

FACTSHEET

Adapting to a changing climate

Farmers are adapting to different climatic conditions and weather patterns all the time; it is the nature of farming. The future impacts of climate change are based on modelled predictions and extensive knowledge and understanding of the impact of climate and temperature on weather patterns. This modelling suggests more frequent and more prolonged adverse events such as drought, floods, and snowstorms.

What changes in weather patterns might we see in the future?

The Ministry for the Environment (MfE) and NIWA have produced a series of interactive maps based on international climate modelling that allow you to explore climate projections for variables such as temperature, rainfall and wind, under a number of different scenarios. A summarised version of some of the key trends for New Zealand farming systems is on the next page.

You can find a link to the maps and underlying data at beeflambnz.com/farmplan.

Models have been used to predict future temperature and rainfall values across New Zealand under the impact of climate change. Projected estimated temperature increases for New Zealand are 0.8°C by 2040 (range 0.2 – 1.7°C), 1.4°C by 2090 (range 0.1 – 4.6°C), and 1.6°C by 2110 (range 0.3 – 5.0°C).

Rainfall changes will show a significant seasonality and variability across the country with the following points:

- Increased rainfall in winter and spring for the west of the North and South Islands
- Increased winter rainfall in Otago and Southland
- Increased summer and autumn rainfall in the north of the North Island
- Extreme rainfall weather events are more likely, particularly on the West Coast
- Drier conditions in the east of the North and South Islands
- Drier summer conditions in the west and central North Island
- Increased dry days in the north and east of the North Island, in winter and spring
- Drought severity will increase in most areas, except Taranaki-Manawatu, West Coast and Southland
- Drought severity increases are most marked in already dry areas

Other changes include

- An increase in the number of hot days (over 25°C)
- Daily extreme winds will increase in eastern regions, particularly Canterbury and Marlborough
- The predicted warming is generally highest in summer and autumn and lowest in winter and spring.

