



Australian Government

Department of Agriculture
and Water Resources



This project is supported by funding from Dairy Australia and the Australian Government Department of Agriculture and Water Resources as part of its Rural R&D for Profit programme.



Smarter Irrigation for Profit

A national partnership project led by the CRDC

Welcome to Open Day 2 of the “Tamworth Optimised Dairy Irrigation Farm”

Property of Rex Tout, Limestone Park, Loomberah



Local Land
Services
North West



DAVEY



Department of
Primary Industries



Program for the day

Morning Session

Welcome & Project Overview (Marguerite White & Rex Tout)

Irrigation System Evaluation & Soil Moisture Monitoring Technology – what have we discovered? (Peter Smith, Project Irrigation Consultant)

Has more informed decision making driven production outcomes?
(Scott Woods, Project Agronomist & Rex Tout)

Toilet/ coffee break (10 minutes)

Smart Automated Irrigation- Increasing farm profit through efficient use of irrigation input to dairy pastures

Key note speaker: Dr James Hills, Tasmanian Institute of Agriculture

12.30 Lunch (30 minutes)

Afternoon Session

Farm Walk

Pasture/ Crop planning V irrigation decisions (Scott Woods/ Peter Smith), Monitoring Equipment, Smart Water Pumping (Joel Gresham, Davey Water Projects), Fertigation (Adam Stent, Solar Injection Australia)

Smarter Irrigation for Profit

Three year partnership between the major irrigation industries of:

- Cotton
- Dairy
- Rice
- Sugar.

Targeting 3000 irrigators to improve their individual enterprise profit by \$20,000-40,000 per annum & 10- 20% improvement in water efficiency.

The project consists of three components:

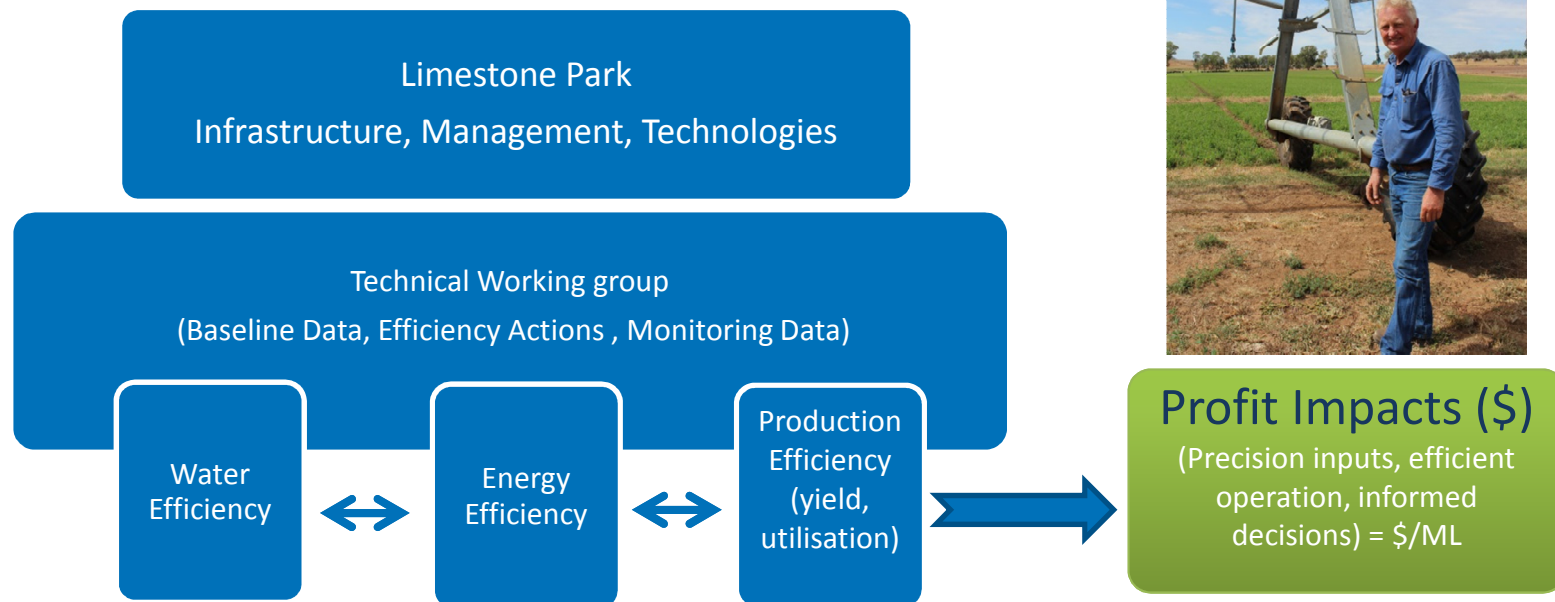
- Practical, reliable irrigation scheduling technologies
- Precise, low cost automated control systems for a range of irrigation systems
- A network of farmer managed learning sites located in major regions referred to as “optimised irrigation” farms.

