

Impact of climate change on *dryland pastures* opportunities for red meat producers

summary

The growth and production of well managed dryland pasture production is likely to increase under a changing climate.

This opportunity for increased pasture yield can be maximised by improved pasture management practices, using summer-active pasture species in a mixed sward and the introduction of irrigation practices.

In recent years, Tasmania has experienced some of the warmest years on record. It is highly likely that average minimum and maximum temperatures will continue to increase in the future.

What does this mean for Tasmania's red meat producers?

Dealing with climate

Over the past decade Tasmanian farmers have experienced extremely wet years, and some of the warmest and driest years on record. Scientists suggest that climate will be even more variable in the future.

Farmers need to continue to respond to immediate and short to medium term climate variability, as well as start preparing for longer term changes in climate.

This information sheet provides management actions that are available to red meat producers to maximise pasture production for intensively managed dryland pastures in response to changes in climate.

Dryland pastures and changing temperature

Projections from [Climate Futures for Tasmania](#) indicate minimal change in annual rainfall in the future. However, temperatures across Tasmania are projected to increase by approximately 2.9 °C by 2100. Relatively small changes in climate can have large impacts on agricultural production.

Projected change in temperature could have varying impacts on pasture production across all regions including:

- changes in pasture yield and quality (nutritional value),
- changes in the timing of farm operations, such as calving and lambing,
- changes in the timing of crop/pasture planting and harvesting,
- seasonal changes in pasture production,
- change in productivity within regions over time, eg an increase in productivity in regions that are currently too cold for maximum pasture production.

dryland pastures



Modelling impacts of the Tasmanian climate

Two locations where intensive red meat production is common (Ringarooma in the north-east and Cressy in the northern midlands) were used to demonstrate potential changes to dryland pasture production. An historical baseline (1971-2000) and three future climate periods: 2025 (2011-2040), 2055 (2041-2070) and 2085 (2071-2100), were selected to assess the projected climate change for each location (Figure 1 and Figure 2). The modelling is based on enterprises that are currently operating at their optimum through 'best practice' management, eg maximising ground cover and providing adequate soil nutrients.

Effects of changing temperature on pasture production

In Tasmania, dryland pastures include sown pasture species such as cocksfoot, phalaris, lucerne, ryegrass and clovers. Growth for these cool temperate pasture species is highest in spring. Modelling of phalaris, lucerne and perennial ryegrass indicated similar results under the projected climate change. For simplicity, this information sheet shows the results from perennial ryegrass pastures only.

Ryegrass pastures are most productive at temperatures below 28°C and least productive below 8°C to 10°C. Modelling results suggest that a projected increase in temperature is likely to result in an increase in the production of dryland pastures throughout the 21st century. Seasonal changes to production are projected particularly during the summer months toward the end of the century, when pasture production is likely to decrease slightly due to higher temperatures and the limitation of available soil moisture.

Locations that are currently limited by lower temperatures, particularly during winter and spring, will benefit the greatest from increasing temperatures for pasture production. Increases in ryegrass yield are projected during late winter and spring (Figure 3), resulting in an increase in mean annual yield* of 4.2 t/ha to 6.4 t/ha at Ringarooma and 4.1 t/ha to 6.7 t/ha at Cressy.

Potential management options

The first step in preparing to maximise returns under a changing climate is to change pasture management to reach current industry best practice recommendations. Farmers can also draw on their recent experiences managing for drought and floods to assess which pasture types persist in the long term on their properties.

Pasture modelling results suggest that higher summer temperatures will limit the production of cool season pastures such as perennial ryegrass during the summer months.

