

# Artificial structures: A practical solution to the problems of uneven hen distribution on free-range layer farms

*Explores possible solutions to difficulties relating to hens' use of free-range areas available to them.*

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## Introduction

There is a growing trend among consumers to demand products derived from animals reared in welfare-friendly environments (Gilani *et al.*, 2014). In the case of egg production, this has effected a steady decline of caged or barn systems in favour of ostensibly more welfare-friendly free-range systems, in which hens have access to free-range areas (Gilani *et al.*, 2014). This is supposed to decrease the average indoor stocking density, providing hens with more space to perform natural behaviours and decreasing risk factors that may compromise the health and welfare of the birds (Bestman, 2005). Nevertheless, these systems are not flawless, as use of the outdoor range varies among hens, and consequently many health issues arise related to stocking density (Sherwin *et al.*, 2013). Therefore, it is in the interests of free-range poultry farmers to develop better housing solutions to help strike a balance between steady financial returns and meeting the welfare demands of consumers. This review discusses the welfare issues facing free-range producers and examines how the introduction of artificial structures on the range could provide a solution to assuage both economic and welfare concerns.

## Discussion

Botreau *et al.* (2007) defines production animal welfare as the level of fulfilment of four criteria: adequate food and water, proper housing, health, and behaviour reflecting optimised emotional states of the animal. The free-range system seeks to improve all these criteria, but it faces certain challenges when it comes to the distribution patterns of the hens and this, in turn, has effects on factors such as health and the display of natural behaviours.

Recent studies focused on the distribution patterns of free-range poultry have found that hens tend to stay close to the shed and perimeters of the enclosure, and do not venture far from these structures (Zeltner & Hirt, 2003). The reasons for this could be fear of aerial predators, fear of novelty, or breed predispositions. The result is a non-uniformity of distribution across indoor and outdoor areas, which increases the stocking density in certain areas, leading to a higher incidence of feather pecking and parasite infestation exacerbated by the accumulation of droppings, especially nematodes that can cause severe gastrointestinal tract diseases (Rault *et al.*, 2013; Sherwin *et al.*, 2013; Van de Weerd *et al.*, 2009; Zeltner & Hirt, 2003).

Furthermore, an investigation into the effects of housing and husbandry on nematode infections in 19 free-range egg-laying flocks has shown links between increased stocking density and an increasing severity of parasite infestation, resulting in a higher faecal egg count (Sherwin *et al.*, 2013). As more hens used the outdoor range, *Heterakis* faecal egg count decreased, confirming the advantages of encouraging increased range-use to decrease the density of faeces indoors, thereby lowering the risk of parasite contamination (Sherwin *et al.*, 2013).

There are several factors that may influence ranging behaviour, for example, light intensity, weather, and the presence of structures or cover (Gilani *et al.*, 2014). Controlled higher indoor light intensity has been shown to encourage birds to range outside, possibly due to reduced variation between indoor and outdoor light intensities (Gilani *et al.*, 2014). Increasing pop-hole sizes also has a positive effect, but the enlarged pop-holes can cause problems under wet conditions, allowing rain to worsen litter quality indoors and to create muddy areas outside the pop-holes, both of which increase the risk of disease (Gilani *et al.*, 2014). While natural cover, such as trees and bushes, provides shelter that appeals to the anti-predatory instincts of poultry, such vegetation grows slowly and can act as perching for predatory birds (Rault *et al.*, 2013). Hence, introducing artificial structures on the range is a practical solution with fewer drawbacks (Singh & Cowieson, 2013).

Two recent studies have investigated the effectiveness of this possible solution by examining the influence of artificial structures on ranging behaviour. First, a study by Gilani *et al.* (2014), using 33

flocks of laying hens of different breeds and flock-sizes, observed a considerable increase in birds ranging at a greater distance from the shed where cover and artificial structures were present. However, more information is needed to establish a thorough understanding of the reasons the birds were attracted to these structures (Gilani *et al.*, 2014).

Second, Rault *et al.* (2013) examined in more detail the effects of vertical structures on a flock of 17,000 Hy-Line brown hens. The vertical structures were placed in three zones on an outdoor range, while control zones were set up without these structures, and video cameras were set up to observe density and behaviours of the hens at certain time intervals after an initial 10-day adaptation period (Rault *et al.*, 2013).

The results showed that significantly more hens were attracted to the zones containing the vertical structures in comparison to the control zones, and that the presence of structures encouraged hens to venture further from the shed (Rault *et al.*, 2013). Hens were seen pecking at the structures 40% of the time, suggesting that they may be attracted to the structures as a form of environmental enrichment (Rault *et al.*, 2013).

Additional research is needed to clarify whether the type of material used for the structures affects their success. Also, the findings revealed that birds were gathering at the structures at particular times, which may reflect other factors that are appealing to them, such as insects harboured near the structures during the evenings. The crowd of birds around the structures may also simply relocate the problem of high stocking density (Rault *et al.*, 2013), but further investigation into the factors that draw hens to the structures will elucidate these uncertainties.

## Conclusions

Resolving the issue of stocking density in free-range hens is a complex process, but artificial structures on the range could be a practical and economical solution to improve the welfare and productivity of egg layers by encouraging a more even distribution across the yard. This will help prevent conditions that are unfavourable to the wellbeing of poultry, and play a significant role in the continuing improvement of animal welfare in poultry farming.

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