Environmental enrichment and its applications in broiler welfare

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Introduction

Numerous welfare issues are associated with broiler chickens raised under commercial conditions. Genetic selection has improved the growth rate of chickens but also, as a result, increased the occurrence of leg abnormalities (Pollock, 2001). High-density systems, while increasing productivity, have increased disease and behavioural abnormalities. Environmental enrichment can alleviate some of these welfare concerns.

Discussion

Arnould and Faure (2003) conducted a study raising chickens at two different stocking densities. Two 45m2 areas were used to raise chickens at a density of 2 chickens/m2. The two groups displayed no significant difference in behaviour or growth, the two areas were declared experimentally identical. Chickens were again raised in these two areas, half at a higher density; 15 chickens/m2. Behaviour and position were monitored over their growth period and on completion the birds were physically assessed.

The behaviour of the two groups of birds was revealed to be significantly different. The birds raised at the lower density did not spend longer standing or moving than the higher density birds but they tended to rest in close proximity to the feeders and drinkers. The birds at higher density spent most of their time lying away from feeders and drinkers (Arnould and Faure 2003). Under both conditions the chickens created localized areas of high density.

Physical examination showed that both groups had similar incidence of structural leg abnormalities. However, higher density birds had higher levels of footpad dermatitis (Arnould and Faure 2003). No more than 1.5% and 11% of all chickens had varus and valgus deformities, respectively. These are deformities that are typically caused by tibial dyschondroplasia, osteochondrosis and crooked toes (Orth 1999).

This study was not conclusive for a number of reasons. With a total of only 762 birds the experiment did not reflect large-scale commercial conditions. In commercial situations various, higher stocking densities are used and the results may have differed had these been tested.

Animal welfare issues arise from the physical and behavioural findings of this experiment. Chickens with leg abnormalities limp, and hesitate in moving. Protection of an injury may be interpreted as discomfort, hence a compromise of that animal's welfare (Grandin and Deesing 2002). Chickens raised at both densities possessed leg deformities and decreasing chicken density did not bring about an improvement. High densities, in addition to exacerbating transmissible diseases may induce behavioural abnormalities, including cannibalism and skin scratching (Arnould and Faure 2003). Lowered stocking rate did not eliminate localized high-density areas in which similar behaviour may arise.

The aim of a second study by Arnould et al (2004) was to determine if environmental enrichment could stimulate greater activity. It was hoped through this means a decrease in leg abnormalities could be achieved. Environmental enrichment also had the potential to create an even distribution of birds on the shed floor, minimizing problems associated with localized overcrowding.

A total of 480 broiler chickens were placed in 12 experimental pens. In 6 pens, sand trays were installed and string hung just within reach (Figure 1). Mortality, the position of the chickens and general behaviour was recorded regularly. Upon slaughter the weights, tarsal angulations and bone compositions of the control and experimental groups were compared.

The study confirmed that the sand trays attracted chickens, lowering the local density near food and water sources (Arnould et al 2004). In the sand area there were significantly more chickens scratching and pecking at the floor than in the corresponding area of the control. However, there were no significant behavioural changes associated with the presence of the string. Only at 2-3 days of age was there an increase in locomotor activity in the enriched environment, hence, there was no significant decrease in leg abnormalities when compared to the control.

This study also had limitations: the number of chickens used was relatively small (480) and a variation in light intensity across the pens added an additional variable unrelated to the hypothesis tested.

This study generated evidence that appropriate environmental enrichment may assist animal welfare (Arnould et al 2004). Environmental enrichment was able to stimulate increased locomotion at the 2-3 day stage. Since other studies have demonstrated locomotion above 400m/day can decrease leg abnormalities (Arnould et al 2004), further enrichment may create increased locomotion for a longer period of time and may significantly alleviate anatomical abnormalities. Also environmental enrichment was successful in lowering local densities of poultry. Thus in situations where cannibalism and disease transfer are prevalent, this technique may be beneficial (Arnould et al 2004).

An article by Jones et al (2004) looks at several studies aimed at reducing feather pecking. Experiments examined include; studies where a variety of forms of environmental enrichment were tested, studies in which birds with trimmed tail feathers were introduced to an enriched pen and studies in which birds with untrimmed beaks were allowed access to string. In all cases the incidence of feather pecking was recorded.

The environmental enrichment studies provided strong evidence that string was a cheap and effective stimulant: the birds teased the fibres apart with a preening action (Jones et al 2004). In studies that further explored the use of string as an environmental enrichment, a reduction in feather pecking was observed when compared to control groups. This was despite trimming tail feathers and avoiding debeaking - usually factors that increase feather pecking (Jones et al 2004).

Care must be taken interpreting the results, as Jones et al did not conduct the experiments themselves. As a consequence little of the experimental design has been detailed and hence, without consulting the original works, the validity of the conclusions is questionable. However, this paper does provide evidence that feather pecking can be reduced with appropriate environmental stimulus. Reducing feather pecking has positive animal welfare implications for typical broiler systems.

Conclusion

There are currently a number of welfare problems associated with broiler production; these include captivity induced leg abnormalities, disease and cannibalism. There is currently experimental evidence that reducing stocking density alone will not relieve these problems. However environmental enrichment has been shown to be successful in a number of cases.

References

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