Dairy Industry- “Optimised Farms”

The dairy sites will enable farmers and their advisors to gain the knowledge, skills and confidence to make major water investment decisions and manage them effectively.

- 💧 Each site will be characterised via detailed mapping including elevation, contours, Electromagnetic conductivity (if appropriate) and soil description (bulk density, soil moisture retention curves at depths and associated texture).
- 💧 Each site will be deployed with appropriate monitoring equipment including weather, soil moisture and soil temperature.
- 💧 The water, energy and labour savings associated with adoption of innovative irrigation technologies and the associated management/skills requirements, maintenance costs and labour and lifestyle implications of each technology will also be quantified.
- 💧 50k over two irrigation season
- 💧 2 field days, 2 workshops to focus on extension of technologies of interest to the wider community.

Tamworth Optimised Dairy Irrigation Farm



Technical Working Group

- Brett Abrahams (Irrigation technician, *AquaNorth Irrigation*)
- George Truman (Senior Mixed Farming Systems Officer, *North West LLS*)
- Rex Tout (Farm Owner)
- Scott Woods (Consulting Agronomist, *Hazell's Farm & Fertiliser*)
- Sally Balmain (Animal Officer/ Data, *North West LLS*)
- Peter Smith (Irrigation Consultant, *Sapphire Irrigation*)
- Marguerite White (Dairy Australia engaged Project Manager, *ICD Project Services*)



Local Land
Services
North West



Monitoring efficiency gains

What	Frequency	Tool	Responsible Party
Crop Coefficient (Kc) entered into SID	Seasonal	Annual Forage & Fodder Plan	Agronomist Scott Woods
Nutrients (NPKS, rate, application, \$/ha)	Application Events	Nutrient Management Plan	Agronomist Scott Woods/ Rex Tout
Eto, Temperature	Real Time	Tamworth BOM linked to Scheduling Irrigation Diary (SID)	Rex Tout (Smartphone App)
Soil Moisture & rainfall	30 minutes	Tain Soil Moisture Probes/ tipping bucket on site (x3)	Rex Tout (Smartphone App synchronisation)
Crop Water Requirements (Etc) mm/ Refill Point- Irrigation Scheduling	Monthly	Combination of above tools (Farm irrigation consultancy sessions conducted monthly)	Rex Tout/ Scott Woods/ Peter Smith (Sapphire Irrigation)
Biomass yield per Irrigator (Water Applications (mm/day), total use (L), & hrs) = kgDM/ ML Water under each irrigator	Daily/ Monthly	Irrigator control panels/ SID	Rex Tout
Biomass yield/ cost (tDM/ha) & growth rate (kgDM/ha/day) = Energy (kWh)& Water Use (ML)/ tDM, cost \$/ tDM	Per grazing rotation or crop harvest	C-Dax Pasture Meter used on established measurement plots	Agronomist Scott Woods/ Rex Tout
Energy Use (kWh/ kL Milk, Energy Cost \$/kL Milk, Energy Cost \$/ ML Water	Quarterly	Power Bills/ MG Milk Statements	Marguerite White
Water Use (Farm Data/ Milk Production) (ML/ kL Milk & ML/tMS)	Quarterly	Surface & Groundwater Statements/ MG Milk Statements	Rex & Marguerite



- IrriSAT monitoring/ validation
- Monthly Irrigation Report- bringing it all together
- Monsoon IQ intelligent pump controller -remote monitoring of the pump and drive

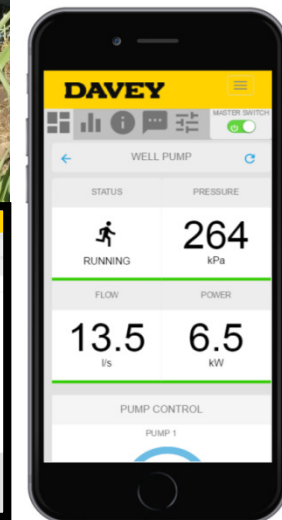
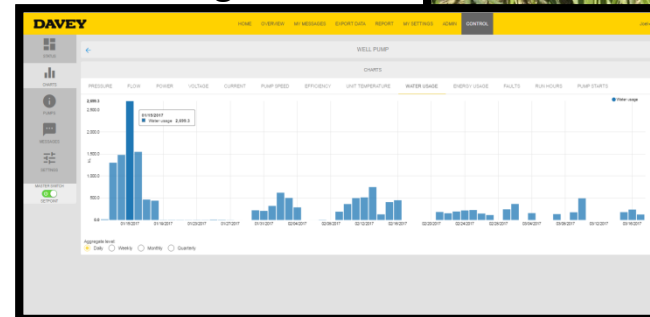
Baseline Investigations

