since 2002. Both the recent report of the European Food Safety Authority (Welfare aspects of various systems for keeping laying hens (EFSA, 2005), and the EU funded LayWel project (LayWel, 2006), evaluated the various aspects of different housing systems for laying hens. In the LayWel project special emphasis was put on furnished cages and the welfare of laying hens housed in it, but also non cage systems such as aviaries and free range systems were investigated. A large database was created with input from various lab studies and studies on commercial farms from the different LayWel partners. In this way statistical analysis on behaviour, production and health in different systems could be performed (LayWel, 2006).

Housing systems for laying hens changed a lot during recent years. In general, there is a tendency for a growth in production of non-cage eggs in the different EU countries, as is illustrated in figure 1. This figure shows that The Netherlands, Great Britain, Germany and France are the largest producers of non-cage eggs (LayWel, 2006).

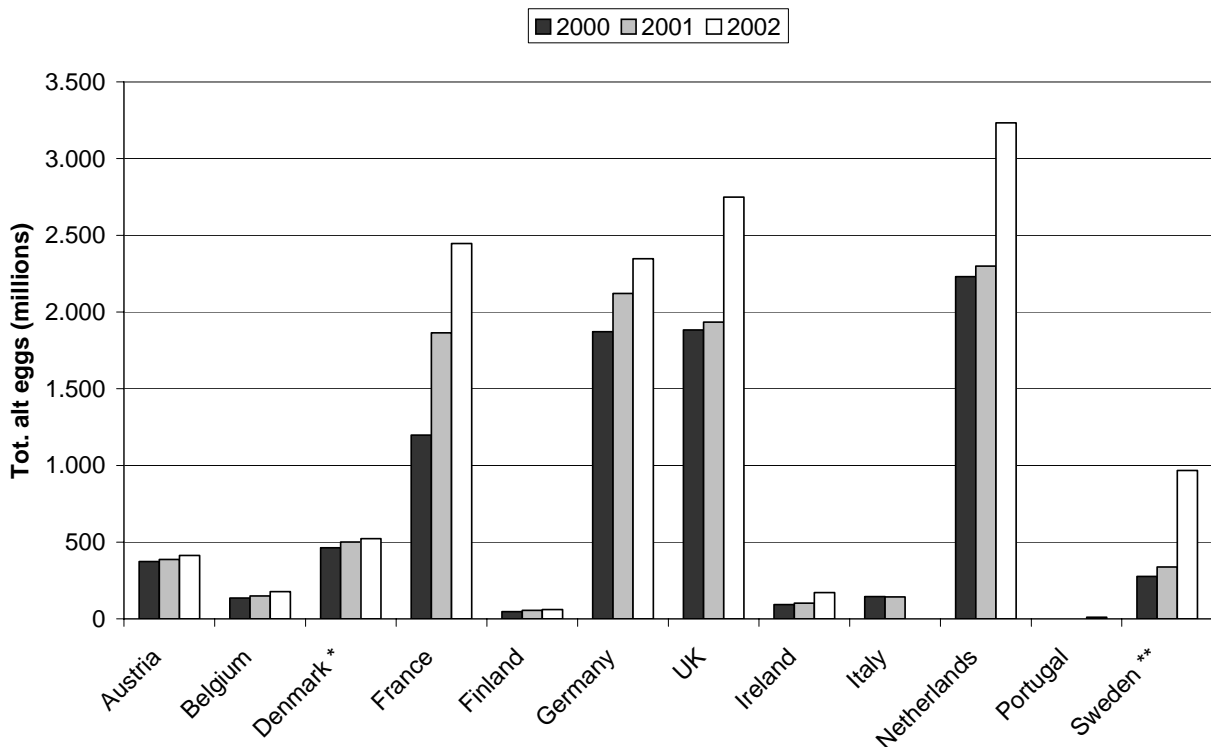


Figure 1. Total number of non-cage eggs produced (in millions) per country (from LayWel (2006) with permission). \* from free range 60% is organic; \*\* 2/3 of cage eggs are produced in furnished cages, which are not included in this figure.

All different housing systems provide most laying hens with their basic needs for survival and also for good productivity. However, for good welfare it should also be considered that hens have behavioural needs. Understanding the behavioural requirements of laying hens can provide strong evidence of the welfare implications of specific housing designs (Cooper *et al.*, 2003b). In this paper we give an overview of the most severe risks for poor laying hen welfare in different housing systems with respect to the behavioural needs of the hens, as indicated by the LayWel project and the EFSA report.

