AGMARDT Agribusiness Innovation Grant A16027. Otago Innovation Ltd Disease Research Laboratory

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New Approaches to Control Parasites; Final Report.

For New Zealand to meet the Government's target of doubling agricultural exports by 2025, new technologies to control infectious diseases are needed.

Parasitic infections are the most important infectious disease in NZ ruminants. They are poorly understood and therapeutic control has changed little since the development of anthelminthic drenches 40 years ago. Diagnosis remains largely unchanged, relying on manually performed faecal egg and larval counts to estimated degree of worm burden.

The research aims of the current study were twofold.

1) Firstly when an animal is scouring or losing weight we wanted to be able to better diagnose why. To this end we have augmented our (existing) Johne's disease faecal test technology to concurrently detect endoparasite species commonly affecting red deer.

The goal has been to develop a composite diagnostic test for animals presenting with generalised, nonspecific clinical indicators of enteric disease such as scouring or progressive weight loss.

Distinguishing between Johne's and parasitic disease remains a continuing challenge in disease control and early differentiation will expedite informed and appropriately targeted treatment and management.

With this funding assistance from AgMardt and the key NZ Deer Farmers' Association Branches, we have developed rapid, quantitative and species-specific DNA tests for parasite eggs and larvae shed in the dung of affected hosts as an alternative to conventional faecal egg counts and as an adjunct to routine Johne's testing.

2) Secondly, we have begun to investigate the emergence of natural resistance or susceptibility to parasitic infection evident in naturally exposed livestock populations.

To this end we have utilised methods we developed to monitor ruminant (cervine) immune responses to Johne's disease to monitor immune responses to parasitic infection.

Improved diagnostics will allow us to differentiate between diseased, susceptible animals, and resilient/resistant animals with protective immunity for further study. These studies are exploratory and a logical prelude to future research to develop immunodiagnostics that identify diseased/susceptible animals for targeted anthelminthic treatment.

By contrast the identification of markers of immune protection/resilience will inform future vaccine development and support genetic selection of animals with superior resistance or resilience to parasites.

Parasitism ranks as the most costly type of infectious disease affecting NZ livestock, with losses >$700M pa.

Currently the strategy to control parasitic disease involves repeated drenching of young animals with anthelminthics using protocols that have changed little in 40 years. Repeat drenching is expensive,

produces chemical residues and results in the development of drug resistance, limiting long term utility.

In a world of ever increasing parasite resistance to chemical drenches, with consumer opinion signalling disapproval of resultant residues and with ever tighter margins on production systems, it is time to consider alternative approaches to the problem of parasitism. This work addresses key issues that could enhance the production of residue-free food products in an ever discriminating International marketplace.

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