- 💧 Irrigation System Performance Report (Sapphire Irrigation Consulting)
- 💧 Irrigation System Performance Recommendations
- 💧 Water Meter Validation Report
- 💧 Preparation of the Forage & Fodder Plan, Nutrient Management Plan (soil fertility testing/analysis)
- 💧 Farm mapping (layout & infrastructure)
- 💧 EM 38 Mapping (electromagnetic mapping)
- 💧 Soil Description/ characterisation (soil coring & analysis)
- 💧 Soil Moisture Probe & tipping bucket rainfall gauge installation (Real Time logging capability)
- 💧 Scheduling Irrigation Diary (SID) integration of Tamworth BOM by USQ
- 💧 Collation of Historical Farm Energy, Water & Production Data



Past year activity

- 💧 Recommendations of the First Irrigation System Performance Report implemented
 - Two new purpose fit pumps & drives installed (Aquanorth & Davey)
 - “Monsoon IQ” intelligent pump controller fitted to the system (Davey)- remote monitoring & control
 - System Recalibration
 - Correct nozzle packs installed and sprinklers amended
- 💧 Installation of a new smart power meter
- 💧 Comparison Second Irrigation System Performance Report
- 💧 Annual Preparation of the Forage & Fodder Plan, Nutrient Management Plan (incl. fertigation)
- 💧 Updating of farm mapping (layout & infrastructure)
- 💧 Ongoing soil moisture monitoring (x 3)/ rainfall monitoring
- 💧 IrriSAT data analysis (DPI NSW)
- 💧 Monthly Report for broad distribution
- 💧 2 day study tour to local Cotton regions



The cost of not metering power..... accurately.



Period	Days in period	Peak		Shoulder		Off Peak		Total Usage	Total Cost	Average Per Day	
		Usage	Cost	Usage	Cost	Usage	Cost	kWh	(\$)*	Usage	Cost
		(kWh)	0.2978	(kWh)	0.3158	(kWh)	0.1654			(kWh)	(\$)
19/01/2015	93	15,966	4,755	0	0	3,263	540	19,229	5,294	207	57
		(kWh)	0.2455	(kWh)	0.265	(kWh)	0.1465				
19/01/2016	95	10,473	2,571	0	0	5,873	860	16,346	3,432	172	36
		(kWh)	0.2969		0.2969	(kWh)	0.1705				
16/01/2017	91	2,393	710	4,001	1,188	12,825	2,187	19,219	4,085	211	45

- Data is for the same irrigation season period over three years.
- Although there has been a fall then rise in power costs, the 2015 and 2017 data provides two periods where similar power usage and similar pricing structure was in place, however, the cost per day is 21% less in 2017 than in 2015 (\$1,200)- the difference being correct meterage!

Usage/ Cost 2015/2016 Baseline V 2016/2017 YTD

Irrigation & Stock water power meterage

*not including gst, on time discount & service to property fee

15/16	63,323.2 kWh \$16,444.58
16/17 (287)	31,454 kWh \$6881.224

Energy Use- 173kWh/ Day or 60 kWh/ kL Milk
109.6 kWh/Day or 36.57kWh/ kL Milk

Energy Cost*- \$45.05/ Day or \$15.74/ kL or 2.93% milk income
\$24/ Day or \$8/kL or 1.8% milk income

Surface & Ground Water: new flow meters installed May 2016

Entitlement Surface= 249 ML
Usage= 0 ML (14/15)

Usage= 43.1 ML (15/16)

Entitlement Groundwater= 212ML
Usage= 126.9 ML (14/15)

Usage= 126.9 (15/16)

Cost
\$22.58/ML

\$31.57/ML

- 0.163ML/ 1000L \$5.15/ 1000L (15/16)- approx. 3% income
- Power= \$96/ ML (15/16)- approx. 0.96% income

Incomplete Water Data at this stage of the project to make compare 16/17- +10% surface water usage charges