Projected impacts of climate change on New Zealand farming systems



KEY



Risk of decrease in annual pasture production



Increase in annual pasture production but a change to the pattern of growth



Change in the pests and diseases that impact your farm



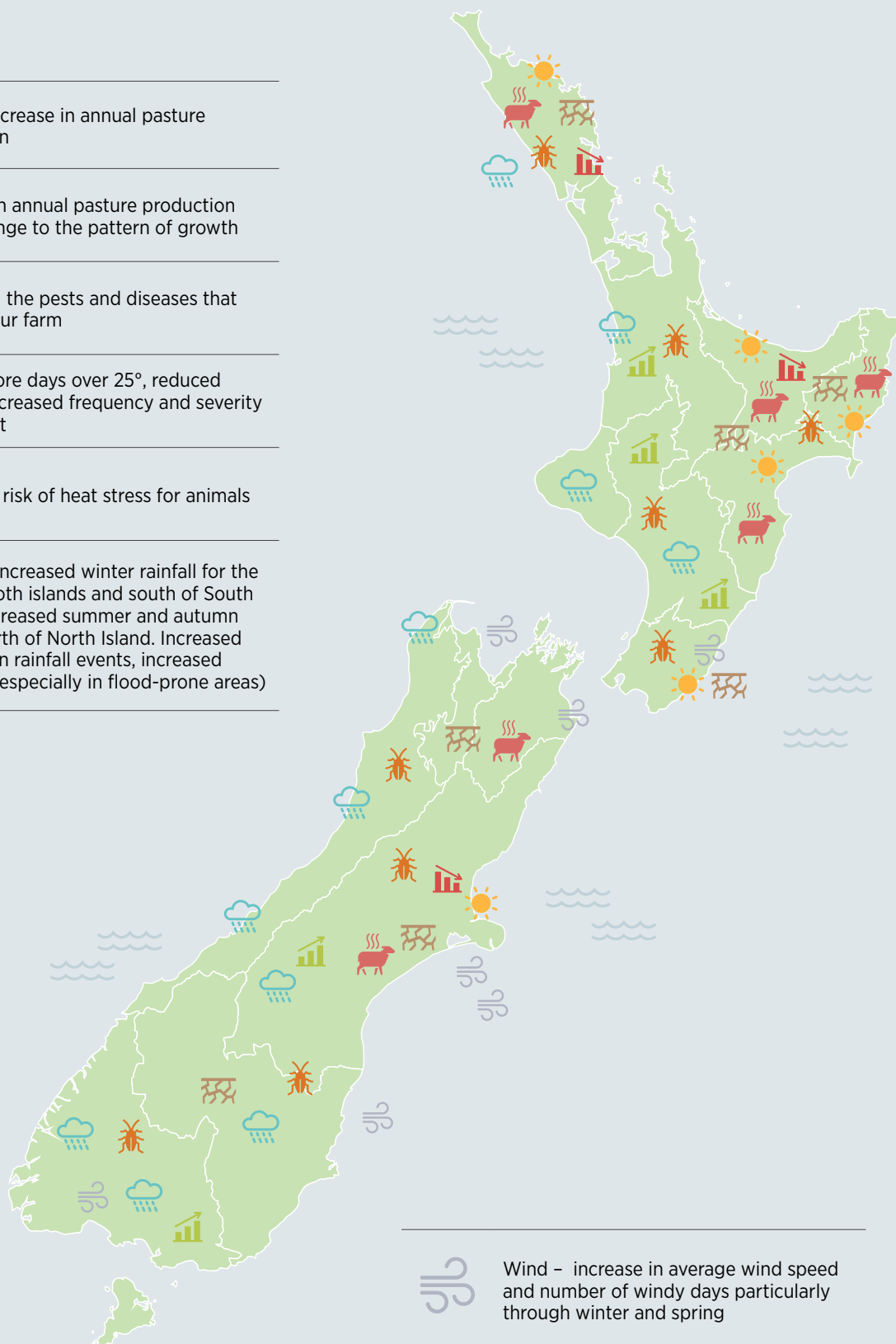
Drier – more days over 25°, reduced rainfall, increased frequency and severity of drought



Increased risk of heat stress for animals



Wetter – increased winter rainfall for the west of both islands and south of South Island. Increased summer and autumn rain in north of North Island. Increased intensity in rainfall events, increased flooding (especially in flood-prone areas)



Wind – increase in average wind speed and number of windy days particularly through winter and spring



Increased drought severity

What might Climate Change look like for New Zealand farms?

Pests and diseases, both of plants and animals

- The incidence and spread of plant and animal pests and diseases that impact your farm are expected to increase under climate change. We may start seeing instances of diseases in regions where they previously didn't occur.
- Sheep in warmer temperatures are likely to face higher disease challenge from such things as Barber's pole worm (*Haemonchus contortus*), flystrike, and fungal toxins including sporidesmin (which causes facial eczema) and zearalenone (which reduces ovulation rate in ewes).
- Facial eczema has spread further throughout New Zealand in recent years. It has direct impacts on the productivity of sheep and cattle, is an animal welfare issue and will have a negative effect on the ability of farmers to realise potential genetic productivity gains as temperatures warm.
- Barber's pole worm is a potentially deadly internal parasite that is prevalent in the northern part of New Zealand. It is predicted to spread much further south as temperatures increase.

Pasture growth

- It is likely that there will be a change in the pasture growth curve and in both the quantity and quality of feed grown. Total pasture production may increase in the south due to an extended growing season.
- Increasingly unpredictable weather cycles could lead to significant differences in on-farm production between years.
- An increase in atmospheric CO₂ will increase pasture production (modelled to increase by between 10 and 20% over the next 100 years). However, increased drought, changes in pasture composition and the potential spread of subtropical grass and pasture pests may mean that not all regions will realise this increased production and may, in fact, have decreased pasture production.
- An increase in temperature will change nitrogen cycling in the soil leading to increased winter growth rates but less growth in late spring and summer.
- A decrease in rainfall in the north and east will have a negative impact on groundwater recharge as well as irrigation and pasture production.