## Nesting behaviour

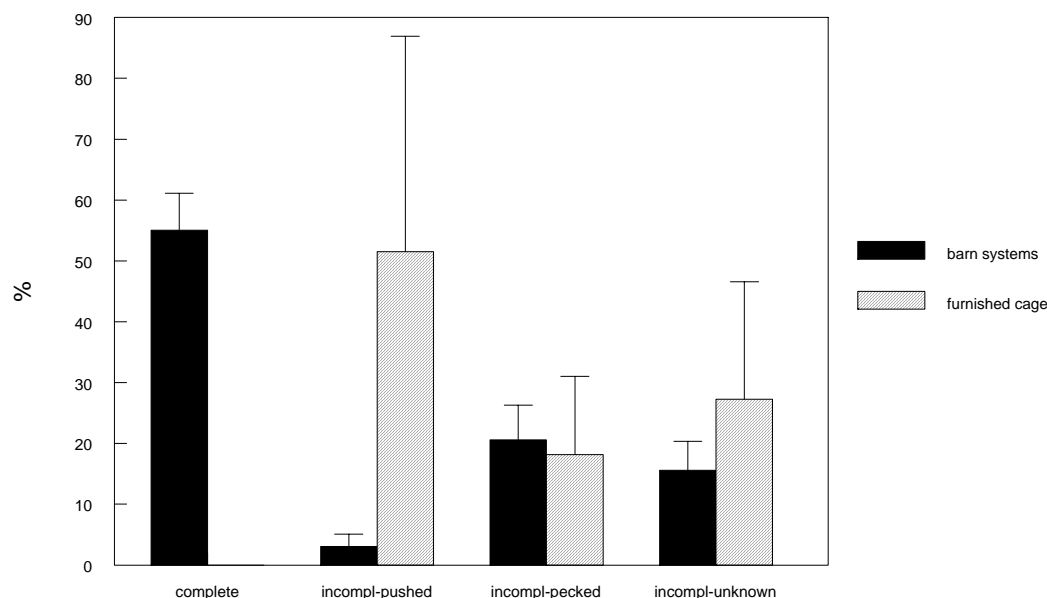
It has been shown that hens are highly motivated to gain access to a discrete, enclosed nest site in the pre-laying period (Cooper *et al.*, 1995; Cooper *et al.*, 1996; Cooper *et al.*, 2003a). With respect to the pre-laying behaviour research suggests that it is important that hens spend some time on nest building prior to egg laying (Freire *et al.*, 1997; Cooper *et al.*, 2003a). The LayWel database indicates that there is a high use of the nest box in the different systems studied (LayWel, 2006). In general it can be concluded that there is a risk for reduced welfare in conventional cages where nest boxes are not available to the birds. However, there is still a lack of research whether nests as presented under commercial conditions, like colony nests or nests with Astro-turf bedding, fully fulfil the behavioural needs of the hens.

## Dustbathing and foraging

Both dustbathing and foraging behaviour require suitable substrates. Research has been carried out to ascertain which substrates are preferred by laying hens to perform these behaviours (e.g., Van Liere *et al.*, 1990; Matthews *et al.*, 1995; De Jong *et al.*, 2006). It has been shown that substrate preference may differ with respect to the behaviours performed in it. Previously, it has been suggested that peat and sand were preferred for dustbathing (Van Liere *et al.*, 1990). More recently, it has been shown that hens preferred peat for dustbathing over sand and wood shavings (De Jong *et al.*, 2006). In contrast, laying hens do not seem to have a specific preference for either peat, sand or wood shavings to perform foraging behaviour (Matthews *et al.*, 1995; De Jong *et al.*, 2006).

Both dustbathing and foraging are generally considered as high priority behaviours (EFSA, 2005). However, it is still unclear how substrates to perform these behaviours can be provided in a practically viable way to satisfy the motivation of the birds to perform these behaviours. For example, we evaluated dustbathing and foraging behaviour in laying hens in furnished cages and single tier barn systems. In that study we observed that none of the dustbaths performed in furnished cages were complete, whereas about 55% of the dustbaths performed in the single tier barn systems were complete (Figure 2). Foraging behaviour was also observed in more birds in the single tier barn systems compared to the furnished cages. These results indicate that a single tier barn system offers more opportunities to perform complete dustbathing and foraging as compared to the furnished cage system. However it should also be noticed that in the single tier barn systems about 45% of the dustbaths were incomplete. This was mainly caused by disturbance from feather pecking birds. More research is necessary how we can improve the provision of substrate and the design of substrate areas in current housing systems to better fit the needs of the birds (LayWel, 2006).

