Hunter Smarter Farming: Irrigating for Profit Project

TOCAL DAIRY
Plans to irrigate for profit

The business context

When it comes to managing Tocal Dairy, Centre Manager Michael Ison's job requires balancing the needs of a leading education facility with operating a farm business to make sustainable returns to the NSW Department of Primary Industries. Added to the mix, he also has plans to increase the farm's presence as a focus for regional dairy by openly investigating best practice management options and evaluating the outcomes of adoption and decisions made, especially when it comes to irrigation.

The 225 hectare (ha) farm has a milking platform of 130ha, including 80ha of mixed irrigation. After eight years of operating a year round calving herd of 200, in 2019 numbers will rise to 300 made possible because of the installation of three new Valley® Irrigation centre pivots. This major investment has allowed the operation to grow more home grown feed from the existing platform.

Tocal Centre Manager Michael Ison says irrigation developments are about growing more home grown feed cost effectively.

Profit versus production monitoring

"Our new focus is on the profitability numbers rather than production alone," says Tocal Dairy Manager, Matt Brett. "But in order to become more profitable, we need to establish better systems to collect the right data on our inputs and outputs, only then can we look at our efficiency."

In January of 2018, Tocal Dairy commenced operation of the newly commissioned centre pivots, replacing bike shift irrigation across 40 ha of mixed pasture.

Water Supply

- Surface Water Entitlement: 686 ML from Paterson River with no usage costs.
- Pumping from two locations by submersible Grundfos pumps.
- Flow-meters fitted.
- Remote control capability using the AgSense® platform on a smartphone or PC.
- Second pond effluent is shandied through the irrigation system via poly-lined piping.

The pivot irrigation infrastructure

- **Irrigator 1**: 19 ha (plus end gun), 5 span, 360^0
- **Irrigator 2:** 16 ha (plus end gun), 3 span, 360^0
- **Irrigator 3:** 4 ha (plus end gun), 2 span, 229^0

Control Panels

- Capability to segment irrigation via wheel speed manipulation. Not currently used.
- Variable rate application along the line not possible (no solenoids on nozzles).
- Panels can be controlled remotely using AgSense® (timing (on/off), rate, speed).

Current Irrigation Scheduling Decisions

- Visual inspection of surface moisture/ plant.
- Soil tension when pushing-in strip grazing posts.
- Weather information considered: temperature, evaporation, crop-coefficient.
- Standard rate of 12mm applied per day.

"With the irrigation in place during the dry spells of 2018, driving production through Nitrogen (N) use was an option for us as we were able to keep soil moisture up. However, we don't know our costs versus income in doing this."

Having no meaningful data from management of the bike shift irrigation, the 2018/2019 is an opportunity to establish benchmarks to measure efficiency gains on the 40 ha irrigated area.

At present, water and power usage/cost to operate the pivot systems is only loosely monitored making it difficult to assess costs at a per tDM unit.

"Being part of the Hunter Smarter Farming project will assist farm management to ascertain what needs to be monitored and put processes in place," admits Matt.

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2019 Planning

Irrigation Costs

Identified issue

Power (Kilowatt Hours (kWh)) and water usage (Mega Litres (ML)) costs ($) associated with pumping are not monitored. No cost/ tDM production or cost/ ML per m head ($/ML/m) calculated.

Action

All 3 irrigators are separately metered for power and flow meters are in place at both pumps. Quarterly power cost calculations are to be undertaken against water usage and DM production figures.

Note Industry benchmarks: >2tDM/ ML and 4-8 kWh/ML/m.

The Irrigation System

Identified issue

The irrigation systems were not commissioned with a full independent system evaluation undertaken. It is unknown whether Distribution Uniformity (DU%) and Uniformity Coefficient (CU%) industry benchmarks of 90% are being met. Similarly, calibration of the control panel was not undertaken using a catch-can test and flow-meter to measure actual water applied (mm) versus control panel setting (% error).

Action

Have an independent evaluation undertaken by a certified irrigation professional to avoid under and over watering which can result in unnecessary power and water usage or avoidable stress to pasture (lost production). To apply the amount of water monitoring methods/ scheduling tools specify, the system needs to reliably deliver to the capacity indicated on the panel.

Pump efficiency

During commissioning, pump efficiency testing was not undertaken with the full system in operation.

Action

Assess the efficiency of both pumps under usual operating conditions and evaluate against the performance chart. Pump performance has a direct relationship with power usage and cost.

Note Industry benchmark: > 70%.

The Hunter Smarter Farming: Irrigating for Profit Project wishes to acknowledge that this information sheet has been prepared by Marguerite White of ICD Project Services.

Irrigation Scheduling

Identified issue

A vital piece of information for deciding when to commence irrigating is the amount of water stored in the soil. If there is not enough water in the soil, the pasture will not develop, N applications can be wasted and long-term soil moisture deficits throughout the irrigation season will likely occur. Conversely, over irrigating can lead to waterlogging of soils and wastes expensive water and power inputs.

Action

Work with a trusted irrigation agronomist to select and install soil moisture monitoring equipment and provide ongoing monitoring and interpretation support.

The location of the equipment should be determined using baseline studies such as a EM38 survey and soil characterisation. Probe information should be representative of the majority soil type/ characteristics of the irrigated area.

Telemetry which provides an easily accessible data platform from a smartphone is essential for real-time decisions and where multiple employees may be involved in scheduling decisions.

Identified issue

No formal water balance tool which uses local weather data is used.

Action

The Scheduling Irrigation Diary (SID) for Dairy should be used for better predicting irrigation scheduling and rate of application, along with consideration of the in-situ moisture monitoring. As there is a weather station located at Tocal, this tool would provide a high level of confidence in recommended water rates and timing based upon the entered crop co-efficient (Kc) of the shallowest rooted pasture grass.

The SID would also provide a good central platform for all employees to enter water usage data.

Continue to follow the plans and decisions of Tocal Dairy as the business improves monitoring and evaluation of available data to identify and assess irrigation efficiency and profit opportunities.
Visit: www.hunter.lls.nsw.gov.au (Smarter Farming)

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