Pasture species

- The predicted changes in climate increase the competitive advantage of subtropical grasses (such as Kikuyu) over legumes which will change feed supply and reduce feed quality.

Pasture quality

- Warmer temperatures will result in a decline in the protein concentration of pasture. This can lead to a reduction in animal performance due to inadequate protein nutrition particularly for finishing lambs or lactating animals.
- Increases in temperature can cause a reduction in leaf quality resulting in a reduced feed intake.
- Alterations in the seasonal distribution of feed supply will require management changes such as deferred grazing. This can lower feed quality and animal performance.

How might the changed climate impact farm systems?

- Farmers may shift away from sheep to cattle due to the changes in feed quality, and the increased incidence of pests and diseases that sheep are particularly susceptible to.
- Research modelling has predicted that, in response to the changing climate New Zealand sheep numbers could decline by 9 to 38% (depending on the level of climate change), deer numbers could fall between 25 and 75% and cattle numbers could rise between 14 and 60% (McRae, 2018).
- A potential increase in cattle numbers and corresponding reduction in sheep numbers has the potential to have a negative impact on freshwater health and may increase GHG emissions if not carefully managed.
- The increased autumn and winter pasture growth may result in farmers lambing or calving earlier to make use of this changed feed supply. This will require selection of animals with the ability to have variability in their reproductive seasonality.
- An increase in the number of hot days will impact on animal and human health with issues of heat stress.

Building a resilient farm system

The unpredictability will require forward planning and the ability to respond to events and build a resilient farm system. Outlined below are some things to consider in building a resilient system.

- Know the signs of stress and have some strategies to manage stress for you and your team
- Secure water supply and water reticulation for stock (year-round)
- Ensure adequate shade and shelter for stock
- Have a proactive animal health plan
- Maintain healthy, well-fed stock year round
- Budget for adverse events – even budgeting a small amount each year can take a bit of pressure off when an adverse event hits
- Source access to a generator or back-up option for extended power loss
- Back-up for communication (e.g. old-style phone)
- Carry out regular feed budgeting and pasture assessments to assist your planning and decision making
- Retain a buffer of supplementary feed on-hand
- Consider the use of summer crops, cereal crops, specialist dryland species such as lucerne, strategic use of winter crops can all add resilience
- Review your farming system and how it aligns with changing conditions in your area, is more flexibility required, are there different crops or products that could be produced, has your pasture growth curve shifted, is the mix of stock classes and mating dates still the best fit?
- Have a drought plan. Respond early and, where appropriate, having a staged de-stocking and strategic culling process
- Consider irrigation and water storage options
- Be proactive with erosion management to limit the damage and soil loss from storms
- Retire less productive areas of your farm into appropriate woody vegetation such as native forest or drought tolerant species. Some species can also provide stock feed.

Further information can be found here:



B+LNZ Factsheets: Find these Factsheets on the B+LNZ Knowledge Hub www.knowledgehub.co.nz

- The Greenhouse effect, including long and short-lived gases
- Biogenic methane from ruminant animals and nitrous oxide from agricultural soils
- Greenhouse gas management and mitigation for sheep and beef farmers



B+LNZ Farm Plan: Environment Module

- You can download the Farm Plan, with the 'Responding to a changing climate' chapter at www.beeflambnz.com/farmplan



Additional information

McRae 2018, BRIEF COMMUNICATION: Potential alterations in New Zealand sheep, beef cattle and deer numbers due to climate change: what can genetics offer? *New Zealand Journal of Animal Science and Production* 78: 146-150 www.nzsap.org/proceedings/brief-communication-potential-alterations-new-zealand-sheep-beef-cattle-and-deer-numbers

<https://niwa.co.nz/climate-and-weather/climate-change/climate-change-adaptation-toolbox/projected-regional-climate-change-hazards>

<https://www.theaotearoacircle.nz/agriadaptation>