Resilience surfaces for pasture production under climate change scenarios

Brendan Cullen & Richard Eckard

Department of Agriculture and Food Systems
University of Melbourne

Overview

1. Climate change projections
2. Resilience surfaces for pasture production
   - Impacts of incremental changes
   - Adaptation options
3. Limitations of approach
4. Conclusions

Climate change projections for southern Aust.

- Based on A1FI emissions (highest)
- Median and range of changes shown

Year	Temperature (°C)	Rainfall (%)	CO_2 conc (ppm)
2030	1.0 (0.6-1.5)	-3 (-10 to 0)	≈ 440
2050	2.2 (1.5-2.8)	-8 (-20 to +10)	≈ 550
2070	3.4 (2.2-5.0)	-10 (-30 to +10)	≈ 710

Source: Climate Change in Australia. Technical Report 2007

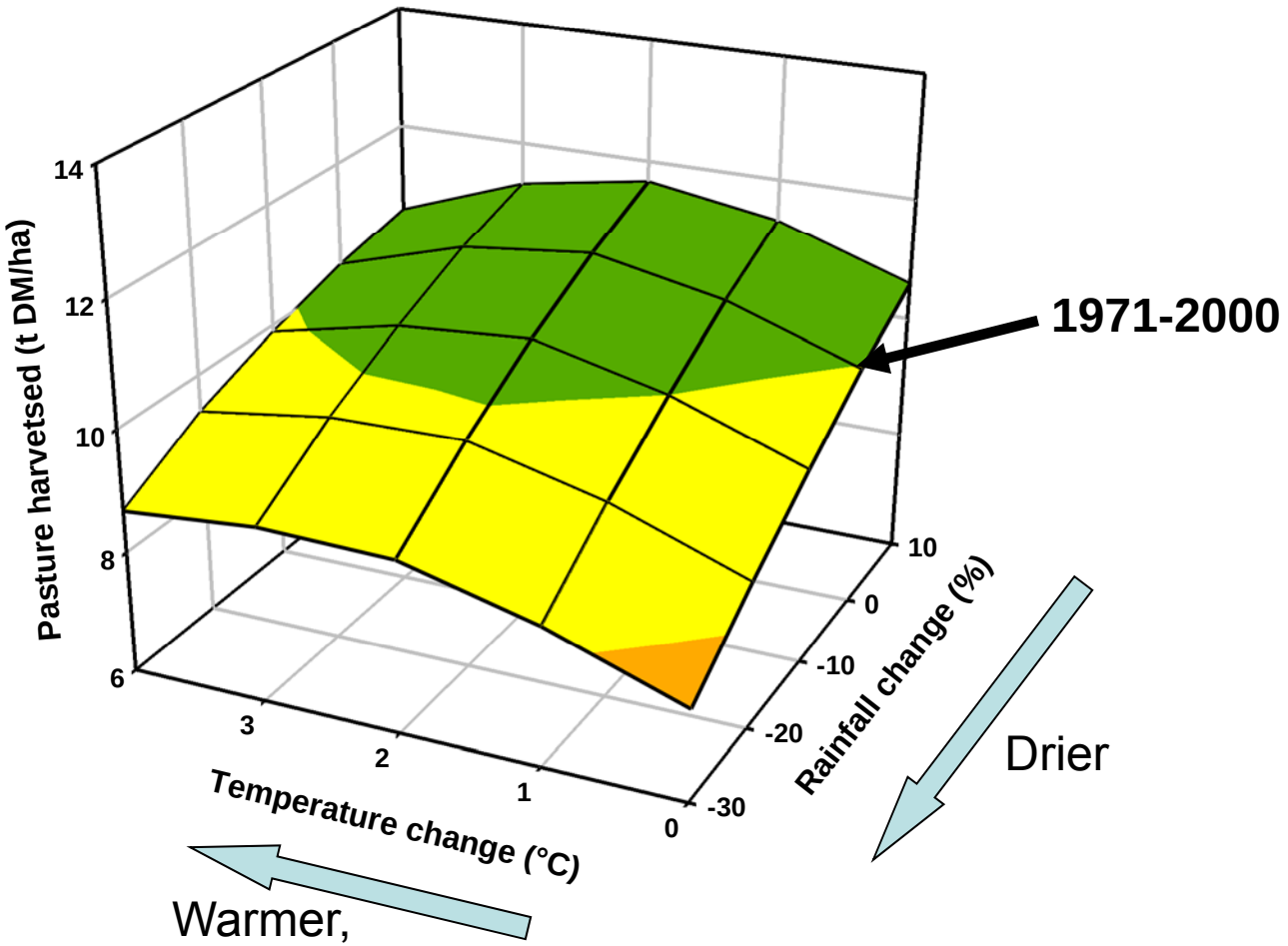
Approach to modelling climate change impacts