Photo: Kerry Bridle



Photo: Laurie Bonney

Modelled Changes in Climate and Pasture Production

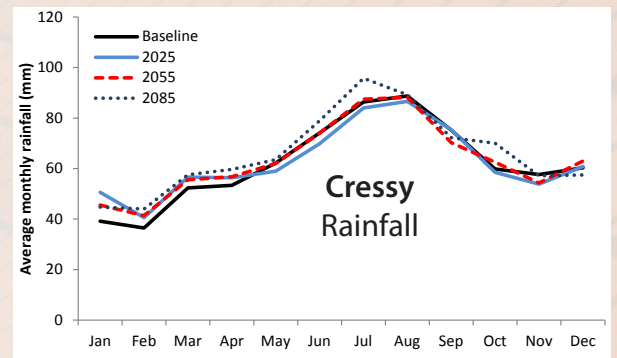
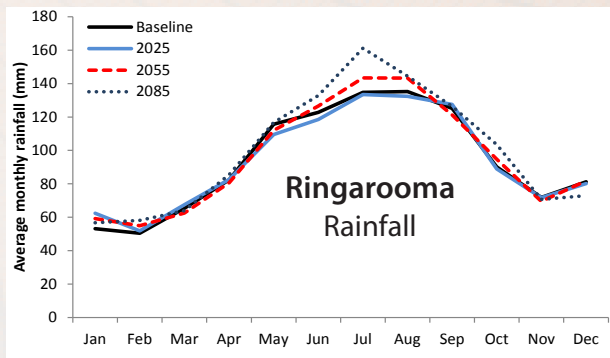
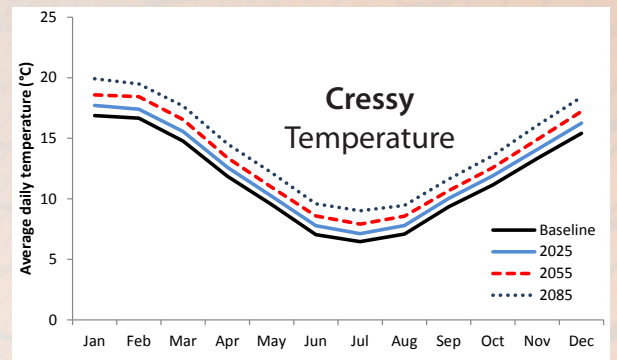
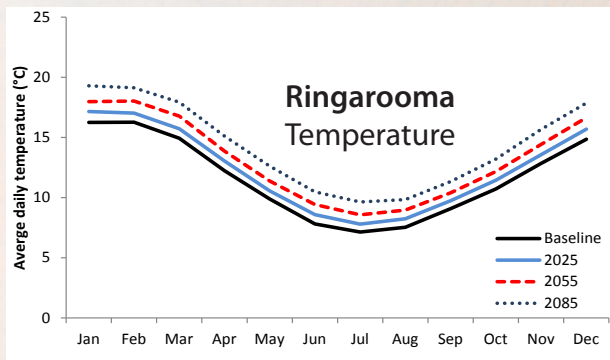


Figure 1 Projected Climate Change at Ringarooma

Projected average temperature (°C) (top) and rainfall (mm) (bottom) at Ringarooma for the baseline period (1971-2000) and three future climate periods: 2025 (2011-2040), 2055 (2041-2070), 2085 (2071-2100).

Figure 2 Projected Climate Change at Cressy

Projected average temperature (°C) (top) and rainfall (mm) (bottom) at Cressy for the baseline period (1971-2000) and three future climate periods: 2025 (2011-2040), 2055 (2041-2070), 2085 (2071-2100).

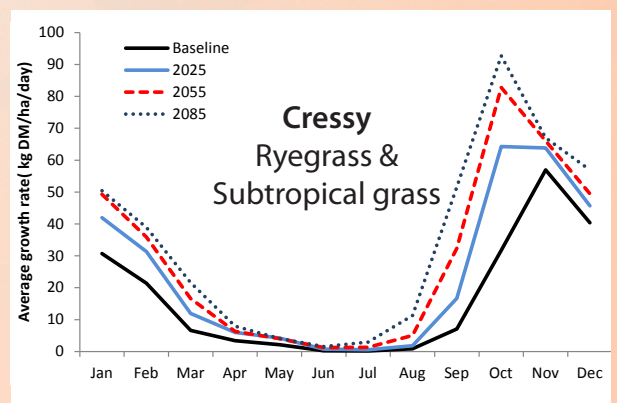
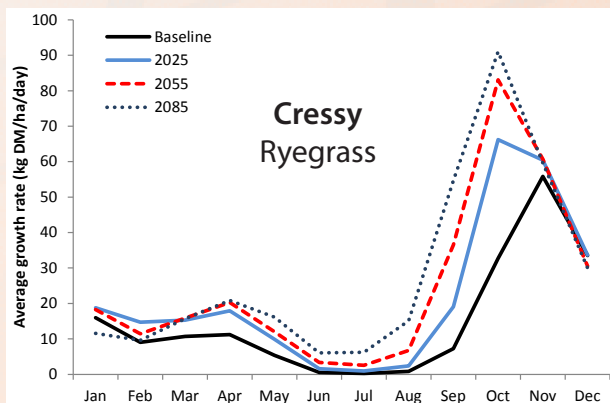
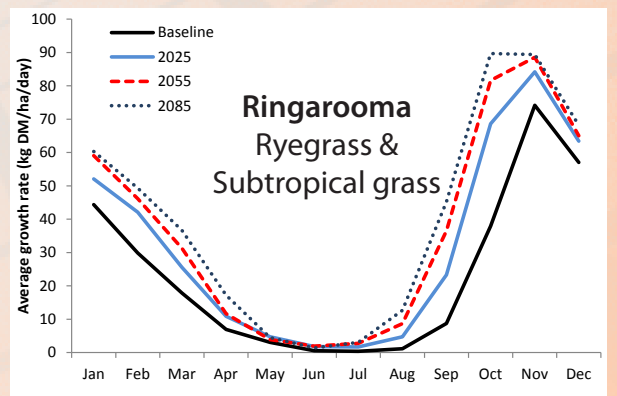
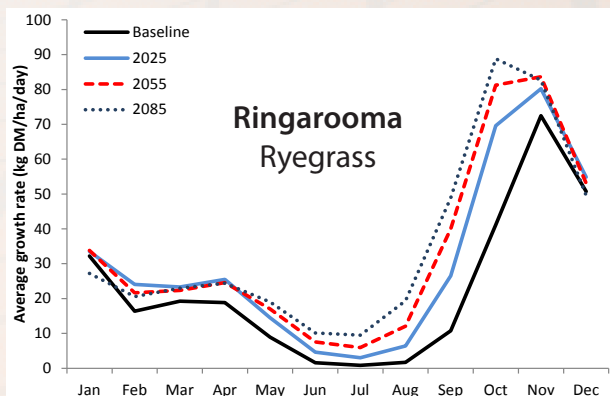


