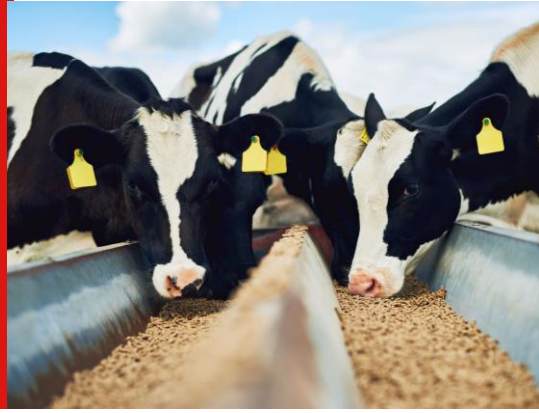
WESTPAC AGRICULTURE CLIMATE CHANGE ASSESSMENT

Canterbury Dairy Drought Study

December 2022



Summary

Key points:

Drought severity & frequency will increase, as will multi-year events.

Adaptation and planning can help mitigate the impacts of these events.

Consider options to build drought resilience into your business.

This information sheet has been prepared as part of the Westpac Agriculture Climate Change Assessment series, as assessed by Lincoln University and the National Institute of Water and Atmospheric Research (NIWA).

Westpac has engaged Lincoln University and NIWA to provide an independent assessment of the cumulative impacts on both the agriculture and horticulture sectors to better understand the physical, transition and adaptation risks and the opportunities for New Zealand from climate change.

New Zealand can expect ongoing warming throughout the 21st century. Events such as droughts have always been a risk for farmers, however, climate change is increasing the frequency and severity of these droughts. Heatwaves are likely to become more common, and rainfall patterns are expected to change with the north and the east of the North Island becoming drier.

Drought can be been defined as a 'severe decrease in water availability below what is expected', and in the agricultural sector can be measured by the level of soil moisture deficit. Droughts are characterised by their frequency, severity, duration, and extent.

The general finding is that droughts will intensify progressively in the future, resulting in an increased risk of multi-year or 'back-to-back' droughts.

Although the majority of Canterbury dairy farms are irrigated, the effects of drought will still be felt in the form of:

- Heat stress in animals
- Heat stress in pasture
- Limited feed availability
- In some cases, reduced availability of irrigation water.

Heat stress in animals can cause milk production to drop as much as 25%, and cause a significant reduction in pasture growth. Highly productive specialised breeds are often more sensitive to extremes in temperature. Animals with no access to shade are also more sensitive.

The underlying impact of drought on a pastoral farming system is reduction of pasture growth. This assessment quantified this reduction in terms of annual pasture grown and is displayed in table 1.

Table 1: Overall impact on pasture production – total pasture grown under different drought scenarios

Drought scenario	T/DM/ha	Percentage reduction
Base	16.0	
Moderate drought	14.2	-11.3%
Severe drought	12.9	-19.4%

Case study

This case study was assessed to understand varying levels of drought impact on an average Canterbury irrigated dairy farm (based on 2019/20 Dairy Statistics and DairyNZ data), of 809 cows on 233ha producing 350,000kgMS.

Modelled analysis was completed on both a moderate and severe drought, resulting in a reduction in pasture growth and additional feed and grazing costs.

In the modelled scenario, a moderate drought would cause milk solid production to drop by 10%, whereas a severe drought would see a 16% reduction in milk solids output. Although an irrigated system mitigates some of the effects of drought, the effects of heat stress in pasture and additional feed costs result in large drops in operating profits.

Canterbury is already at moderate risk of heat stress, and this risk is projected to increase by an extra 5-7 moderate heat stress days per year which will impact milk production.

Table 2: Drought Impact on a Canterbury Dairy Farm

Scenario		Cows	Cows/ha	kg MS Total	kg MS/ha	kg MS/ cow	Operating Profit ($/ha)	% Difference	GHG (T CO2e/ha)	% Difference
1	**Base farm**	809	3.4	349,135	1,498	439	$6,215		13.1	
2	**Moderate Drought**	809	3.4	315,556	1,354	397	$4,562	-26.6%	12.2	-6.9%
3	**Severe Drought**	809	3.4	292,515	1,255	368	$3,471	44.2%	11.8	-9.9%

Note: SR = Stocking Rate

Key Findings

With the knowledge that droughts are likely to increase in severity and intensity with the changing climate, this modelled scenario indicates challenges ahead for the dairy sector.

Another consideration is that dryland dairy farms in Canterbury will likely be more severely impacted than these modelled impacts for irrigated farms. This should provide further motivation for these dryland farms to act now on building drought resilience as soon as possible.

New Zealand is a major exporter of dairy products and changes in supply from New Zealand can affect global milk prices. This case study has not considered changing milk (or other commodity) prices, but in reality, they will have an impact on producer returns. Climatic changes globally may change supply from other regions as well (positively or negatively) which may change global milk price and New Zealand's market share.

Farmers commonly mitigate the effects of drought by reducing stocking rates. This comes with the caveat of reduced production and therefore profitability. Destocking does however increase feed supply for remaining animals on farm; it reduces operating costs and provides a cash injection from the sale of those stock.

The carryover impact of drought on dairy farms can be minimised provided:

- Cows are dried off early enough so that they can calve down in the new season at body condition score of 5.
- Young replacement stock are fed well enough to maintain growth rates and achieve target rates.

GHG Considerations

The New Zealand Government is working with the agriculture industry to establish an emissions scheme for the sector with a view to meeting the national emissions reduction targets. This project has considered how GHG will be affected as a result of farm-level changes to mitigate droughts. It has found lower production levels could lead to a reduction of up to ~10%. When proposed emissions prices are considered, the savings from these reduced emissions costs are unlikely to have any material impact on the dramatically reduced operating profits.

Adaptation options

Some of the adaption options for managing drought risks are outlined below.

Table 3: Adaptation options to build resilience to drought

Drought tolerant pasture species	- Incorporating some alternative species known to be tolerant to drought into your pasture rotation for example lucerne, chicory, or cocksfoot. - Using grass and brassica species that have been developed specifically for their water use efficiency.
Expand stock water resilience	- Expanding stock water storage to cater for multi-year drought events. - Install or expand reticulated water systems to use stock water more efficiently.
Livestock heat stress	- Planting more trees for shade & shelter to reduce heat stress. - Some trees also provide an alternative feed source if needed e.g. willows. - Additional benefits could be gained with sequestration credits (noting the final agricultural emissions scheme structure is still to be confirmed).
Utilise technology	- There is a raft of technology available for feed budgeting, water storage or water use monitoring, cashflow calculating etc. Use this tech to your advantage in drought events.
Farm management options	- Expand your knowledge: Build your farm management skills by joining farmer networks or using farm consultants. - Invest in carrying additional feed reserves. - Consider incorporating other land use options available that could help build resilience to drought such as growing summer feed crops on the platform (e.g. turnips or fodder beet); or tree planting for animal shade and shelter which may also qualify for ETS).
Investment	- Consider investing in a block with irrigation to provide additional drought resilience.
Consider fire risk	- Considering fire risk in your farming infrastructure and planting plans, as fire danger will be an increasing hazard with climate change.

Supporting Farmers

This research project has worked through the expected farm level effects of multi-year droughts and the associated financial impacts.

The experience Westpac has of supporting farmers across the country through many droughts is consistent with the financial findings from this project. Westpac hopes this research will help the agricultural sector build further resilience and successfully transition into a future in which climate change continues to be a significant factor.

For further information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