Proportion complete and incomplete dustbaths



**Figure 2. Proportion of complete and incomplete dustbaths in single-tier barn systems and furnished cage systems. Incompl-push: dustbath interrupted by other hens pushing or running over the dustbathing hen; Incompl-peck: dustbath interrupted by pecking by other hens; Incompl-unknown: dustbath interrupted by unknown reasons (from LayWel, 2006).**

## **Perching**

A few studies have shown that hens are prepared to work to gain access to perches at night, (e.g., Olsson *et al.*, 2002), but thus far there has been insufficient research to know the extent to which perching is a behavioural priority (EFSA, 2005). Perches are relevant for rest and sleep (Blokhuys, 1983, 1984) but may also contribute to bone strength and offer opportunities for extra (vertical) space (EFSA, 2005).

However, when perches are provided, hens make use of them with up to 100% birds perching at night (EFSA, 2005). Also the LayWel database showed that there was a high use of perches at night, with about 50% - 85% of the hens on the perches in various housing systems (LayWel, 2006). The use of perches does not seem to differ between cages and non-cage systems. However in non-cage systems there seems to be a better use of perches in multi-tier systems as compared to single tier systems (LayWel, 2006).

## **Space**

Sufficient space should be provided to enable the hens to perform priority behaviours. Previous research in cages showed contradicting results (e.g., Lagadic *et al.*, 1987), but recent studies in cages suggest that there is an intermittent preference for a large cage that is context dependant, e.g. on the time of the day (Cooper *et al.*, 2003b). In non cage systems it is difficult to prescribe space allowance due to the complexity of the environment and the distribution of the birds (EFSA, 2005). In the LayWel project it was concluded that the larger space availability in non-cage systems offers hens more freedom for exercise like wing-flapping and flying and offers submissive hens the opportunity to avoid aggressive birds as compared to cage systems. The limited space in conventional cages is unacceptable in view of bird welfare (LayWel, 2006).

## **Feather pecking**

Feather pecking is one of the most important welfare problems in laying hens. Especially in non-cage systems there is a high risk of feather pecking which sometimes leads to cannibalism and a high mortality. A literature review on studies in large-scale commercial flocks indicated that 40-80% of the flocks suffered from feather pecking (LayWel, 2006). The LayWel database indicated that the incidence of feather pecking may differ between housing systems. E.g., mortality rates mainly due to feather pecking were higher in large furnished cages as compared to conventional cages, small- and medium sized furnished cages, although some recent unpublished studies that were not included in the database showed lower mortality rates. Plumage condition in non beak trimmed birds was inferior in non-cage systems as compared to small furnished cages (LayWel, 2006).

## **Discussion and conclusions**

From the LayWel project it was concluded that all housing systems for laying hens, with the exception of conventional cages, have the potential to provide satisfactory welfare for laying hens. However, this potential is not always realised in practice (LayWel, 2006). In the EFSA report it was concluded that recent research and development have led to considerable improvements of design of housing systems, particularly furnished cages, and improvements of how to manage birds in the different systems. However, it is also concluded that injurious pecking is a serious problem in many systems, and that high priority behaviours such as foraging, dustbathing, perching and nesting can not always be performed in the different laying hen housing systems, which is detrimental to bird welfare (EFSA, 2005).

Cage systems provide a more hygienic environment which may be positive for bird welfare. However, the most important risks for bird welfare in cage systems are damaging pecking and cannibalism in cages with a higher group size and a risk for bone fractures during the laying period and depopulation. In non cage systems there is a high level of bone fractures during the laying period. In addition, feather pecking and consequently damaged birds and cannibalism are highly prevalent in these systems (EFSA, 2005; LayWel, 2006).

Although furnished cages and alternative systems offer much more opportunities for laying hens to fulfil behavioural priorities like dustbathing, foraging, nesting and perching as compared to conventional cages, this does not implicate that these opportunities fully match the behavioural needs of the hens. For example, as discussed above, the inclusion of a substrate area in a housing system does not necessarily implicate that complete dustbathing behaviour can be performed. Factors like total surface of the area, location in the house or cage, friability and type of substrate, the presence of feather peckers and social ranks may play an important role in the use of a substrate area in laying hen housing systems. More research is needed to establish those factors that are determinative for the use of various resources in laying hens and how the hens' needs can be met in the different housing systems.

Special attention should also be paid to the rearing conditions which are very determinative for the development of the hen's behaviour (including behavioural capacities and preferences) and the later use of resources by hens. For example, rearing without early access to perches has a negative effect on the use of perches at a later age (Gunnarsson *et al.*, 2000). The preferences for a dustbathing substrate during laying are largely affected by the substrate provided during rearing (Van Liere *et al.*, 1991). The LayWel database also indicated a higher dustbathing activity in floor reared hens as compared to cage reared hens (LayWel, 2006). Moreover, it is well known that the provision of a substrate during rearing may reduce the risk for feather pecking at a later age (e.g., Blokhuis and van der Haar, 1989; Nicol *et al.*, 2001).

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