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Impact of climate change on *irrigated pastures* opportunities for dairy farmers

summary

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

This opportunity can be maximised by improved pasture management practices and sowing summer-active pasture species into cool-season pasture.

Rainfall projections indicate a slight increase in winter rainfall, therefore allowing greater opportunities for harvesting runoff water for irrigation supplies.

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 dairy farmers?

irrigated pastures

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 will need to continue to respond to immediate and short-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 dairy farmers to maximise pasture production for irrigated pastures in response to changes in climate.

Photo: Rachel Brown

Irrigated 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,
- changes in the timing of farm operations, such as calving and lambing,
- changes in the timing of forage/ 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.

Modelling impacts of the Tasmanian climate

Two locations where dairy production is common (Flowerdale in the north-west and Ouse in the south) were used to demonstrate potential changes to irrigated 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, perennial ryegrass and white clover are commonly used for dairy, beef and lamb production. Ryegrass pastures are most productive at temperatures below 28 °C. As temperatures are projected to rise in the future, production of ryegrass is likely to increase across the state until approximately 2050. Beyond 2050, ryegrass production is projected to decrease due to higher temperatures limiting pasture growth during the summer months.

Locations that are currently limited by lower temperatures will benefit the greatest from increasing temperatures for pasture production.

Increases in ryegrass growth rate and yield are projected during late winter and spring (Figure 3). By 2085, mean annual yield* could increase at Flowerdale by 5.3 t/ha to 6.1 t/ha and at Ouse by 1.9 t/ha to 4.1 t/ha.

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 has shown that higher summer temperatures will limit the production of cool season pastures such as perennial ryegrass pastures during the summer months, but the climatic conditions for summer-active pastures (eg sub-tropical pastures) may become more favourable over time (post 2050).

Photo: David Russell

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Modelled Changes in Climate and Pasture Production