- IF… how will the climate change?
  - Warmer and drier across southern Australia.
  - But considerable uncertainty with rainfall.
  - Use a range of climate scenarios
    - Temperature scaled by 0, 1, 2, 3 and 4° C
    - Rainfall scaled by +10, 0, -10, -20, -30%
    - Atmospheric CO_2 concentration increased with temperature.

- THEN… what is the likely impact on pasture production?
  - Need modelling tools, like DairyMod.

Annual pasture growth in warmer & drier climates

Hamilton - perennial ryegrass, subclover



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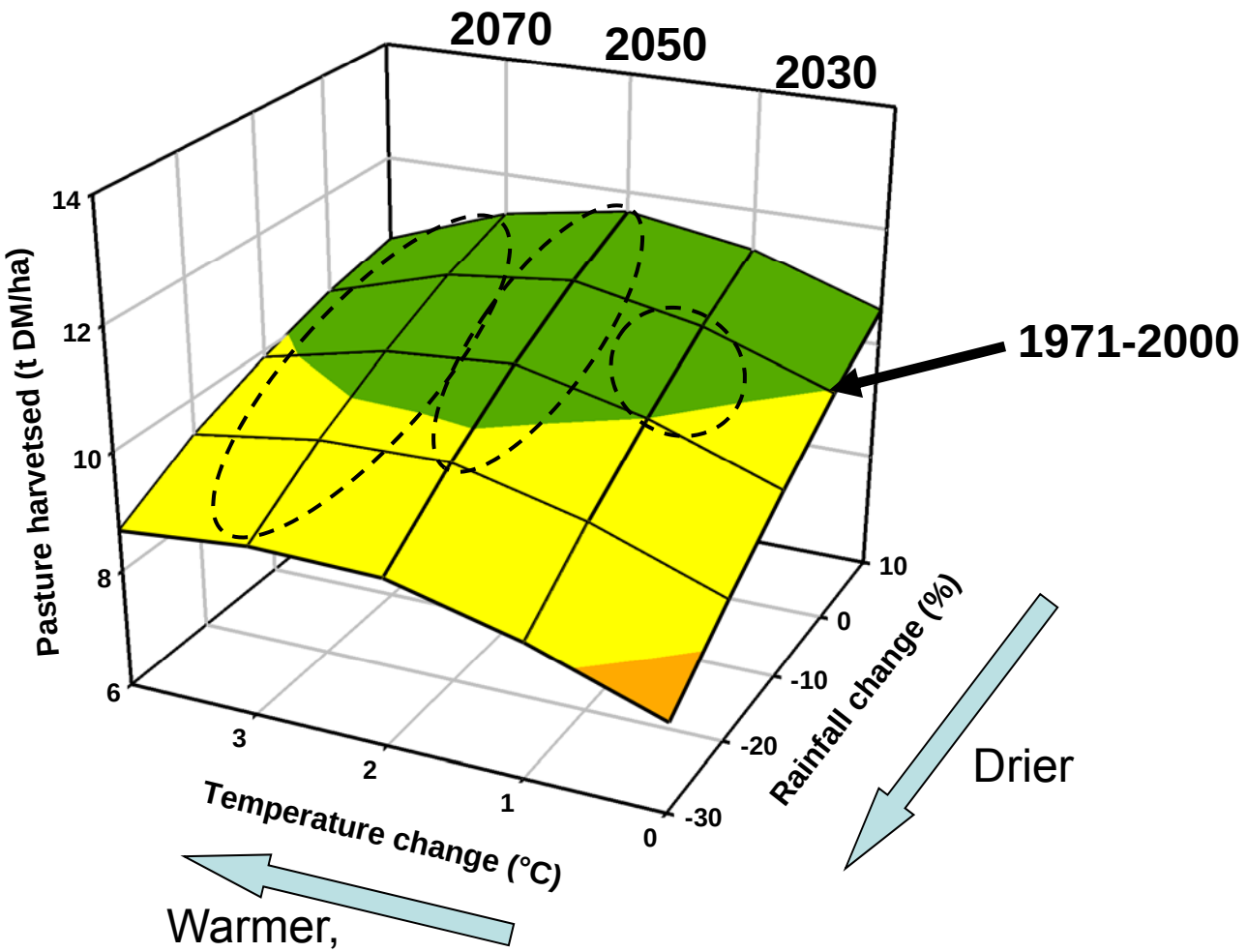
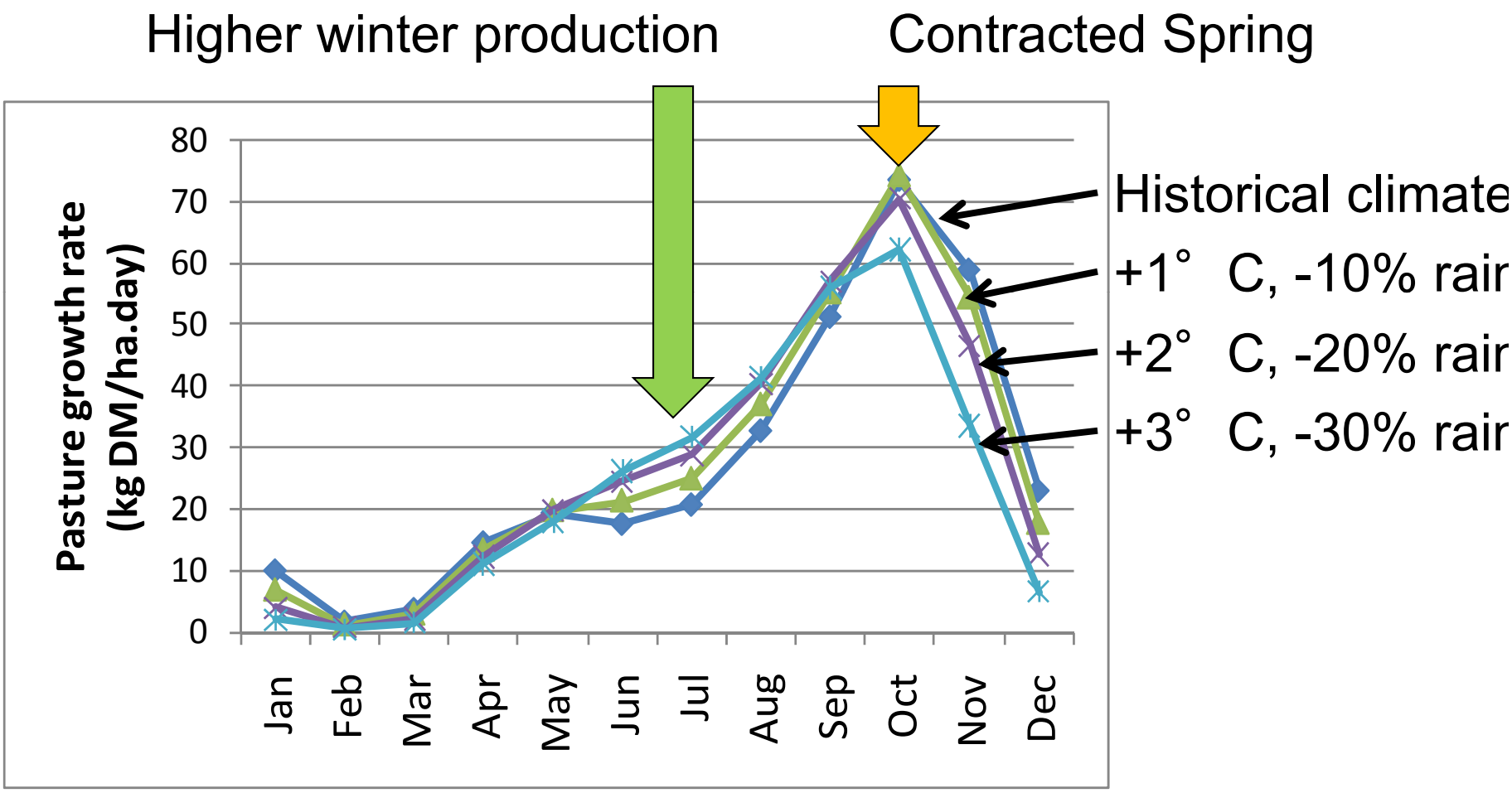


