

The comparative welfare of laying hens in a wide range of egg production systems as assessed by criteria in Swedish animal welfare standards

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Council Directive 1999/74/EC (1999) defines three major categories of housing system; alternative (non-cage), unenriched (conventional) cage and enriched (furnished) cage. Conventional cages are to be phased out by 1st January 2012, leaving only two categories of housing system. Both categories however comprise a wide variety of different designs and models, making it hard to draw conclusions on bird welfare in these systems. Thus, it is deemed important to gather information on the comparative welfare of hens in various egg production systems. The objective of this study is to provide information about the comparative welfare of laying hens housed in a variety of egg production systems, using evaluation criteria based on the Swedish monitoring system. The study involves assessments on flocks in conventional and furnished cages, single and multi-tier aviaries (barns) with and without verandas as well as fixed and mobile house free-range systems. Production assessments are measured throughout the laying period. Physical condition assessments are carried out on hens at 35 and 60 weeks of age looking at feather cover on the back and wing area, feather hygiene, comb wounds, rear and back wounds, keel bone damage, bumblefoot and broken claws. Environmental assessments are taken at 35 and 60 weeks of age. The basics of the evaluation program are results obtained on physical condition, mortality and production in relation to stipulated minimum requirements given as percentages of defect birds. Each physical condition assessment parameter is scored from 1 to 4, where 1 means a serious defect and 4 means very good condition. For the physical condition assessments, only scores of 1 and 2 are included in the minimum requirements. Those hens are counted in the total percentage of defect hens. Hens that score 3 or 4 for any parameter counted as a non-event. Early indications show that feed usage of hens in cage systems (both conventional and furnished) is lower than in non-cage systems, even though the bodyweight and egg production of hens is higher in cage systems than in non-cage systems. Mortality is low or very low in conventional and furnished cages, moderate in barns/aviaries and highest in free-range systems. To date, all systems studied have met the Swedish welfare standards for rear and back wounds, feather hygiene and broken claws. The most favourable housing systems for laying hens in terms of comb wounds, keel bone damage and bumblefoot are conventional and furnished cages.

Keywords: Laying hens; housing systems; welfare

Introduction

In laying down minimum standards for housing of laying hens Council Directive 1999/74/EC (1999) defines three major categories of housing system; alternative (non-cage) systems, unenriched (conventional) cage systems and enriched (furnished) cage systems. According to this Directive, conventional cages will be prohibited on 1st January 2012, leaving only two categories of housing system. All categories however comprise a wide variety of different models, making it hard to draw

conclusions on bird welfare in these systems. A better indication of welfare in relation to housing system can be made by using sub-categories of housing system (Fiks-van Niekerk and Elson, 2005).

Furnished cages, also known as enriched cages, contain nest boxes and perches, have litter areas, are operated from the outside of the system and have greater height than conventional cages. There are three categories for group size in furnished cages; large colony cages containing over 30 hens, medium colony cages with between 15 and 30 hens and small colony cages with up to 15 hens. Non-cage systems, also known as alternative systems, are operated from inside the system. There are several categories of non-cage system; barn systems which are single-tiered, multi-tiered aviaries both with non-integrated and integrated nest boxes, and portal systems that have elevated perforated floors, the top tier of which is a single level under which operators can pass, with nest boxes integrated into the system.

The objective of this study is to provide information about the comparative welfare of laying hens housed in a wide variety of egg production systems, using evaluation criteria based on the Swedish monitoring system (Tauson and Holm, 2002). In earlier studies of this kind, for example Freire *et al* (2003), Vits *et al* (2005) and Wall *et al* (2004), attempts have been made to assess the level of bird welfare within individual systems. In others, for example Leyendecker *et al* (2005), bird welfare has been compared between a limited number of systems. Few, if any, such studies have included the free-range system. As far as is known, this is the first such study in which bird welfare has been assessed in a wide range of production systems and designs and the systems then compared on that basis. The results obtained should also indicate how good a tool the Swedish welfare standards are for this purpose.

Materials and methods

This three year study, due to conclude in 2007, involves assessments on flocks in conventional and furnished cages, single and multi-tier aviaries (barns) with and without verandas as well as fixed and mobile house free-range systems. Production and mortality are recorded throughout the laying period for each flock. Feed usage is recorded between 16 and 72 weeks of age in weekly periods on a house basis. Body weight between 16 and 72 weeks of age is recorded at regular intervals, including 35 and 60 weeks of age, to check whether the hens follow the breeders recommended growth curve. The number of hens housed at 16 weeks of age and all deaths between 16 and 72 weeks of age are recorded in four-week periods. The total number of eggs collected each day is recorded for each house between 20 and 72 weeks of age.

Physical condition assessments are carried out on thirty hens from each flock at 35 and 60 weeks of age (Tauson *et al.*, 2005). Feather scores are carried out separately for both the back and wing areas of the hens. A feather hygiene score is carried out on a whole bird basis. Hens are assessed for the number of peck wounds to the comb and for rear and back wounds, including the base of the tail. Hens are assessed for evidence of keel bone damage and a bumblefoot score is carried out. Hens are also assessed for the number of broken claws per hen.

Environmental assessments are taken at 35 and 60 weeks of age for each flock. On the day of sampling, environmental monitoring is carried out of ammonia level (ppm), carbon dioxide level (%), dust level (mg/m³), inside and outside temperature (°C) and inside relative humidity (%).

The basics of the evaluation program are results obtained on physical condition, mortality and production in relation to stipulated minimum requirements given as percentages of defect birds. Each physical condition assessment parameter is scored from 1 to 4, where 1 means a serious defect and 4 means very good condition. For the physical condition assessments, only scores of 1 and 2 are included in the minimum requirements. Those hens are counted in the total percentage of defect hens. Hens that score 3 or 4 for any parameter count as a non-event.

Interim findings and discussion

Early indications show that feed usage of hens in cage systems (both conventional and furnished) is lower than in non-cage systems, even though the bodyweight and egg production of hens is higher in cage systems than in non-cage systems. In conjunction with other parameters, mortality is an important indicator of bird welfare. Results to date suggest that mortality is low or very low in conventional and furnished cages, moderate in barn/aviaries and highest in free-range systems. If mortality progresses to 72 weeks of age at a similar rate to that pertaining at 45 weeks of age flocks in the former systems will comfortably meet the Swedish welfare standard whereas the free-range systems will exceed it, possibly by a considerable margin.

To date, all systems studied have met the Swedish welfare standards for rear and back wounds, feather hygiene and broken claws. The most favourable housing systems for laying hens in terms of comb wounds, keel bone damage and bumblefoot are conventional and furnished cages. Air condition is mostly good with low to moderate levels of dust and low levels of ammonia and carbon dioxide. However, dust levels are higher in non-cage systems than in cages. Fluctuations in temperature are partly due to seasonal variation, as measurements are carried out at different times of the year and relate to normal conditions in the United Kingdom, Germany and the Netherlands.

Full term results are not yet available for all flocks in this study and therefore firm conclusions should not be drawn at this stage. However, it appears likely that differences in welfare assessments between housing systems will be established. Some parameters, for example mortality, can be taken to be good indicators of bird welfare whereas others, such as egg production and keel bone deformity, provide much less definite welfare information (LayWel report, 2006. www.laywel.eu).

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