New insights into the Impact of different Housing Systems on the Welfare of intensively reared Layer Hens

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Introduction

Welfare issues surrounding intensive farming of layer hens have long been a point of contention for producers and consumers of chicken eggs. These concerns centre mainly on whether the production advantages of conventional cage-based systems can justify the lack of environmental enrichment provided to layer hens. These issues came to a head with the 1999 announcement that conventional cages will be prohibited in the EU from 2012 (Sherwin *et al.*, 2010). In the past few years, European producers have been forced to move into new production models to ensure their survival. It has been the responsibility of the scientific community to determine which system is the most humane and to encourage farmers to adopt this model. This review will consider three recent studies that aim to evaluate the impact of conventional and alternative housing systems on layer-hen welfare.

Discussion

The Five Freedoms concept of animal welfare developed by the Farm Animal Welfare Council (1992) has been extensively used as a tool to measure and compare the welfare status of animals in captivity. The Five Freedoms are defined as freedom to express normal behaviour, freedom from pain, injury and disease, freedom from hunger and thirst, freedom from fear and distress, and freedom from discomfort (Shimmura *et al.*, 2010). In studies conducted by Shimmura *et al.* and Sherwin *et al.* in 2010, this model was used objectively to compare welfare of hens in a range of commercially used housing options. It was also used by Shimmura *et al.* (2011) to assess the effectiveness of potential welfare grading systems that may be adopted to provide consumers with a means of differentiating between production systems at point-of-sale.

In 2010, Shimmura *et al.* used the Five Freedoms principle to compare small and large furnished and conventional cages, barn and free-range systems over an 18-month period. Each "freedom" was examined using parameters developed by the 2007 LayWel project, producing results as weighted scores that could be used to directly compare individual farms or production systems (Blokhuis *et al.*, 2007). The results of the Shimmura *et al.* (2010) study suggested that while all production systems scored equally on freedom from hunger and thirst due to *ad libitum* provision of food and water, there were significant differences for the other parameters. It found that non-cage systems provided better welfare in terms of natural behaviours and freedom from fear and distress, but that thess were balanced by high levels of mortality and injury. This was to be expected as mortality rates are usually relatively high for hens kept in large groups because of cannibalism (Blokhuis *et al.*, 2007). Conversely, cage-based systems scored lower for freedom to express natural behaviour and freedom from fear and distress but higher for freedom from pain, injury and disease. Perhaps the most significant finding of this paper was that of the caged systems: birds kept in small furnished cages displayed the greatest behavioural diversity and had low stress levels analogous to free-range birds.

A study by Sherwin *et al.* (2010) used similar parameters to evaluate welfare issues in four different housing systems. In contrast to Shimmura *et al.* (2010), who examined birds in a single location over a single period, Sherwin *et al.* observed three times hens kept in established commercial farms over a laying period. The housing systems examined in this study were conventional cages, barns, free-range and furnished cages. Unlike the Shimmura *et al.* study, Sherwin *et al.* did not use the LayWel system to provide a standardised means of comparing housing systems. Regardless of this, the conclusions drawn were comparable to those determined by Shimmura *et al.* Again, one of the most significant findings was that the welfare of birds in furnished cages appeared to be significantly better across most measured

parameters. While the authors proposed that these results may have been due to the relative novelty of the furnished-cage system, the correspondence of these results with those from the Shimmura *et al.* study suggests that they are significant. In addition, it was noted that hens kept in barn systems had lower scores for most welfare indicators, suggesting that this may be the least welfare-friendly housing system. A highly significant finding of this study was that results indicative of stress were obtained from all the housing systems, suggesting that modern production demands may be more than the average layer hen can cope with.

The 2011 study by Shimmura *et al.* aimed to translate data from animal-based assessments such as those described previously, to a grading score that could be displayed on packaging at point-of-sale. It looked at two commercially used assessment methods: the Animal Needs Index (ANI) – a primarily environment-based grading system – and FOWEL (short for FOwl WELfare) – a computerised model using scientific literature to provide weighting to different parameters and produce an overall welfare score (De Mol *et al.*, 2006). It compared these to animal-based observations as well as a novel scientific model similar to FOWEL. The results indicated that both the science-based models evaluated overall animal welfare more accurately than the ANI system, which put undue emphasis on space and so was not sensitive with cage-based systems. The two science-based modelling methods were also assessed to be more effective long-term than the ANI system, as they can be easily altered to take into account new data. Overall, this study determined that there is potential for a grading system that would allow consumers to base their purchasing decisions on scientific evidence to be developed.

Conclusion

These recent studies reveal some differences in welfare parameters between alternative housing systems for layer hens. The Shimmura *et al.* (2010) and Sherwin *et al.* (2010) studies seem to agree that furnished cages have significant advantages over conventional cages and may also be preferable to non-cage systems. Eventually, the success of any production system will come down to consumer preferences and the Shimmura *et al.* (2011) study provides some indication that an accurate grading system for point-of-sale packaging to provide clear information to consumers is potentially feasible.

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