

# The hormonal and behavioural aspects of sex role reversal in Brown Kiwi (*Apteryx mantelli*)

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Many animal species are characterised by males that are more colourful, louder, and aggressive than their female counterparts. Few species however, present sex role reversal or reverse sexual dimorphism, where females instead take up the role of being the larger, louder and more aggressive sex. Sex role reversal and reverse sexual dimorphism have been studied in female mammals with hyenas a prime example of masculinised females. These studies show that there is a hormonal component to masculinisation, and that mothers pass on their dominance to their offspring with offspring of dominant mothers doing better. In contrast, bird studies are lagging.

In all five species of kiwi across Aotearoa New Zealand, females are significantly larger than males, with disproportionately larger bills. Rowi *Apteryx owenii* and North Island brown kiwi *Apteryx mantelli*, also show behavioural sex role reversal, with males taking over the traditional female role of sole incubator. Previous work by our team showed that prolactin, a hormone associated with parental behaviour, is higher in brown kiwi males than females, linking to incubation behaviour. No one has studied other behavioural differences between male and female kiwi and whether there is a hormonal environment that correlates with masculinisation. Camera trap videos of kiwi by our team show females engaging in intense dancing/chasing of males, a behaviour that is often expected in reverse. When taken together these observations suggest that kiwi is a great species to study female masculinisation.

Therefore, this project aims to study sex role and dimorphism reversal in brown kiwi by 1. Investigating plasma levels of hormones involved in masculinization; 2. Describing the behaviours of male and female brown kiwi during the breeding season; and 3. Measuring hormones in the egg yolk of unhatched eggs.

We will use already collected plasma samples from our previous hormone study to investigate the levels of the hormone androstenedione (a precursor of testosterone that has been linked to masculinisation in mammals and other bird species). We will carefully collect and analyse videos of 'intense sexual dances' to determine the role of males and females. As maternal androgens are transferred to egg yolks in other bird species, we will investigate androstenedione levels in unhatched eggs (sourced from Operation Nest Egg).

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Above: Male (left) and female (right) brown kiwi held by I. Castro showing the large sexual dimorphism in this species. Photo A. Witehira. Below: C. McLeod holding a female brown kiwi during her training. Photo by I. Castro.

