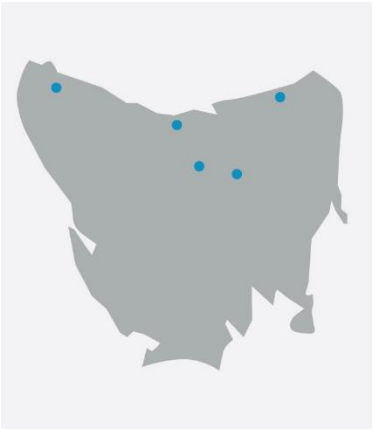
Closing the yield gap: Beyond Water Smart - Advancing Dairy Irrigation System Performance



1. What is the project about?

At the centre of this project are five optimised dairy irrigation sites linked to satellite farms across Northern Tasmania. These optimised dairy irrigation sites are providing an opportunity for farmers and service providers to work with researchers to identify and demonstrate the farm scale costs and benefits of using good irrigation practice and supporting technologies. The aim is to identify and address the yield gap resulting from poor irrigation system performance and irrigation scheduling practices.

The project is also trialling existing and new autonomous irrigation technologies that have potential to increase irrigation performance whilst reducing labour and energy costs.

Project sites are located at Lileah, Sisters Creek, Waterhouse, Meander and Cressy.

2. Why do irrigators need to know about it?

The Smarter Irrigation for Profit Phase 1 found that conducting annual system checks including pumps, getting the startup time right and avoiding the 'green drought', increased energy and water use efficiency as well as overall whole farm productivity and profitability by 30- 40% on some sites.

Currently key irrigation decisions such as start-up time, scheduling interval, irrigation depth and system performance (uniformity and energy efficiency) are often determined by simple rules-of-thumb or gut feel estimates. These sites provide an opportunity for irrigators to check their operating practices against good practice whilst building skills in how to manage existing irrigation systems more efficiently. They also provide an opportunity to assess new irrigation technologies and decision support platforms such as Pasture.io and discuss their potential usefulness for their irrigation system.

3. How will the project activities benefit irrigators?

A discussion group made up of farmers and service providers with researcher and extension support has been established for each optimised irrigation site. These groups have oversight of the benchmarking of system performance on both the optimised and linked satellite farms, provide input into the selection of technologies to be tested, and ensure recommendations are practical and cost effective. The discussion groups are also supported with professional development training.

Research activities include further testing of the autonomous system 'VARIwise', developed as part of the Smarter Irrigation for Profit Phase 1 project and evaluation of spatial measurement of pasture growth rates and soil moisture. These technologies are being assessed in collaboration with the Centre for Agricultural Engineering (CAE) at the University of Southern Queensland and other commercial partners. Smarter Irrigation for Profit 1 found existing variable rate irrigation technologies can achieve productivity gains of 30% and autonomous irrigation is feasible for dairy and has potential for wider application.

Australian Government
Department of Agriculture, Water and the Environment

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4. Key results to date

The selected strategies being used on the five optimised irrigation sites include:

- Using the Wildeye telemetry and associated dashboard and capacitance probes for soil moisture monitoring at all sites with support from AgLogic.
- Using the online Irripasture irrigation budgeting tool at all sites.
- Testing the Pasture.io platform for satellite based automated pasture growth rate data on all 5 sites to provide critical benchmarking data and to compare with manually collected data (cages and harvest cuts, plate meter and C-DAX)
- Testing a commercial decision support system (SWAN systems) that uses local soil moisture, weather and pump water flow data to assist with water budgeting and irrigation scheduling.
- Assessing autonomous variable rate technology (VARIwise) at the TIA Research farm in collaboration with the University of Southern Queensland.
- Assessing the impact of application rate and infiltration under the pivots at the optimised farms for various soil types (sand, loam and clay) to better understand the impact of effective irrigation and limitations. This analysis will inform the required engineering solutions for effective irrigation under infiltration limitations.
- An assessment of the impacts of compaction on various soil types in relation to the time grazed after irrigation and its impact on effective irrigation.

The 20-21 season focused on collection of good pasture growth rate data, soil moisture from probes and water budgets from irrigation rainfall and evapotranspiration data to assist with evaluating available and developed tools for farmers to make better irrigation scheduling decisions. The data collected has shown that the water budget tool provides a good indication of the available water within the soil profile and should be able to be used as a reliable tool for irrigation scheduling decisions.

The 20-21 season results found farmers are still making poor decisions around irrigation scheduling – particularly at the start of the season and after rainfall events. There is considerable room for improvement in irrigation practice which would lead to significantly improved pasture production under irrigation.

Detailed research trials have supported the observed impact of reduced production due to poor scheduling.

For more information visit the Smarter Irrigation for Profit and Irripasture websites and watch the webinars and videos:

- "Getting the Basics right" with Dr James Hills. Available at: https://www.facebook.com/watch/?v=4948713698479246
- "Irripasture". Available at: https://www.facebook.com/DairyAustralia/videos/164997255766191
- "Smarter Irrigation for Profit Phase 2, Beyond-water-smart-advancing-dairy-irrigation-system-performance". Available at: James Hill AW4 1080p 20mbps - YouTube
- https://smarterirrigation.com.au/using-soil-moisture-monitoring-and-data-to-maintain-readily-available-water-raw/
- https://smarterirrigation.com.au/pump-performance-webinar/
- https://smarterirrigation.com.au/weather-forecasting-and-soil-information-for-irrigation-decisions-webinar/

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