

# Interaction between the immune system and food choice in cockerels

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There is increasing evidence that birds can associate foods with negative post-ingestive consequences and later exhibit conditioned responses to those foods. This has been clearly illustrated when LiCl, an aversive substance when associated with a normally acceptable food, will cause later rejection of that food (Hale and Green, 1988). Classical aversion responses have been shown for a number of substances and it has been suggested that associations may also occur between negative immune system changes and foods. Such suggestions are largely anecdotal and a preliminary experiment was designed to examine if a negative association, as reflected in rejection of a feed, could be demonstrated between immune suppression and a novel food.

Forty **Isa-Brown** cockerel birds (6-8 weeks old) reared together on a wheat-based crumble diet were randomly allocated to 8 large cages in groups of 5. Half of the birds (4 cages) were treated as controls and the other half were allocated to an immune suppression treatment (25mg of Cyclosporin-A). During this treatment the diet of all birds was changed to a **maize-based** food (*ad libitum*) for a period of 2 days. The birds were then returned to the wheat diet for 4 days before being offered maize for another 2 d. During this period of maize feeding, the birds were dosed with either **LiCl** or **NaCl** (40mg–20mg/ml) with the treatments balanced across the previous immune suppression treatments. Subsequently the birds were again fed the wheat-based diet for 7 d. On the 8th day after **LiCl** treatments all groups of birds were offered a choice of maize- or wheat-based food for a period of 24 h.

Wattle thickness was measured on one group of birds from each of the control (C) and suppressed (C-A) groups at the beginning and end of the cyclosporine treatment. These tests involved the injection of 20µg of phythemagglutinin (**phA**) mitogen into the left wattle of each bird-the right wattle was injected with saline. Wattle **thickness** was measured before and 24 h after the food change/immune suppression treatment.

There were no significant treatment effects on growth rate or final weight of the birds; however the increase in wattle thickness in response to the **phA** was reduced by the cyclosporine ( $P<0.01$ ) indicating suppression in immune responsiveness.

Group food intakes during the one day choice test were markedly lower for the maize compared to the wheat (42.0 vs 297g). The intake of maize by the immune suppressed birds was much lower than the controls (10.2 vs 73.3 g/bird,  $P<0.08$ ) and the ratio of maize to wheat intake was markedly lower in the immune suppressed group (0.02 vs 0.36,  $P<0.06$ ).

There was no significant interaction between the immune suppression and **LiCl** treatments; however there was also a significantly lower intake of maize by the **LiCl** treated birds (18.0 vs 65.5g/bird) with a maize to wheat ratio of 0.07 vs 0.32 ( $P<0.09$ ) for **LiCl** and **NaCl** treated birds, respectively.

These data support the contention that birds can associate immune suppression with a novel food and exhibit a conditioned aversion when the birds are re-exposed to the food 10 days **after** immune suppression. The extent of this aversion seems to be similar to that induced by **LiCl** but it is unclear whether the effects are mediated via similar mechanisms. Further studies are needed to elucidate the mechanisms linking feeding behaviour and immune function.

## Reference

- Hale, C. and Green, L. (1988). Effects of early ingestional experience on the acquisition of appropriate food selection by young chicks. *Animal Behaviour* 36, 211-224.