



Photo: Chris Crear (TIA)

Maximising dairy farming potential with smarter irrigation

Introduction

The Tasmanian component of the national Smarter Irrigation for Profit Phase 2 (SIP2) project, led by Dr James Hills at the Tasmanian Institute of Agriculture (TIA), integrated irrigation technologies with practical farming techniques to improve water productivity, enhance farm profitability, and support sustainable dairy farming practices.

The research team worked closely with a network of farmers in five key dairy regions from 2019 to 2022. One farm in each region was selected as an optimised site, where weather, irrigation, soil moisture

and pasture growth data were collected and reported weekly to a reference group of nearby farmers to inform their irrigation scheduling. The data was also used to measure and validate improvements at the optimised sites throughout the project. The reference groups met monthly through the irrigation season to discuss these topics.

SIP2 provided compelling evidence of the benefits of improving irrigation scheduling on pasture production and water-use efficiency. Farmers involved with the project demonstrably increased their knowledge and changed their irrigation practices accordingly.

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Tim Salter, Clear Springs Dairy, Meander

KEY RECOMMENDATIONS

- **Maintain your irrigation system, checking it before during and after the irrigation season.**
- **Know your soils, how much water they can hold, and how they change across your irrigated area.**
- **Monitor how much water your plants are using and replace with irrigation if no rainfall.**
- **Start irrigating earlier than you think at the beginning of the season and after rainfall events.**



Key takeaways for dairy farmers



Preparing for a successful season – system maintenance is key

Before each irrigation season, conduct thorough tests, inspections and maintenance of irrigation systems, ensuring all components, including pumps and pivots, are in good working order. Monitor this as the season progresses and fix on the go. To assist with this, refer to the handy pre-season checklists on [Dairy Australia's website](#).

Repeat these checks at the end of the season so that you know what needs fixing through the winter and before the next season.

Preventing the green drought by starting irrigation at the right time

Green drought describes a situation where, despite the appearance of green and seemingly healthy pastures, soil moisture levels are too low due to insufficient rainfall and inadequate irrigation causing reduced pasture growth rates. To avoid this, ensure that you:

- **Keep a close eye on soil moisture and evapotranspiration** (ET_0 , the process by which water is transferred from the land to the atmosphere by evaporation from the soil and other surfaces and by transpiration from plants) at the start of the season. Start irrigation before the soil dries out too much. You can monitor soil moisture with a properly installed probe, but regular checks with a shovel are important.
- If you have significant areas that are very wet while others need irrigating, **consider investing in drainage of the wet areas** if possible. Waiting for wet areas to dry out before irrigating can

compromise overall productivity. Investing in variable rate technology could also be an option (download the Dairy Australia [variable rate irrigation fact sheet](#)).



- After significant rainfall, your soils should be full but the amount that is available to use by the plants is often less than the total rainfall. To maintain adequate soil moisture, start irrigating sooner than you think you need to.
- Continue to monitor ET_0 and irrigate the amount that is not being replaced with rainfall.

Tools to support irrigation decisions



Several irrigation technologies are available that can support effective and efficient irrigation (some more costly than others), including:

- **IrriPasture**, a free online irrigation scheduling tool ([irripasture.com](#)).
- **Soil moisture probes** (usually installed and maintained by an AgTech provider). Alternatively, use a shovel to dig and assess the soil moisture – see the Dairy Australia fact sheet on [Determining readily available water from soil texture information](#). Even if you have a moisture probe, use a shovel to check the technology is working correctly.
- **A rain gauge**, either automatic or a simple manual read system (remember to empty the manual system when you have rain).



- **ET_0 data from a local weather station** – there should be one in your area, but avoid airport stations, which can overestimate the ET_0 from pastures. An alternative is to use the Bureau of Meteorology's gridded ET_0 data. A handy way to access this is through the SWAN Systems weatherwise daily email updates ([weatherwise.swansystems.com.au](#)).
- Other **commercial decision support platforms**, such as SWAN Systems, which assist with water budgeting and scheduling ([www.swansystems.com](#)).

