Alternative Solutions to Beak trimming in Layer Hens to Reduce Feather pecking and Improve Welfare

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Introduction

Feather pecking (FP) is one of the most significant welfare and economic problems in the egg production industry (Wysocki *et al*., 2010). For many years the solution to this problem has been beak trimming, which typically involves removing approximately 30% of the upper and lower mandibles with an electrically heated blade (Dennis & Cheng, 2010). However, this practice is now under scrutiny due to growing concerns for animal welfare. The procedure causes acute pain and distress in the bird and there is also evidence to suggest chronic pain due to the formation of neuromas (Cheng, 2006). Furthermore, removing part of the beak mechanically impairs the birds' ability to express natural behaviours such as foraging. Therefore, it is reasonable to suggest that the practice of beak trimming is simply substituting one welfare issue with another. This essay endeavours to explore the reasons behind FP in layer hens and how these may underpin the potential of alternative solutions to this problem.

Discussion

The reasons for FP in layer hens are multifactorial (Petek & McKinstry, 2010; Wysocki *et al*., 2010). The behaviour is generally thought to be a form of redirected foraging behaviour, but it is also recognised that fearful birds have a greater tendency to develop FP behaviour (Kjaer & Guemene, 2009). While it is firmly established that genetic selection may reduce the incidence of FP in layer hens (Rodenburg *et al*., 2010; Wysocki *et al*., 2010), the impact that this selection may have on fear responses and foraging behaviour has remained largely unknown (de Haas *et al*., 2010).

The first study to be addressed in this essay explored the relationships between each of these factors in order to establish a clearer understanding of the mechanisms underlying FP. This was accomplished by de Haas *et al*. (2010) by examining the behaviour of 16 birds from a High Feather Pecking (HFP) line and 16 birds from a Low Feather Pecking (LFP) line inside a plus-maze. In the novel maze-test, HFP birds had a significantly shorter latency to vocalise and walked a significantly longer distance than LFP birds. In the forage test, both lines had a preference for worms compared to grass, feathers or regular food pellets. Nevertheless, HFP birds ate worms significantly faster and also tended to have more worm-eating bouts relative to LFP birds. The results of this study indicated that HFP birds responded more proactively to fear-eliciting situations (de Haas *et al*., 2010). This suggests that rather than a preference for consuming feathers, HFP have a stronger pecking motivation than LFP birds (de Haas *et al*., 2010).

Therefore, it stands to reason that by reducing pecking motivation there will be a reduced incidence of FP. One way of achieving this is discussed in an article by Matauschek *et al*. (2010), in which the effect of taste aversion learning to eliminate FP in layer hens was investigated. In this experiment 60 birds from LFP lines and 60 birds from HFP lines were each randomly allocated to control or treatment groups. Birds in the treatment group had their feathers coated in quinine, a bitter tasting substance. Behavioural observations were then recorded during the "rearing period", the "early laying period", and the "laying period". It was found that there was an overall reduction in severe FP behaviour in both the "rearing period" and significantly so in the "early laying period". However, during the "laying period", when birds in the quinine treatment group were no longer treated with quinine, FP occurred at significantly higher levels compared with the "early laying period".

The implication of this study for animal welfare is that coating feathers in quinine offers a less invasive solution to control FP, provided that the chemical is always detectable on the feathers (Matauschek *et al*., 2010). However, this means that quinine would need to be re-

applied at least every 2 weeks in order to maintain effective control of FP (Matauschek *et al*., 2010). This is impractical and expensive in the commercial situation, so the development of a more durable formulation may be necessary, or the implementation of automated spraying systems (Matauschek *et al*., 2010).

This study used positive punishment as a learning mechanism for preventing FP. Due to the potential for habituation, future research could investigate an alternative method using negative punishment as a learning technique.

Another method of reducing pecking motivation may be to provide enrichment. It is widely accepted in the literature that enrichment reduces FP (Petek & McKinstry, 2010; McAdie *et al*., 2005; Steenfeldt *et al*., 2007). A recent paper by Dixon *et al*. (2010) investigated what constituted the best form of enrichment to reduce FP. To determine this, a group of birds was rotated through each of four treatments: forages, novel objects, dust baths, and no enrichment. The degree of FP behaviour and the number of pecks to the enrichments were recorded.

The results illustrated that providing forage reduced the incidence of FP significantly more than any other treatment. FP levels were statistically similar between dust bathing and novel objects, but they were still significantly lower compared to the non-enrichment treatment. The implication of this research is that providing forage may be the best form of enrichment to reduce the incidence of FP. Furthermore, past studies have demonstrated that forage also improves nutrition and egg production (Steenfeldt *et al*., 2007). From a production perspective, this is a positive relationship. This further highlights the importance of providing birds with forage substrates. Future research should focus on developing an economic and user-friendly substrate that is still effective in reducing FP (Dixon *et al*., 2010).

Conclusion

In conclusion, the causes of FP are multifactorial in nature, which suggests that the solutions may also be multifactorial. From the evidence presented in this essay, an approach that integrates genetic selection and environmental modification to reduce FP motivation is likely to be the best way to improve welfare and the best alternative to beak trimming.

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