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Nematodiasis and larval migrans in Kiwi (*Apteryx* spp.)



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Abstract

The aim of this thesis is to investigate the inter-relationships between host and parasite specificity and aberrant larval migration, using the kiwi family (*Apteryx spp*) and their nematodes as the study system. Kiwi are endemic to New Zealand, and have been estimated to have declined by 90% since human settlement in New Zealand. The effect of disease, mainly parasitism on kiwi populations have been a minor issue compared to predation, however with intensive conservation management the effect of parasites on kiwi are likely to increase. Very little is known about parasites in kiwi and how they impact the birds, especially the aberrant larval migrans syndromes.

I determined the prevalence of nematodes in all kiwi species from 1991-2012 (n=642) that were necropsied at Massey University, using the National Wildlife Pathology Database (Huia), with a specific focus on larval migrans. Brown kiwi (*Apteryx mantelli*) were found to have the highest prevalence of nematodiasis, and were also the only species to show evidence of neural larval migrans. Visceral larval migrans were found in brown, rowi (*A. rowi*) and little spotted kiwi (*A. owenii*). With the brown kiwi showing the highest incidence of larval migrans, I focused on this species for further investigation. It has previously been proposed that the larval migrans could be caused by nematodes from the *Toxocara spp*, since wild kiwi can share habitats with wild cats and dogs, which are the normal host of this nematode). However, with specific PCR analysis conducted on archived tissue, I concluded that neither *Toxocara cati* or *T. canis* was present in the tissues. I also investigated the cause of cutaneous larval migrans (CLM) in rowi. Uniquely, CLM has not been previously recorded in any avian host. A generic nematode PCR analysis followed by DNA sequencing were used in this study to identify the nematode involved in CLM as being closely related to a nematode from the *Trichostrongylus* species.

My results suggest that introduced animal hosts are having an indirect effect on our native bird populations, but to what extent is still unknown. The parasites transmitted between the introduced species and our native species are causing adverse effects to our native populations' health, in the case of larval migrans; but how often are these introduced parasites infecting our native population and could our native species cope with this competition? From my study it can be presumed that our native species are struggling to adapt to new parasites, and competition between introduced and native species could be contributing to the decline in our species.

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Preface

This thesis has been written and organised as self-contained chapters that will act as submissions to peer-reviewed scientific journals. Because of this, individual chapters will contain unavoidable repetition. This thesis is the original work of the author, unless stated otherwise in the references, methods and acknowledgments.

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