

Welfare of Broiler Breeders

Discusses ways of improving and measuring the welfare of frustratingly hungry broiler breeders.

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Word count: 979

Introduction

The selection of broiler breeders for increased growth rate has resulted in increased appetite (Siegel & Wiseman, 1966). Consequently, *ad libitum* feeding of broiler breeder flocks causes obesity, which must be controlled in order to maintain reproductive and general health (Mench, 2002). To counteract this problem, broiler breeders are reared with substantial feed restrictions (Robinson *et al.*, 1993). Although restricted feeding improves welfare by preventing obesity and its health-related issues, studies have shown that feed restriction results in increased abnormal oral behaviours, such as stereotypic pecking at non-food objects (FAWC, 1998). Studies on feeding motivation in broiler breeders has also concluded that, due to their enormous appetites, they will also be hungry for considerable periods (FAWC, 1998). Recent studies examine how effective alternative diets can measure hunger indirectly to reduce it and to find tests that can be performed to better measure hunger.

Discussion

Symptoms of chronic hunger are thought to be associated with behaviours indicative of frustration, such as pecking at non-food objects, increased general activity and aggression, excessive drinking and increased feather-pecking (Savory & Maros, 1992; Duncan & Wood-Gush, 1971; Shea *et al.*, 1990). While previous studies have shown that diets most effective for alleviating chronic hunger and its associated behaviours have a high fibre component and an appetite suppressant (calcium propionate, CaP) (Sandilands *et al.*, 2005; Sandilands *et al.*, 2006), Morrissey *et al.* (2014a) studied this area further and showed that a feed-grade appetite suppressant and skip-a-day (SAD) feeding regimes maintained the best feather condition. Morrissey *et al.* (2014a) used feather condition, which reflects feather pecking, in their study as an indirect parameter to measure hunger. Although feather pecking is a complex behaviour affected by internal motivations and external factors, it may be considered as stereotypical behaviour associated with chronic hunger and frustrated feeding/foraging motivation (Dixon, 2008; Van Krimpen *et al.*, 2005).

Morrissey *et al.* (2014a) examined the relationship between diet and feather-pecking by separating groups of 9-12 birds into 6 separate pens – each with 5 replicate pens – and giving each group a certain dietary treatment. Dietary treatments consisted of a commercial control diet (C), a diet containing soybean hulls (a dietary diluent) and feed-grade purity of calcium propionate (F), or a purified form of calcium propionate (P). These diets were given either daily or on a SAD basis. Birds were then regularly checked over a 26-week period and given a feather-condition score.

Re-written paragraph:

Morrissey *et al.* (2014a) studied the relationship between diet and feather-pecking by dividing 342 birds into 6 groups, which were each given a different combination of diet and feeding regimen. There were three different diets prepared; a commercial control diet (C), a diet containing soybean hulls (a dietary diluent) and feed-grade purity of calcium propionate (F), or a purified form of calcium propionate (P). The 3 different diets were dispensed in two feeding regimes; either daily or on a SAD basis, meaning there was a total of 6 different treatments to be tested. These birds were then regularly checked approximately every 6 weeks and given a feather-condition score.

From the study, it was clear that diets containing soybean hulls and appetite suppressant (F and P) had positive effects on feather condition and also that the feed-grade appetite suppressant (F) diet resulted in better feather condition than that with the purified chemical. Thus, the (F) diet was most effective in improving feather condition, reducing hunger and improving satiety. Also, SAD-fed birds had a delayed decrease in feather condition over time compared to birds fed daily. This suggests that the birds may have been receiving enough feed every other day to satisfy their hunger, which may be better for their welfare than never feeling full on a daily-fed schedule.

Morrissey *et al.* (2014b) also completed the same study with the same birds and dietary treatments but measured levels of hunger by examining behaviour. Bird behaviour was examined by security cameras, and

observed for 90 minutes after the end of the feeding bout (after half the birds had left the feeder after feeding began). SAD-fed birds that were examined on non-feeding days were observed at the same time as the daily-fed birds. The study revealed that F and P diets reduced behavioural symptoms of hunger, indicated by increased time resting, decreased time feather/object-pecking and aggression. Although not all stereotypic behaviours stopped, results suggested that the addition of soybean hulls and CaP to the diet might moderately improve welfare. The effects of feeding frequency are less clear. Behaviour indicating satiety or reduced hunger increased in SAD-fed birds but behaviours indicating hunger and feeding frustration also increased in SAD-fed birds.

