Monitoring facial eczema in New Zealand over three years

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Introduction

Facial eczema (FE) is a harsh and challenging disease, with no cure, that affects pasture grazing ruminants and camelids in New Zealand. Despite being a problem for over 100 years, there has been no epidemiological study to determine the incidence and distribution of FE in NZ.

FE is associated with the ingestion of toxic spores from *Pseudopithomyces* species. The toxin, sporidesmin, causes liver damage which subsequently results in the build-up of chlorophyll byproducts in the bloodstream. Sub-clinical signs of the disease include weight loss, reduced growth rates, reduced milk production and poor reproductive performance. As the disease progresses, ruminants develop photosensitivity, and clinical signs include the appearance of severe sunburn.

Our study aims to provide a better understanding of the disease, its prevalence, distribution, and associated risk factors. Most importantly, it will provide a platform for a community of practice among farmers, providing opportunities to share experiences and input into the development of new management solutions. By generating knowledge and disseminating new knowledge, FE awareness will increase, farmers and veterinarians will be empowered with evidence-based insight to inform risk, and a baseline to measure the effectiveness of future interventions will be established.

Methods

Farmer recruitment and connection

After obtaining human ethics approval (AREC23_43), farmer volunteers were recruited through various communication channels. Consent was obtained from farmers, and initial farm and sheep information was documented. To facilitate sample collection, written protocols, videos, and a podcast were developed. Farmers were provided with sample kits containing return courier postage for convenient collection.

Once assessed by the B+LNZ Research team, participating farmers received their results. In case of unexpected findings (e.g. spores in areas not typically associated with FE), farmers were contacted directly by phone and advised to consult their local veterinarian. Participating farmers were also able to view all testing results via a bespoke online spatial viewer. Sampling reminders were sent to farmers via email and through an optional WhatsApp group. Additionally, a webinar explaining the study and results to date was delivered for farmers at the mid-point of the first FE season.

Sample size, collection, analysis and follow-up

Up to 350 farms from around NZ will collect samples from one mob of sheep approximately every two weeks from October to May. This will be carried out over three years. Farmer participants from these 350 farms will collect 10 individual fresh faecal samples from the ground and send them for laboratory analysis to Awanui Veterinary - pooled faecal FE spore count.

To better understand the relationship between faecal FE spore count and sub-clinical FE and confirming clinical FE, one-off further testing will be carried out (AEA2281). For sub-clinical FE on up to 70 randomly selected farms each year. This further testing will be activated when the faecal FE spore counts exceed 100,000 spores per gram in a pooled sample. The farmer's veterinarian will be contacted to collect paired blood and faecal samples from 10 animals of the same mob and a pasture sample from where the mob are currently grazing and send them to Awanui laboratories. Blood samples will be tested for Gamma-glutamyl Transferase (GGT), faeces will be tested for FE spore counts (both individually and pooled) and pasture will be tested for FE spores.

For clinical FE, veterinarians will visit up to 30 farms where clinical FE has been noted on the fortnightly submission form. Veterinarians will collect the same samples and the sub-clinical testing and verify clinical FE according to a proposed case definition.

Data collection

Each sample collected will include accompanying information on pasture type and height, altitude, aspect, GPS location, sheep age and breed, signs of clinical or sub-clinical FE. In addition, two surveys (beginning and end of the season) will be completed by each farmer. This will include information on stocking rate, preventative measures, and other farm pertinent information.

Data analysis

We will estimate the incidence of both clinical and sub-clinical facial eczema (FE) annually and over the three-year study period. This analysis will be stratified by island and region to illustrate variations in FE incidence across New Zealand. Additionally, we will use data from clinical and subclinical FE sampling to assess the correlation between faecal spore counts and GGT levels.

Furthermore, we will investigate the impact of FE preventative measures on faecal spore counts by comparing farms that implemented preventative measures to those that did not within the same geographical area. The aim is to analyse this data to help identify potential risk factors and ultimately management strategies.

Results to date

In the first FE season (2023/24), 202 farmers volunteered to participate in the study. This included 65 farms in the South Island and 137 in the North Island. Participating farmers provided feedback on sample collection protocols and the value of the WhatsApp group for generating connections and a sense of community.

No FE spores were detected on any property from October – December 2023. From January to April 2024, FE spores were detected in the North Island (Northland, Auckland, Bay of Plenty, Gisborne, Hawkes Bay, Taranaki, Manawatu-Whanganui, Wellington) and the South Island (Tasman, Marlborough, Nelson, Canterbury, Otago, Southland).

An online spatial viewer provided by B+LNZ using the software ArcOnline by Esri, allows study participants to view the FE risk in their region based on the spore count results from submitted samples. The results can be viewed at a regional level to protect the privacy of individuals.

Conclusion

Although this study is in its infancy, the first year of results is establishing a comprehensive data set on FE prevalence in New Zealand. Analysis of this data set will allow us to accurately map FE risk areas in NZ, deliver new methods of monitoring and prevention of FE and reduce animal suffering on New Zealand production animal farms. The level of farmer engagement has provided a good platform to increase farmer recruitment for years two and three. The farmer interaction and engagement has been positive, demonstrating the significance of FE for New Zealand farmers.