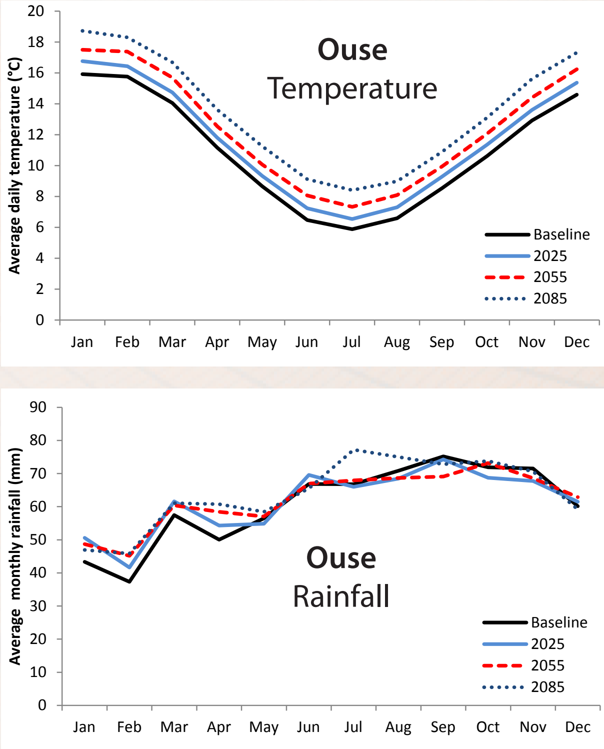

Figure 1 Projected Climate Change at Ouse

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

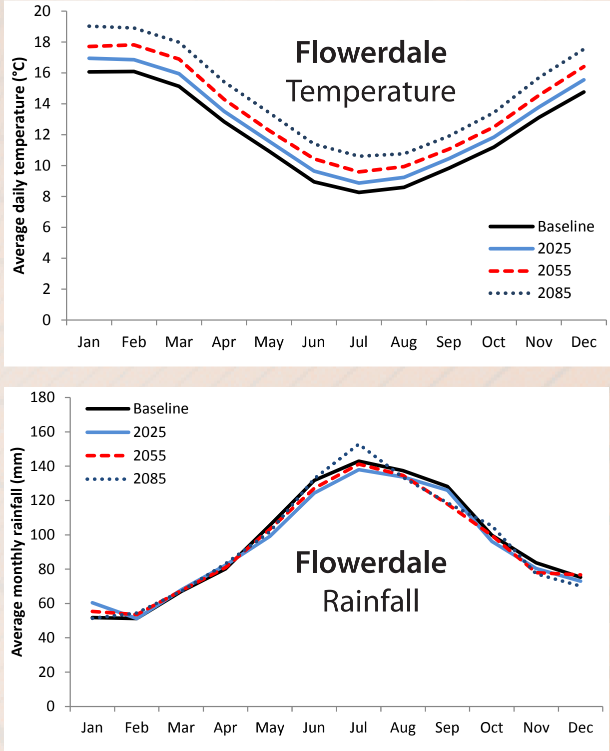

Figure 2 Projected Climate Change at Flowerdale

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

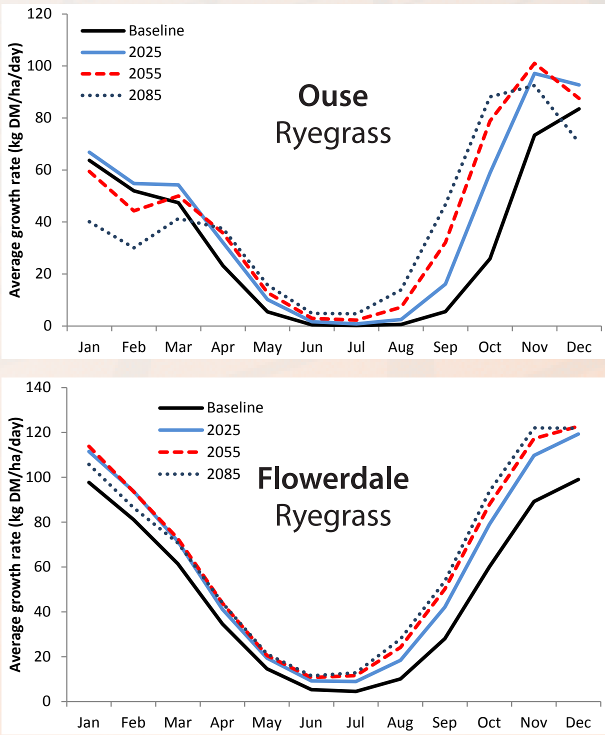

Figure 3 Projected Ryegrass Yields

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

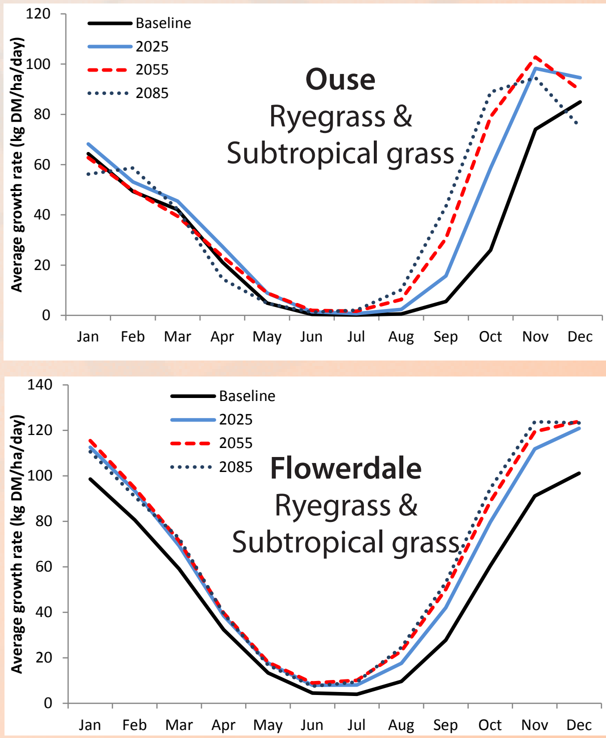

Figure 4 Projected Ryegrass and Summer-Active Grass Yields

Modelled average monthly yields (kg DM/ha/day) for irrigated perennial ryegrass and a summer-active subtropical grass at Ouse (top) and Flowerdale (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.*

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Potential management options cont.,

The addition of summer-active grass species may increase future pasture growth and yield (Figure 3 and Figure 4). By 2085, the addition of a summer-active grass to ryegrass at Ouse could result in increases to mean annual pasture yield* of 2.7 t/ha to 4.9 t/ha. At Flowerdale the addition of a summer-active grass does not increase yield.

Therefore, adaptation options which involve growing pasture grass species and cultivars with different climatic tolerances will vary from region to region.

Short to medium-term

Farmers can look at enterprise specific options such as:

- changing calving/lambing times based on an earlier winter/spring break,
- changing fertiliser strategies.

Long-term

If pasture growth rates are projected to increase during winter and spring but decrease in summer in the future, 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,
- introducing summer active species into pastures.

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

Dairying for tomorrow provides information on climate change in Australian dairy regions:

www.dairyingfortomorrow.com

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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