The limitations of both of Morrissey *et al.*'s studies (2014a; 2014b) include the fact that hunger was measured indirectly and so can give conflicting results, as shown in the study above. Incidentally, research by Dixon *et al.* (2014) investigated a way to measure hunger more directly by measuring the willingness of broiler breeders to undertake appetitive behaviour (e.g., foraging) even though there was no guarantee of obtaining food. A total of 60 birds were divided into 3 groups of 20, housed in groups of 3 with the remaining pair housed together. Each group was allocated to one of three dietary treatments: a diet with quantitative commercial feed restriction (R), a diet with twice that amount (2R), and a diet with 3 times that amount (3R). The testing apparatus consisted of two wooden platforms with a runway between them across water (which hens find aversive). The water level was raised progressively to assess the "cost" birds are willing to pay to forage in wood shavings at the terminal platform. Results showed that R-fed birds accessed the wood shavings at a higher cost (i.e., a higher level of water), and spent a greater proportion of their time foraging there than 2R- and 3R-fed birds. The R-fed birds also took less time to reach the terminal platform, although this could just be the hens rushing through the aversive challenge. This simple test, which exploits foraging motivation, could be applied to test alternative dietary treatments and to more accurately test their effectiveness at reducing hunger.

Conclusion

Recent studies have shown that alternative diets can moderately improve animal welfare by reducing hunger. The effect of such diets could be measured using tests that measure hunger more accurately than previously, such as those reported by Dixon *et al.* (2014), which exploit foraging motivation. Further research into even more accurate indices of hunger is required to further understand hunger mechanisms and optimise broiler breeder flock welfare in the future.

References

- Dixon, L.M. 2008. Feather pecking behavior and associated welfare issues in laying hens, *Avian Biology Research*, 1:2, 73-87.
- Dixon, L.M., Brocklehurst, S., Sandilands, V., Bateson, M., Tolkamp, B.J., D'eath, R.B. 2014. Measuring Motivation for Appetitive Behaviour: Food-Restricted Broiler Breeder Chickens Cross a Water Barrier to Forage in an Area of Wood Shavings without Food. *PLoS One*, 9:1.
- Duncan, I.J.H., Wood-Gush, D.G.M. 1971. Frustration and aggression in the domestic fowl. *Animal Behavior*, 19:3, 500-504.
- Farm and Animal Welfare Committee (FAWC) 1998. FAWC report on the welfare of broiler breeders, Department for Environment, Food and Rural Affairs, UK. Viewed 13 March 2015, <<https://www.gov.uk/government/publications/fawc-report-on-the-welfare-of-broiler-breeders>>.
- Mench, J.A. 2002. Broiler breeders: feed restriction and welfare. *World's Poultry Science Journal*, 58:1, 23-29.
- Morrissey, K.L.H., Widowski, T., Leeson, S., Sandilands, V., Arnone, A., Torrey, S. 2014a. The effect of dietary alterations during rearing on feather condition in broiler breeder females. *Poultry Science*, 93:7, 1636-1643.
- Morrissey, K.L.H., Widowski, T., Leeson, S., Sandilands, V., Arnone, A., Torrey, S. 2014b. The effect of dietary alterations during rearing on growth, productivity and behavior in broiler breeder females. *Poultry Science*, 93:2, 285-295.
- Robinson, F.E., Wilson, J.L., Yu, M.W., Fassenko, G.M., Hardin, R.T. 1993. The relationship between body weight and reproductive efficiency in meat-type chickens. *Poultry Science*, 72:5, 912-922.

Sandilands, V., Tolkamp, B.J., Kyriazakis, I. 2005. Behavior of food restricted broilers during rearing and lay – effects of an alternative feeding method. *Physiology and Behavior*, 85:2, 115-123.

Sandilands, V., Tolkamp, B.J., Savory, C.J., Kyriazakis, I. 2006. Behaviour and welfare of broiler breeders fed qualitatively restricted diets during rearing: Are there viable alternatives to quantitative restriction. *Applied Animal Behavior Science*, 96:1, 53-67.

Savory, J.C., Maros, K. 1992. Influence of degree of food restriction, age and time of day on behavior of broiler breeder chickens. *Behavioral Processes*, 29:3, 179-189.

Shea, M.M., Mench, J.A., Thomas, O.P. 1990. The effect of dietary Tryptophan on aggressive behavior in developing and mature broiler breeder males. *Poultry Science*, 60:10, 1664-1669.

Siegel, P.B., Wisman, E.L. 1966. Selection for Body Weight at Eight Weeks of Age: 6. Changes in Appetite and Feed Utilization. *Poultry Science*, 45:6, 1391-1397.

Van Krimpen, M.M., Kwakkel, R.P., Reuvekamp, B.F.J., Van Der Peet-Schwering, C.M.C., Den Hartog, L.A., Verstegen, M.W.A. 2005. Impact of feeding management on feather pecking in laying hens. *World's Poultry Science Journal*, 61:4, 663-686.