The development of the corticosterone stress response of kororā (little penguin, *Eudyptula minor*) chicks in response to frequent handling

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Abstract

In birds, when a stressor is encountered, the hypothalamo-pitiutary-adrenal (HPA) axis is activated to produce the corticosteroid, corticosterone. The production of this hormone incites a flight or fight response in order to best avoid long-term damage from the stressor. However, prolonged or repeated exposure to high levels of corticosterone can have damaging behavioural and physiological effects. For this reason, high levels of the hormone should be avoided where possible in developing chicks. Chicks of altricial species in particular, seldom hatch with a highly functioning HPA axis so as to avoid these detrimental effects while their parents are still protecting them from major stressors such as predators, adverse weather and low food availability. Previously, studies have mapped the development of the HPA axis in a range of species or studied the effects of stress from a young age on future behavioural or physiological responses. This current study aimed to not only describe any adverse effects observed as a result of increased encounters with stressors but also track the development of the HPA axis in kororā (little penguin, *Eudyptula minor*) chicks.

Kororā chicks from the Oamaru Blue Penguin Colony were selected from both available sites and grouped based on their age at the time of sampling, 2 weeks old, 4 weeks old and 6 weeks old and a further two groups were formed for chicks that were handled twice a week from 2 weeks of age until 4 weeks or 6 weeks at which point they were sampled. Blood sampling and handling and capture stress responses were done following a modified standard protocol of a blood sample at 0 mins, 15 mins and 30 mins at which point they were returned to their nest to avoid over or under heating depending on the age and weather. The chicks being exposed to frequent human interactions were weighed twice a week and also had their flipper length and beak width, length and depth measured to graph the growth rates and body condition indices which has never previously been done in penguin chicks. It was found that frequent interactions with people did not have a significant effect on the stress responses

when comparing previously handled chicks with unhandled chicks of the same age and that the previously handled chicks developed their adult-like stress response at a similar age to those that had not been previously handled. With regards to body condition indices and growth rates, this study showed that the parents leave the nest just after body condition indices drop to the low point in the chicks' development.

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