

Improving the housing of laying hens to enhance welfare

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Housing laying hens in battery cages is a serious animal welfare concern. Although they are the most widely used poultry housing system throughout the world, conventional wire cages provide no environmental enrichment, very little space and no opportunity for birds to perform natural behaviours such as dustbathing, perching, nesting and foraging. From January 2012 this type of housing will be banned within the European Union, prompting research into alternative housing options that provide more space per hen to allow for a greater behavioural repertoire. New housing systems require careful planning and management to overcome potential risks to production and the health of hens (Tauson, 2005). This paper aims to investigate welfare concerns in housing layer hens, and their place in developing alternative systems.

The EU Council Directive 1999/74/EC requires that from January 2012 cages must provide a minimum of 750cm² floor space per bird, with at least 600cm² of this area no less than 45cm high. There must be a nest box, 15cm of perch space per bird, litter, and readily available food and water for all birds (EU, 1999).

In Australia, the current minimum floor space requirement is 550cm² per hen in cages with three or more birds where the hens weigh less than 2.4kg and where cages were installed after January 2001. For those installed prior to this date the requirement is 450cm² (PISC, 2002), which is smaller than the average body volume of a hen, calculated as 475cm² (Dawkins and Hardie, 1989). A study by Onbasilar and Aksoy (2005) provides insight into the welfare consequences of space allowance by examining the stress responses of hens in different cage densities and heights. Hens were housed in cages of one, three or five birds, with 1968, 656 and 393.8cm² floor space per hen respectively. Equal numbers were allocated to the three cage levels. Production performance, egg quality characteristics, blood parameters, antibody response and external appearance were all recorded as measures of stress. A significantly greater stress response was seen in the groups of five hens. These birds were in poor physical condition with lower body weight, reduced egg production and poor plumage condition. Blood tests revealed increased circulating neutrophils, increased plasma corticosteroid and decreased antibody levels. There was no significant difference found between cages with one or three hens, or between the three levels. Higher density housing has been associated with birds' inability to perform comfort behaviours, including wing flapping, stretching, body shaking and tail wagging (Albentosa and Cooper, 2004), which may explain the greater stress response seen in this study. Restricted movement in high-density housing can also cause bone fragility and muscle weakness (Tauson, 2005). From these results it can be predicted that the minimum floor space requirement of 750cm² required by the EU Directive can potentially reduce the stress response of laying hens.

Dustbathing and foraging are normal behavioural requirements for hens. Dustbathing involves tossing and rubbing dust between the feathers to maintain feather and skin condition. Foraging involves pecking and scratching on the floor for food. Conventional cages with wire flooring do not allow expression of these behaviours. A study by Merrill and Nicol (2005) tested two new floor types made from rubber and string to evaluate their potential to facilitate dustbathing and foraging, and to assess their effect on feather condition. The floor types were tested against traditional wire flooring and litter (wood shavings). Hens were videotaped, and the duration, number of bouts and behavioural quality of dustbathing and foraging was recorded. Rubber flooring had the advantage of allowing faeces to fall out through small holes in the surface, but it failed to encourage dustbathing and resulted in poor feather condition. String flooring encouraged some dustbathing and birds on this surface had good feather and foot condition. Neither of these floor types allowed for foraging, nor did they encourage the same duration or quality of dustbathing as seen on litter. Rearing hens on the same flooring on which they are kept as adults can help encourage dustbathing. Feather pecking is a redirected behaviour that occurs when hens are unable to dustbath and/or forage for food (Sedlackova *et al.*, 2004), so appropriate flooring material allowing expression of these behaviours will reduce feather pecking.

Two options for commercial housing are furnished cages of around 10 to 20 birds or larger groups of 40 to 60 birds, both of which incorporate the changes required by the EU Directive, including litter, nests and perches. Weitzenburger *et al.* (2005) conducted trials to compare mortality levels in the furnished cage and group systems. The number of deaths and their causes was recorded for the two systems over a set time period. An average mortality of 5.2% was observed in the group housing

system compared to 4.1% in furnished cages. Cannibalism was the most common cause of death, followed by peritonitis. Cannibalism is preceded by an outbreak of feather pecking, initiated by a small number of birds. Although the incidence of feather pecking is lower in group housing compared to the cage system, when it does occur it spreads rapidly throughout the flock through social facilitation of the abnormal behaviour, resulting in widespread cannibalism. Furnished cages combine the benefits of small group sizes and low cannibalism with the possibility to perform natural behaviours (Tauson, 2005). A previous study by Appleby (2004) recommends an optimal group size of around 10 to 12 birds. Other factors influencing mortality are rearing method, vaccination, light intensity, bird genotype, feed composition, beak trimming and air quality (Tauson, 2005). Further research should focus on adapting these practices to suit alternative housing systems.

These studies have demonstrated a range of factors impacting on the welfare of housed laying hens. To improve welfare, future housing systems should have a larger space allowance per hen, flooring material that permits dustbathing and foraging, an appropriate group size, and careful planning and management to prevent cannibalism. With these improvements hens will have greater freedom to express normal behaviours while maintaining good health and physical condition.

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