Predicting facial eczema (FE) risks in a changing New Zealand climate

How you can use this research:
This document can be used by government, industry, and rural professionals as it provides valuable information on the effects climate change and rising temperatures have on livestock and the risk of developing facial eczema. This document summarises the research by AgResearch for Our Land and Water and Deep South.

Facial Eczema on livestock is caused by the ingestion of spores of the fungus *Pithomyces chartarum*, usually found on decaying plant material. The symptoms of FE include inflammation, blistering, and skin crusting.

Effects of temperature increase on facial eczema

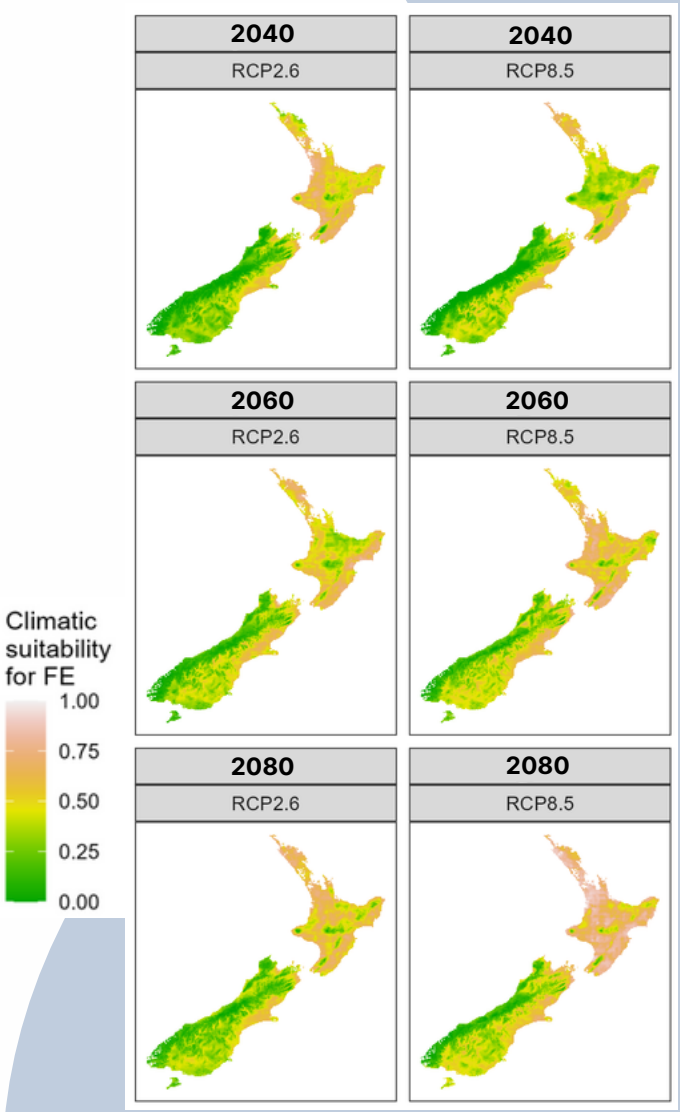
When looking at different future climate scenarios during 2030, 2040, 2050, and 2060 of RCP 2.6 and RCP 8.5:

- The West Coast is expected to have the least change in favourable FE conditions.
- Wellington region is projected to have the most change in favourable FE conditions.
- Auckland will be the region with the highest average favourable FE conditions, making them most susceptible to facial eczema.
- At a national level, under RCP2.6 climatic suitability remained roughly constant until around 2030. Whereas under RCP8.5, it continues to increase until around 2080.

Under RCP 8.5:

- Taranaki and the West Coast were estimated to have the least change in risk of FE.
- Under RCP8.5, more of the North Island becomes increasingly climatically suitable for FE, and by 2080 nearly all of the North Island becomes climatically suitable for FE.
- Most of Canterbury, Tasman, and Marlborough are climatically suitable for FE under RCP8.5.

Predicted climatic suitability for facial eczema in different locations



Predicted climatic suitability for facial eczema in 2040, 2060, and 2080 under RCP 2.6 (low emissions) and RCP 8.5 (high emissions)

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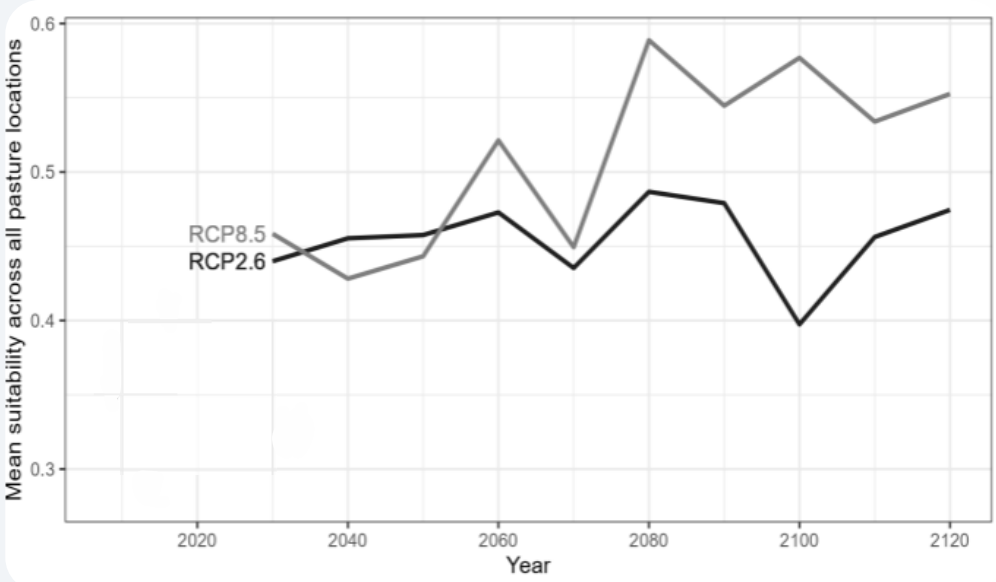
RCP

The Representative Concentration Pathways (RCPs) are example global greenhouse gas emissions pathways that are used to explore possible trajectories for global and regional climate and help us understand how climate change may impact things like temperature, sea level, and storms in New Zealand. In general, the higher the number, the more greenhouse gases would be emitted globally, and the more extreme the climate impacts.
To find out more information on RCP click here.

Average suitability for P. chartarum with climate change



Mean climate suitability for *Pseudopithomyce chartarum* sporulation for each decade from 2030 to 2120 using HADGEM2 predictions under emissions scenarios RCP 2.6 and RCP 8.5.

Facial eczema on livestock is expected to increase in some areas around New Zealand as the temperatures increases from the effects of climate change

The fungus responsible for facial eczema is usually present in the pasture, but its growth and toxin production are accelerated when warm temperatures and regular light rainfall occur together

Research Goals:

- To investigate the potential effect of climate change on facial eczema in New Zealand through developing a simple model of *P. chartarum*'s temperature and rainfall requirements for sporulation.
- Historical spore count data were used to help predict how the prevalence of high spore counts and its effect on facial eczema may change with climate change.
- To find more information from the research article by AgResearch on facial eczema, here.
- To find more information on the dataset and methodology from this research, visit the Land Use Opportunities Data Supermarket, here.

Cause of facial eczema:

- Facial eczema varies by year and region because of the link between spore production and weather conditions.
- FE is most significant in the North Island during late summer and autumn.
- Based on previously published data, the modelling assumed that FE risks were greatest when the temperature was in the range of 14-35°C and rainfall was in the range of 0.7-5mm per day.

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