Real-time data from these technologies and practices allows informed decision-making, leading to better water management and enhanced pasture growth.

Measurable benefits

Farmers adopting these practices reported significant improvements in:

- **Water-use efficiency:** Growing more tonnes of pasture per megalitre of irrigation water applied.
- **Pasture productivity:** By providing the water that pasture plants need when they need it, pasture growth increases, as long as other factors aren't limiting (e.g. nutrients, which may need adjusting given increased growth).
- **Resource optimisation:** Water, power and irrigation infrastructure are a significant cost to the business, so optimising them is highly beneficial to your bottom line.



Participating farmer perspective

Photo: TIA



Clear Springs Dairy, Meander

Tim and Fiona Salter manage Clear Springs Dairy in Meander, which won the 2019 Dairy Business of the Year award. Tim spoke about his experience working with TIA on the SIP2 project, the resultant changes he and Fiona have made to irrigation management, and the impact on the farm.

The benefits of AgTech

Since starting dairy farming in 1989, I've witnessed tremendous advances in agricultural technology. The key is to spend money in a way that lets you save or make money.

A lot of AgTech now is so easy – it's on your phone, you can get it in 5 seconds, you can turn irrigation on and off with the phone.

Using tech well saves time and improves efficiency. In the past, I would waste power and water if I couldn't turn irrigation off when it needed to be turned off. And if an irrigator stops moving but you don't know, you can waste 8 hours of water, if it's overnight, which is common because that's when you get cheaper off-peak power.

Through the use of technology, we've found we actually save more money by irrigating correctly than we were by using off-peak power. That's been a key learning for us.

One of the main tools we've used is the Environdata automatic weather station, which provides real-time data via WeatherMation on ET_0 rates, rainfall and soil temperatures. Understanding ET_0 has been crucial;

lower rates mean less irrigation is needed, conserving both water and energy.

We've installed soil moisture probes that measure moisture levels down to 40 cm, but the critical zone for us is the top 10 cm, especially for growing ryegrass on our soil type. Efficient watering in this layer has been essential for optimal growth.

Smarter irrigation is profitable

Our water application is much more precise now. Previously, we would apply 15 mm per irrigation cycle. Now, we only apply 6 mm, focusing on keeping the top 10 cm of soil moist. This has reduced runoff and wasted water, and there's less waterlogging, allowing us to grow more grass in low-lying areas.

This understanding came out of our participation in SIP2. We've learned that ryegrass thrives when the available moisture in the root zone is adequate.

This has allowed us to grow more grass using less water, reducing both our resource use and environmental impact. This approach not only saves money but is also better for the environment.

Leading farmers to water

Some farmers still struggle with over- or under-watering, which is a waste of money. Understanding the research that has gone into irrigation management gives you the confidence to base your water applications on the moisture required in your soils.

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Applying the basics

The basics are simple:

- Know your ET_0 ;
- Understand your soil profile – how much water will it hold and how much do you need to add to keep the active root zone watered (generally the top 30cm); and
- Invest in key technologies like soil moisture probes (or a shovel) and weather stations in regions that don't already have them.

Sticking to this has helped us a lot in recent years. The 2022-23 season was very good. We're growing and harvesting more grass with less water.



FURTHER INFORMATION AND RESOURCES

The Dairy Australia website includes highly relevant irrigation and soil moisture checklists and fact sheets, including:

- Irrigating to avoid the “Green Drought”
- Using soil moisture monitoring to schedule irrigation
- Optimising irrigation system performance
- Using weather forecasts to schedule irrigation



Podcasts

- Smarter Irrigation know-how taking out the guess work – DairyPod – Podcast overview of the project and recommendations.
- How smarter irrigation can boost production - DairyPod – Dr James Hills discusses the project.
- Making every irrigation drop count - DairyPod – Will Russell, a SIP2 dairy farmer from Bega, NSW, discusses his experience.

For further information, contact project leader Dr James Hills at the TIA Livestock Production Centre at james.hills@utas.edu.au.



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