

Housing conditions effect broiler welfare more than stocking density

A large-scale study in Europe on broiler welfare showed that stocking density did not significantly affect bird behaviour. Birds showed no evidence of trying to avoid each other at any stocking density; environmental conditions proved to be more important.

By Wiebe van der Sluis

For many years animal welfare groups have expressed their dislike for the ways in which broilers being kept and grown to slaughter weight. Mass production has attracted accusations of poor welfare and forced the European Union to adopt production standards for broilers aimed at preventing overcrowding by limiting the maximum stocking density. Research conducted by a team of researchers of the University of Oxford, UK, now doubt the role of stocking density on welfare, because evidence from a large-scale study has proven to be contradictory.

Professor Mary Stamp Dawkins, who lead the research team, explained at an Aviagen broiler meeting in Edinburgh that they came to that conclusion after examining the effects of stocking density on the welfare of broiler chickens kept in a wide range of commercial husbandry systems. The large-scale study (2.7 million broilers) was carried out on commercial farms – 94 different houses - belonging to



The way birds use the available space reveals that they like crowding and are not socially averse to their house mates.

eleven major broiler producers in the UK and Denmark. These producer companies stocked their birds to five different final densities (30, 34, 38, 42 and 46 kg/m²) without changing their original production practices. The stocking densities were analysed under normal commercial conditions during the summer and winter, at which time the temperature, humidity, litter and air quality were recorded. Welfare was assessed through mortality, physiology, behaviour and health, with an emphasis on leg health and walking ability (Table 1).

Differences among companies

The results gathered by the Oxford researchers were an eye-opener. They found that the effect of stocking density was overshadowed by much larger differences among companies. Chickens grew more slowly at the highest stocking densities and jostled each other more, and fewer of them showed the best gaits. However more obvious measures of bird welfare such as the numbers of birds dying, being culled as unfit and showing leg defects, showed no correlation to stocking density (Figure 1). There were, however, substantial differences among companies in al-

most all other measures examined, with the exception of the bird's breed. At no point was the origin of the bird a significant factor, which lead to the conclusion that the differences found are predominantly related to the environmental conditions the birds were exposed to.

Some companies were more successful than others at maintaining birds at higher densities. The reasons why can be found in the fact that much of the variation in broiler health and welfare was associated with the percentage of time a company was able to maintain houses within the recommended temperature and relative humidity limits. They were able to maintain litter quality and air ammonia levels at a desirable level. Prof. Dawkins explained that 56% of the variation in litter moisture could be explained by effects such as heater position in the house and the number of drinkers per 1000 birds, and 73.3% of the variation in air ammonia is related to effects such as season and ventilation type.

The importance of humidity

Litter moisture and ammonia however have a strong link with bird health. Higher levels of both were correlated

EU broiler welfare rules

In early June the European Commission proposed a maximum of 30kg live weight per square meter floor space to provide welfare to broilers during their relatively short life. If sufficient welfare measures are taken by following good husbandry practices the member states can allow individual farmers to produce at a higher density with a maximum of 38 kg per square meter. Criteria for good husbandry practices will be set and mainly controlled by the processing company on the basis of lesion scores.

Table 1 - Scoring of gait, hockburn, pad dermatitis and leg deviations

Leg health measure	Score 0	Score 1	Score 2
Gait	Bird walks with ease, has regular and even strides and is well balanced	Bird walks with irregular and uneven strides and appears unbalanced	Bird is reluctant to move and is unable to walk many strides before sitting down
Hockburn*	No discolouration or lesions	<10% hock with lesions	>10% hock with lesion
Pad dermatitis**	No lesions	<5mm lesion on pad	>5 mm lesion on pad
Angle: in	Legs straight	Inward bow at intertarsal joint so that two legs meet >22°	
Angle: out	Legs straight	Outward twist at intertarsal joint with ≥30° between the legs	
Rotation	Legs straight, pads facing away from handler	Rotation of the tibia shaft so that the pads face each other > 15°	

* Pink hocks were also recorded
 ** Pervasively dirty pads also scored

with more dirty pads, more legs scored as angle-out and fewer birds with unblemished hocks. In addition, birds had more hock lesions with wetter litter. High concentrations of ammonia were unexpectedly associated with lower mortality, but both litter moisture and air ammonia increased the excretion of the stress hormone corticosteroid. Some 84% of the variation in faecal corticosteroid is related to the house temperature in week 1, humidity in week 5, season and ventilation type. The corticosteroid concentration also proved to be correlated with mortality, which suggests that stress on birds and their risk of dying depend on the extent to which companies can control the house environment.

The key house variables that affect bird welfare, according to Prof. Dawkins, were temperature and humidity. She found that early control of environment was an important factor in later life. Relative humidity in week one affected leg health in week 5 and if temperature and humidity were outside the recommended range during weeks one and five birds showed a dramatic increase in bad gaits. Mortality increased when temperature and humidity

were outside the range in weeks three and five.

Seasonal effects

Differences between summer and winter confirm the importance of house environment. Both mortality and corticosteroid concentrations were lower in summer than in winter. Foot pad conditions were correspondingly better with more birds scoring pad 0 in summer (88.9%) than in winter (71.6%) and fewer birds having pervasively dirty pads (8.8% in summer versus 30.3% in winter).

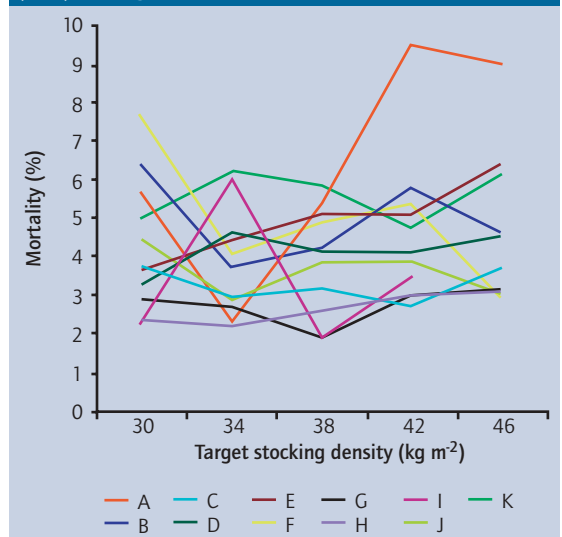
Although house environment is crucial to bird welfare, Prof. Dawkins and her team emphasise that stocking density is also important. At the two highest target stocking densities (42 and 46 kg/m²) there were fewer birds with the best gait score. Culling rates were not higher, which suggests that at least some aspects of leg health are compromised at or above a stocking density of 42 kg/m².

From these results the Oxford researcher concluded that, although very high stocking densities do affect bird welfare, stocking density *per se* is, within limits, less important than other factors

Chickens are sociable birds

The Oxford study also looked at the natural behaviour of broiler chickens at various stocking densities. They stated the industry opinion that chickens are not socially averse. Chickens are attracted rather than averse to each other and are therefore more likely to consistently group together rather than spread out randomly. Stocking density did not affect the tendency to group together, and there was no evidence of birds attempting to avoid each other, even at the highest stocking densities.

Figure 1 - Total mortality in relation to stocking density measured separately for each company (A-K) taking part in the trial



in the birds' environment. These environment factors differ per house and per company. It proves that good stockmanship counts, even in highly automated facilities. They therefore suggest that any legislation to limit stocking density that does not consider the environment that the birds experience could have major economical repercussions without the hoped-for improvements in animal welfare. These will come, according to Prof. Dawkins, from improving the environment, nutrition and genetics. ■