Growth rates under warmer and drier climates

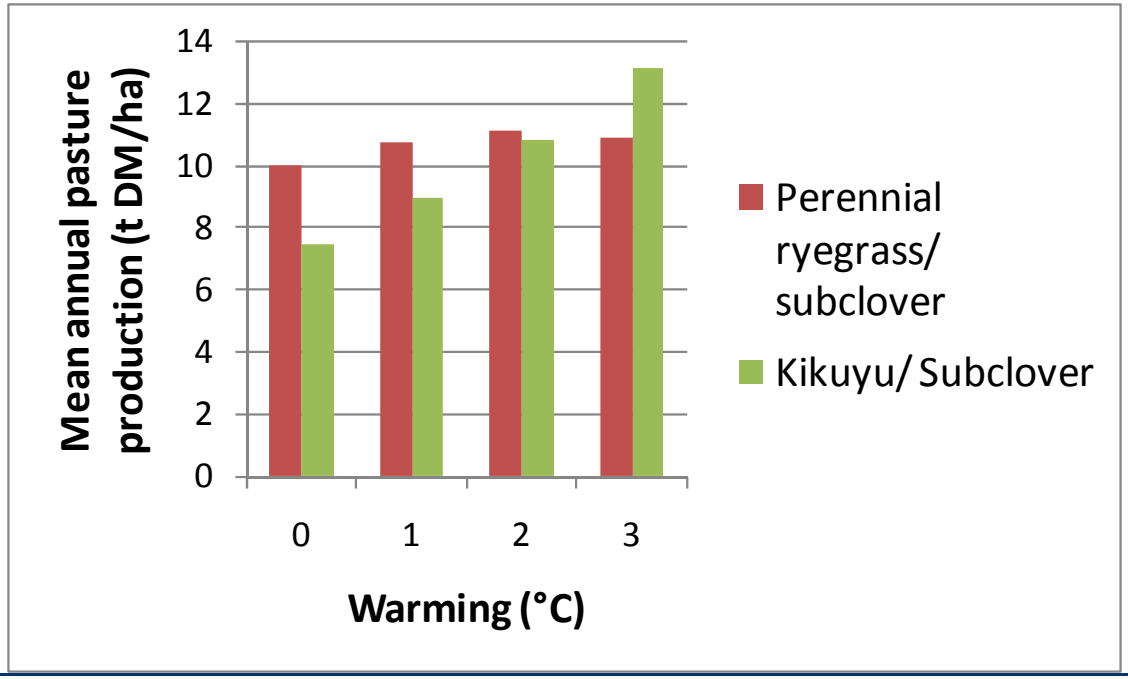


Hamilton – perennial ryegrass, subclover

Adaptation to warmer and drier climates

- Select species/cultivars with:
  - Heat tolerance
  - Higher water use efficiency, deeper roots

C_4 grasses, like kikuyu, will become more productive as the climate warms.



