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**Coccidia of the endangered South Island
Takahē (*Porphyrio hochstetteri*):
Investigations of pathobiology and
management**

A thesis presented in partial fulfilment of the
requirements for the degree of

Masters of Veterinary Science

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This thesis is dedicated to my Mum and Dad, as always I owe you everything, and also to absent friends.

Abstract

The South Island Takahē (*Porphyrio hochstetteri*) is a large flightless rail, endemic to New Zealand currently listed as endangered with a population numbering approximately 340 individuals. The intensive management programme for this species has seen a modest increase in the population and includes strategies such as captive rearing for release at protected sites and numerous translocations of birds between these sites each year to maximise genetic diversity. This interconnectedness of geographically dispersed populations and critical points of high stocking density contribute to the potential for spread of infectious disease. Coccidian oocysts have been detected in Takahē faecal samples for decades and sporadically coccidia were implicated in the death of Takahē. By early 2015 concerns were being raised about markedly elevated individual faecal oocyst counts and the apparent failures of treatment with toltrazuril. The potential for significant negative impacts of coccidia in terms of both clinical disease and sub-clinical effects on juvenile growth rates and fertility led to the investigations reported in this thesis into the coccidia affecting Takahē.

A novel *Eimeria* sp. is described from a Takahē host. Based on morphological characteristics this coccidian species is distinct from other *Eimeria* spp. described in hosts of the family Rallidae. A survey of stored historical faecal samples and contemporary routine screening samples demonstrated the presence of this *Eimeria* sp. across most of the fragmented conservation management network for Takahē. Modification of treatment protocols and management actions was closely associated temporally with a sustained reduction in the *Eimeria* sp. shedding rates at a breeding facility central to the Takahē population network. Preliminary results were supportive of the existence of a diurnal shedding pattern for the *Eimeria* sp. with a peak of oocyst shedding in the late afternoon after 3pm in winter, which has implications for the collection of screening samples and the interpretation of results collected at different times of day. Concurrent to these investigations into the biology of the Takahē coccidia, trials were carried out to establish the safety of the anti-coccidial medication, decoquinate, in Takahē. No clinically significant deleterious effects were found in the parameters examined.

The findings presented are initial investigations into an *Eimeria* sp. from a Takahē host, the effectiveness of control measures implemented and safety of potential management options. The crisis of regular extreme oocyst counts in Takahē, which prompted this research, was resolved, however the potential for a recurrence is ever present in a species conservation programme that relies on intensive breeding and translocation of individuals. This research is the foundation for future research into the characterisation and management of *Eimeria* spp. in Takahē.

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Permitting and Animal Ethics requirements

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The coccidiostat safety trial described in Chapter 5 was also approved by the Massey University Animal Ethics committee (Protocol 15-72). The remaining work did not involve the manipulation of live animals and therefore did not require Massey University Animal Ethics approval.

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