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The effect of stocking density, flock size and modified management on laying hen behaviour and welfare in a non-cage system

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Abstract

The current large-scale experiment aimed to study laying hen behaviour under commercial stocking densities, flock sizes and management practices using a replicated design.

Thirty-six flocks of beak-trimmed Shaver laying hens (113,400 birds in total), six flocks per treatment, were housed within commercial single-tier aviary systems. The six treatments comprised different combinations of stocking densities (low: 7 birds m^{-2}, medium: 9 birds m^{-2}, high: 12 birds m^{-2}), flock sizes (small: 2450/3150 birds, large: 4200 birds) and management conditions (standard and modified). Bird behaviour (incidence of feather pecking, aggression, preening, dustbathing and allopreening) was recorded directly by an observer when birds were approximately 32, 48 and 60 weeks of age.

The initial level of feather pecking and aggression was highest in the low stocking density. Feather pecking and aggression increased with age but only in the high stocking density treatments. In the high stocking density treatments more aggression, preening and allopreening were recorded in small flocks than in large flocks and especially the small flocks under standard management conditions showed higher levels of feather pecking and aggression by the end of the laying cycle. This effect of

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small, high density flocks on feather pecking and aggression was counteracted by modified management conditions.

Behavioural observations in this study did not show that the welfare of laying hens was compromised by housing them at 12 birds m^{-2}, in comparison with birds housed at 9 or 7 birds m^{-2} 2 in single-tier aviary system. However, modifications in management decreased feather pecking and aggression.

Keywords: Laying hen; Group size; Density; Feather pecking; Aggression; Deep-litter

1. Introduction

As the 2012 EU ban on conventional cages for laying hens approaches, non-cage or alternative systems are likely to become more predominant. This has raised the issue of what stocking density is most appropriate for production and welfare of hens. The Council Directive 1999/74/EC (C.o.t.E., 1999), which lays down minimum standards for the welfare of laying hens, states a maximum stocking density of 9 birds m^{-2}. However, where the usable area corresponds to the available ground surface a stocking density of 12 hens m^{-2} is allowed until 2012 in systems applying this density on 3 August 1999. There is no clear scientific evidence for the recommendation of the maximum stocking density of 9 birds m^{-2}, because large-scale replicated experimental studies are few. Whether or not the welfare of hens is improved by housing birds at 9 animals m^{-2}, or less, can only be assessed by considering the effect of stocking density on a broad range of different potential indicators of welfare. One of these indicators is laying hen behaviour.

Higher stocking densities have been associated with higher levels of feather pecking in laying hens, in different systems (Nicol et al., 1999). Also laying growers (Hansen and Braastad, 1994; Huber-Eicher and Audige, 1999) and growing bantams (Savory et al., 1999) showed more feather pecking, measured by the amount of feather damage, under higher densities. Furthermore, epidemiological studies have shown that use of the outdoor range in free-range flocks of laying hens reduced the risk of feather pecking (Bestman and Wagenaar, 2003; Nicol et al., 2003), which might be the result of lower stocking densities within the barn. Other studies, however, failed to find a relationship between stocking density and feather pecking (Appleby et al., 1989; Carmichael et al., 1999; Gunnarsson et al., 1999; Oden et al., 2002).

Under commercial conditions, an increase in stocking density is often accompanied by an increase in flock size. An increase in flock size is associated with higher levels of feather pecking (Nicol et al., 1999; Bilčik and Keeling, 2000), higher levels of fear (Bilčik et al., 1998) and lower bodyweight (Keeling et al., 2003). However, levels of aggression are generally low in large flocks of laying hens (Hughes et al., 1997; Carmichael et al., 1999; Nicol et al., 1999; Estevez et al., 2002, 2003), possibly due to the formation of sub-groups of familiar individuals within a large flock (Grigor et al., 1995). Alternatively, low levels of aggression could be the result from a lack of social relationships brought about by a strategy of social tolerance (Hughes et al., 1997; Pagel and Dawkins, 1997; Estevez et al., 2003).