Limitations of approach

- Projected changes in the variability of climate are not captured
  - Eg. increased precipitation intensity
- Grazing systems models do not considered plant persistence

Conclusions

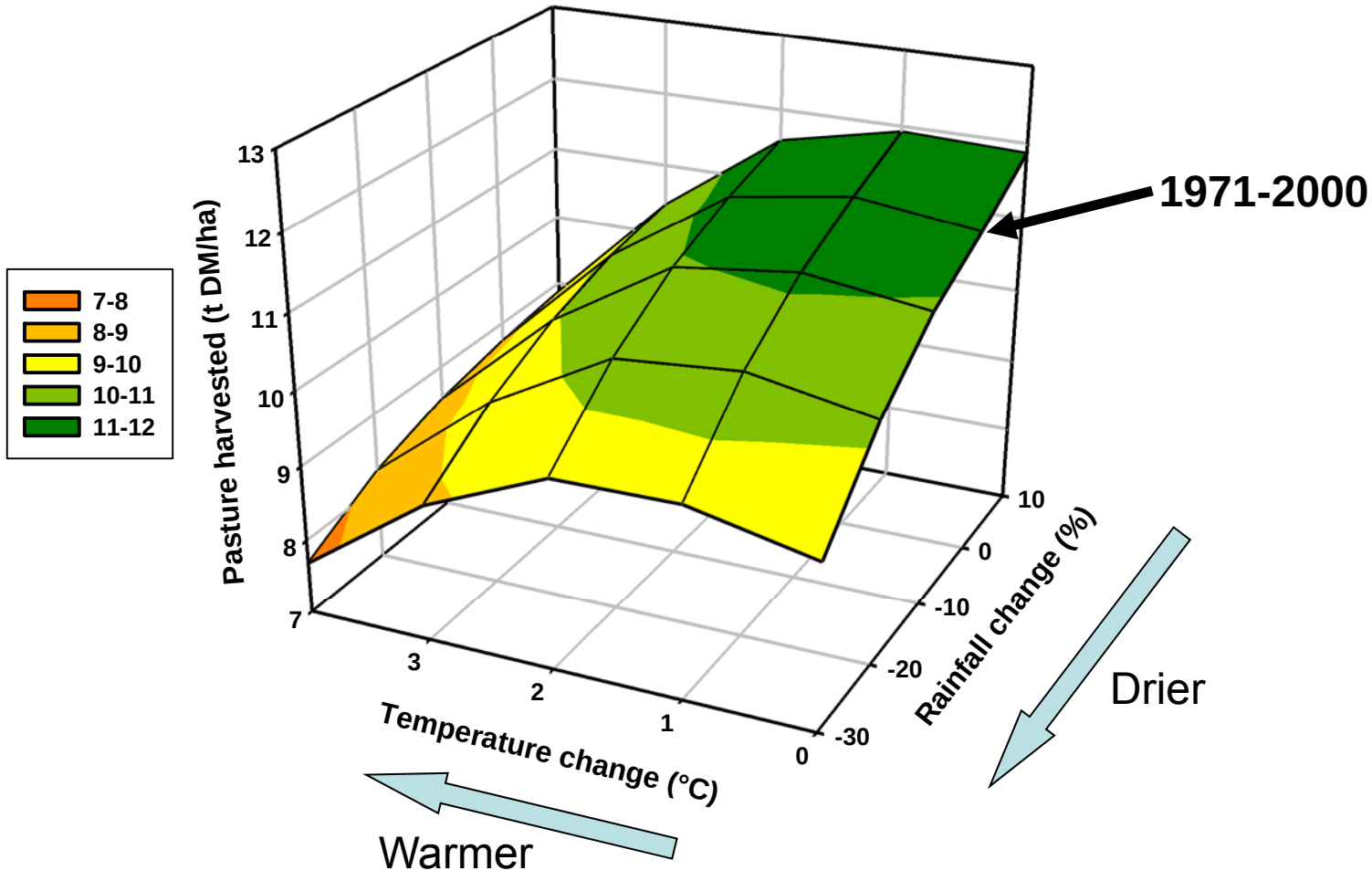
- Approach allows exploration of a range of future climate scenarios
- Pasture systems are resilient to climatic changes projected over next 20 years.
- Trend towards:
  - higher winter production.
  - shorter spring seasons.
- Heat tolerance and water use efficiency will be more important as climate becomes warmer and drier.

THE UNIVERSITY OF MELBOURNE

Brendan Cullen bcullen@unimelb.edu.au
Department of Agriculture and Food Systems

Ellinbank pasture production in a temperate climate

Ellinbank, West Gippsland



Elliott pasture production in a cool temperate climate

Elliott, NW Tasmania