Figure 3 Projected Ryegrass Yields

Modelled average monthly yields (kg DM/ha/day) for perennial ryegrass at Ringarooma (top) and Cressy (bottom) for the baseline period (1971-2000) and three future climate periods: 2025 (2011-2040), 2055 (2041-2070), 2085 (2071-2100).

Figure 4 Projected Ryegrass and Summer Active Grass Yields

Modelled average monthly yields (kg DM/ha/day) for perennial ryegrass and a summer-active sub-tropical grass at Ringarooma (top) and Cressy (bottom) for the baseline period (1971-2000) and three future climate periods: 2025 (2011-2040), 2055 (2041-2070), 2085 (2071-2100).

* **About the data:** Yield estimates are based on maximum and minimum yields (t DM/ha/year) using six climate models.

Potential management options cont.,

The addition of summer-active pasture species into a mixed sward is likely to increase future pasture growth and production in some regions (Figure 3 and Figure 4). By 2085 the modelling results indicate an increase in mean annual yield* of 6.1 t/ha to 7.8 t/ha at Ringarooma and 6.2 t/ha to 8.7 t/ha at Cressy.

Rainfall during winter is projected to increase at both Ringarooma and Cressy, resulting in increased runoff, providing opportunities for water harvesting and storage for irrigation practices.

Short to medium-term

Farmers can look at enterprise specific options. These adaptation options will vary from region to region and include:

- optimising fertiliser strategies,
- introducing irrigation,
- sowing a well adapted pasture species and cultivars.

Long-term

There are a number of strategies that farmers may want to consider adopting. These include:

- using alternative feed sources to meet summer feed demands, eg changing fodder conservation strategies and introducing summer active species into pastures,
- changing calving/lambing times based on an earlier winter/spring break.



climate futures for tasmania

About Climate Futures for Tasmania

The material in this information sheet was developed from outputs from the Climate Futures for Tasmania project. In particular, from the Impacts on Agriculture Technical Report (Holz et al 2010).

The Climate Futures for Tasmania project was funded primarily by the State Government of Tasmania, the Australian Government's Commonwealth Environment Research Facilities Program and Natural Disaster Mitigation Program. The project also received additional funding support from Hydro Tasmania.

The Climate Futures for Tasmania project was managed by the Antarctic Climate & Ecosystems Cooperative Research Centre (ACE CRC). For more information about the project go to:



www.acecrc.org.au



This information sheet is a joint production of the Tasmanian Government and the Tasmanian Institute of Agriculture.

Further information

This information sheet is part of a series produced by TIA on the impacts of climate change in agriculture. The full suite of information sheets is available at:

www.dpipwe.tas.gov.au/climatechange

The Tasmanian Government's Tasmanian Climate Change Office (TCCO) provides information on climate change mitigation, and adaptation programs and options:

www.climatechange.tas.gov.au

Climate Futures for Tasmania reports provide information on the impacts of climate change in Tasmania on general climate, water and catchments, impacts on agriculture and extreme events:

www.climatechange.tas.gov.au

The Bureau of Meteorology provides data on weather forecasts and climate variability:

www.bom.gov.au

Meat & Livestock Australia Limited (MLA) delivers marketing, research and development services for Australia's cattle, sheep and goat producers.

www.mla.com.au

For further information to assist farmers and potential investors to allow comparisons to be made between enterprises including cash crop and livestock enterprise tools visit:

www.dpipwe.tas.gov.au/wealthfromwater

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