The time course of corticosterone responses in kororā (little penguin, *Eudyptula minor*)

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Abstract

When birds and other vertebrates perceive a situation to be threatening the hypothalamo-pituitary-adrenal (HPA) axis is activated and glucocorticoid hormones are secreted from the adrenal gland. Activation of the HPA axis in response to a stimulus perceived to be threatening is called a stress response. The main glucocorticoid hormone in birds is corticosterone. Corticosterone responses of birds are typically measured by the collection of an initial blood sample when a bird is captured or picked up, then the collection of further blood samples until 30 to 60 minutes has elapsed, at which time the bird is released. Whilst this standard sampling protocol provides information on the size of the corticosterone response, it does not provide any indication of how long it takes for corticosterone concentrations to return to initial values. The main objective of this thesis was to characterise the total duration of the corticosterone response of free-living kororā (little penguins, *Eudyptula minor*).

Little penguins at Oamaru were picked up from their nestboxes and initial blood samples collected. Birds were handled and then restrained by being placed in a box. Further blood samples were collected 15, 30 and 60 min after the birds were first picked up. Birds were then returned to their nest boxes and an additional blood sample collected 15, 30, 60, 120, 240, or 360 min later. Mean corticosterone concentrations declined to initial values two hours after birds were returned to nest boxes. The rates at which corticosterone concentrations increased when a stressor was present and then decreased when the stressor was no longer present were positively correlated. Seasonal changes in corticosterone responses in little penguins were also investigated in this study. Mean corticosterone responses were similar in winter and in the pre-laying period, whereas mean responses were lower in birds during early chick rearing. Corticosterone responses during the pre-laying

period were greater in male than female little penguins. The current study is the first to document the complete corticosterone responses of free-living penguins and provides information about changes of corticosterone concentrations after a stressor is removed from the free-living individuals. It is also the first to reveal that free-living penguins with relatively high corticosterone responses to a stressor had relatively high rates of corticosterone decline.

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